Evaluation of the Impact of the ASSP (*Accès aux Soins de Santé Primaires*) Project in the Democratic Republic of Congo

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Executive summary

Purpose: The purpose of this report is to present the results from a mixed-methods evaluation of the impact of the DFID-funded ASSP (*Accès aux Soins de Santé Primaires*) project on selected population, health, and nutrition outcomes. It is hoped that the results will be useful in informing the design of future health programs supported by DFID, the Ministry of Health, and other stakeholders.

Background: When the ASSP project began in 2012, the DRC was emerging from four decades of conflict and related mismanagement that had devastating effects on the economy, institutions, and the people. In the period from 1998 to 2012, it is estimated that over 3.5 million people died as a result of the conflict. In 2011, gross national income per capita was USD 190 and 71 percent of Congolese lived below the poverty line of USD 1.25 per day. Although the country was relatively more peaceful in 2012, a crisis involving several armed factions persisted in the eastern part of the country and there remained longstanding political tensions.

Despite the need for a more responsive health system, the ability of the government to provide access to health, population, and nutrition services of sufficient quality was limited, due to health workforce challenges, lack of transportation and communications infrastructure, security challenges, and limited health financing. At the beginning of this decade, the government spent only about four percent of the national budget on the health sector, which was among the lowest levels of health spending in the world, and there was a large concern that as much as 70 percent of the population had little or no access to the health services resulting from both physical and financial barriers.

By the early 2010s, health indicators had improved compared to much lower levels experienced during the mid-2000s. Nevertheless, according to the 2013-14 Demographic and Health Survey, under-five mortality (104 deaths per thousand) and maternal mortality (846 per 100,000 live births) remained very high, while the current use of modern contraceptive methods among women of reproductive age was only 8 percent. The nutritional status of children was also found to be extremely poor, with an estimated forty-three percent of children under age five being stunted, and 23 percent being severely stunted.

Program Description: As part of its program to assist the government in strengthening the country's health system, DFID awarded the five-year ASSP project to IMA World Health and its implementing partners and subcontractors in 2012. Aimed to improve reproductive, maternal, neonatal and child health (RMNCH), ASSP was a complex project, consisting of a wide array of population, health, and nutrition programmatic interventions and health systems strengthening interventions with multiple interacting outputs and impacts.

ASSP initially worked in 56 health zones that were purposively selected. These consisted of all the health zones that were part of the Access to Healthcare Program (Maniema (10), Kasai Central (3), Tshopo (3) and Sud Kivu (4)) and 36 additional health zones in Nord Ubangi, Kasai, and Kasai Central, which were considered to have relatively weak health systems. Of these 56 health zones, the four health zones from Sud Kivu were dropped after one year, leaving 52 health zones in the project. An estimated nine million people live in these health zones.

Methods: The evaluation employed a mixed-methods design. The quantitative component of the evaluation used a quasi-experimental panel design with constructed treatment and comparison groups. Both descriptive and multivariate analyses were carried out. The multivariate analysis used a difference-in-differences approach based on population-based surveys consisting of household, women, health facility, and health worker modules administered in 2014 and 2017, which was expected to be the final year of the project. All survey modules were administered face-to-face using paper forms or electronic devices.

The original study design called for the impact evaluation to be carried out in all five ASSP provinces. A baseline survey was conducted in all five provinces as-planned, but in 2017, civil unrest in two provinces, Kasai and Kasai Central, prevented the research team from returning to these provinces for the endline survey. To compensate for the loss of Kasai and Kasai Central, additional sampling areas were selected in the three remaining provinces to preserve the power of the analysis.

Qualitative data were also collected at the time of the endline survey using key informant interviews, in-depth interviews, and focus group discussions among a broad range of stakeholders and beneficiaries. The purpose of the qualitative component was to explore perceptions of stakeholders on project implementation in three areas – maternal health, child health care, and child nutrition – and reasons why selected strategies worked or did not work.

Results: Overall, the results of the evaluation suggest that the ASSP project had a positive impact on several outcomes, including reducing the incidence of childhood illnesses (fever and suspected pneumonia), improving rates of deliveries in health care facilities among pregnant women, reducing out-of-pocket expenditure for outpatient care, and increases in improved sources of water and sanitation. However, the effects of the ASSP project were found to be insignificant for most of the outcomes analyzed, and for some outcomes, such the use of ANC services, facility-based treatment of children with symptoms of ARI and fever, and stunting were found to be negative and significant.

The report discusses the weight of the evaluation results by triangulating the results with other sources of evidence, including routine programmatic data made available from the project as well as data from other population-based surveys.

Limitations: In interpreting the results of the study, several potential limitations of the research design and data should be noted. First, a “gold standard” randomized control trial was not feasible for this evaluation because the target health zones were selected non-randomly. Second, the limited availability of health information system data at the time the study was designed meant that the matching of comparison groups could be done on only four characteristics. Third, due to unforeseen delays in obtaining approval of the research protocol, data collection for the baseline phase was delayed by ten months after launching of the ASSP project, which meant that the results of the difference-in-differences approach for some outcomes, such as maternal and child health care utilization, outpatient health care utilization, and use of modern contraception services, may be biased towards the null hypothesis. Fourth, while the study was powered to detect overall differences between intervention area and matched comparison areas at the household- and individual-levels, it was not powered to detect differences stratified by population sub-groups (i.e. wealth groups and provinces). Nor was the analysis powered to detect differences in facility-level characteristics. Nevertheless, population sub-group DID models and facility-level DID model were estimated and presented in order to aid in the interpretation of the study findings, and in some instances, the DID results from these models were found to be statistically significant. Fifth, in interpreting the results, it should be noted that the analysis excluded Kasai/Kasai Central, the provinces where ASSP had the highest level of activity, the greatest number of health zones, and according to ASSP routine program data, the most active uptake of some services. Sixth, an assumption of the DID model is that the only systematic difference between the ASSP and non-ASSP groups relates to the exposure to the ASSP project. As mentioned above, this assumption may not have been met, as the World Bank introduced its new project *Projet de Développement du Secteur de Santé,* which focused on performance-based financing to improve the delivery of health and family planning services, in some of the non-ASSP health zones. Although statistical controls were used to account for this possible bias, it must nonetheless be considered a potential limitation.

In addition to the research limitations described above, several contextual issues should also be considered when interpreting the evaluation results. Since 2013, political tension and violence repeatedly and significantly interrupted ASSP operations, and in 2016, substantial civil conflict occurred in Kasai and Kasai Central, which hampered ASSP operations between August 2016 and July 2017, and as mentioned above, prevented the ability of data collectors for this evaluation to return to Kasai to carry out the endline survey. In addition, provinces in eastern DRC, specifically Ituri, Nord Kivu, Maniema and Sud Kivu, experienced insecurity during the ASSP project due to several instances of political violence. These attacks slowed down ASSP operations as caution was exercised to minimize the exposure of staff members to militia violence.

Recommendations: Based on the study findings, the following are recommendations to consider for future DFID programming.

- More formative research focused on community perceptions and needs. This recommendation is based on the qualitative research findings indicating that 1) perceptions of low quality of care as well as cultural practices and social norms are important factors that constrain the use of facility-based maternal and child health care services, and 2) time constraints, lack of availability of caregivers, stigma associated with having a malnourished child, and other factors adversely affecting the uptake of the project's home gardening approach to improving child nutrition. More use of formative research would allow for greater consideration of geographical and cultural differences, and adaptations in the design of program approaches to better coincide with contextual conditions.

- More focus on incorporating behavior change and communications strategies in the design of interventions. This recommendation is based on limited attention that such interventions received in the ASSP approach, as well as on qualitative research findings that suggested that behavioral factors limited the uptake of key ASSP interventions.

- More programmatic emphasis on the role that changes in provider payment strategies (i.e. changing how facility- and community-based health workers are paid) can play in influencing health worker motivation and incentives, and in turn, service quality and availability. This recommendation is based on the qualitative research findings indicating that reductions in pay in Maniema may have had the unintended consequence of reducing health worker motivation of both community-based and facility-based health workers, and as a result, the quality of health services.

- More use of piloting to inform decisions on whether and how interventions should be scaled up, particularly for experimental community-based interventions that rely on untested assumptions regarding community and health worker behaviors, and more emphasis on monitoring and evaluation of those interventions. This recommendation is based on the results indicating limited uptake of the home gardening approach as well as the community-based health financing approach, investigated through a separate operations research study, that was intended to mobilize household pre-paid premiums for local health centers.

- More programmatic emphasis on supervision of local health officers and health workers and on improving the collection, availability and use of routine data, beyond the data that is available in the DHIS2. This recommendation is based on findings from the qualitative research component of the study that indicated that limited supervision of health workers may have played a role in constraining the use of ASSP-supported interventions, and findings from an operations research study on the project's community-based financing strategy that indicated problems in the quality and use of programmatic data that was reported to the Kinshasa-based ASSP management team.

Chapter 1
Background

Abbreviations

ASSP	*Accès aux Soins de Santé Primaires*
DAH	Development Assistance for Health
DFID	Department for International Development
DHS	Demographic and Health Survey
DRC	Democratic Republic of Congo
EU	European Union
FBN	Faith Based Network
IRC	International Rescue Committee
KSPH	Kinshasa School of Public Health
MERLIN	Medical Emergency Relief International
MOH	Ministry of Health
RMNCH	Reproductive, Maternal, Neonatal and Child Health
SNIS	National Health Information System
WASH	Water, Sanitation, and Hygiene
UNFPA	United Nations Population Fund
USAID	United States' Agency for International Development

i. Country context

Geographic, economic and political context

The Democratic Republic of Congo (DRC) is the largest country in Sub-Saharan Africa, with borders with nine countries and a land surface area of 2.3 million square kilometers. The country is rich in natural resources, including mineral deposits, forests, water, and arable land. It has a strategic location, and a young population.

When the ASSP (*Accès aux Soins de Santé Primaires*) project began in 2012, the DRC was emerging from four decades of conflict and related mismanagement that had devastating effects on the economy, institutions, and the people (World Bank, 2013). In the period from 1998 to 2012, it is estimated that over 3.5 million people died as a result of the conflict. Millions more were pushed into poverty due to displacement and the loss of their economic livelihoods. By 2012, most of the country had returned to relative peace, although in eastern DRC a crisis involving the M23 armed group as well as other armed factions persisted. In addition to armed conflict, the DRC had experienced longstanding political tensions. The 2011 presidential and legislative elections were marred by violence and disputes about the results, which reflected deep political divisions and the fragility of DRC's electoral institutions.

In 2012, poverty remained widespread and the country was not on track to reach any of the Millennium Development Goals by the 2015 deadline (World Bank, 2013). In 2011, gross national income per capita was USD 190 and 71 percent of Congolese lived below the poverty line of USD 1.25 per day. Individuals living in rural areas were more likely to be impoverished than individuals in urban areas (75 percent vs. 61 percent). In 2012, DRC ranked last among 187 countries in the Human Development Index.

Heath system context

The DRC's government-run health system is organized on three levels: central, provincial, and peripheral (*zone de santé* or health zone, the equivalent of a district in most countries). The Ministry of Health at the central level is responsible for overall policy direction and stewardship, and the management of national programs. At the provincial level, the provinces are responsible for providing technical support and supervising health zones. At the peripheral level, each health zone covers an average population of 110,000 and includes a central health zone office and at least one general reference hospital. The health zone is divided into health areas (aires de santé), each of which contains, in theory, at least one health center or health post that is responsible for providing a minimum package of services as defined by the government. As described later in this section, the government had received significant technical and financial support from major bilateral and multilateral partners, including Britain's Department for International Development (DFID), the United States' Agency for International Development (USAID), the European Union, the World Bank, and the United Nations, including the World Health Organization, UNICEF, and the United Nations Population Fund (UNFPA).

In the early 1990's, the DRC health system was considered to be among the best in Africa. However, the system experienced "a near total collapse" between 1995 and 2001 when the government disengaged from the health and education sectors as part of a structural adjustment policy that was recommended by the International Monetary Fund and the World Bank in exchange for macroeconomic assistance. Public funding for the country's decentralized health system was drastically reduced and faith-based organizations and other non-government organizations became the principal health care providers at the health zone level. Nevertheless, reduced funding for social services as well as discontent with the government's capacity to manage the economic and social crises and address widespread poverty led to pillage in many parts of the country, and as a result, the breakdown of government control and normal societal functioning.

In the beginning of this decade, the government spent only about four percent of the national budget on the heath sector, which although higher than in previous years, was among the lowest in the world (World Bank, 2013). Consequently, out-of-pocket health payments from clients and development assistance for health (DAH) had helped to maintain a minimal availability of health services (Zinnen, 2012), but there was a large concern that as much as 70 percent of the population had little or no access to the health services resulting from both physical and financial barriers (Waldman, 2006). While DAH has steadily increased in recent years, funds have largely been directed to vertical disease control programs such as malaria, HIV/AIDS, tuberculosis control and immunization programs. Although the government welcomed increased DAH provided by international partners, there was concern that the emphasis on vertical programs may have neglected primary health care services outside the scope of the programs and that the programs would not be sustainable once donor support ended (Maurizzio, 2011).

By the early 2010's, health indicators had improved compared to alarmingly low levels experienced during the mid 2000's. The 2013-14 Demographic and Health Survey (DHS) reported a 30 percent reduction in under-five mortality from 2007 to 2013-14, although the rate remained high at 104 deaths per thousand (Ministère du Plan et Suivi de la Mise en œuvre de la Révolution de la Modernité (MPSMRM), Ministère de la Santé Publique (MSP) and ICF International, 2014). The DHS also reported very high levels of maternal mortality in 2013-14 – 846 per 100,000 live births, among the highest in the world – while the current use of modern contraceptive methods among women of reproductive age was only 8 percent. The nutritional status of children was also found to be extremely poor. Forty-three percent of children under age five were stunted, and 23 percent were severely stunted, an indication of chronic malnutrition. The three leading causes of child death, malaria (25-30%), diarrhea (16%) and pneumonia (16%) were all preventable diseases (United Nations Population Fund, 2011).

History of health programming in the DRC

In addition to vertical disease-control programs, there have been several large-scale health systems strengthening projects implemented in the DRC, dating back to 1981. Many of these projects have supported an integrated approach to improving the availability and quality of health care services. These include the following:

- SANRU I (50 health zones covered from 1981 to 1985)
- SANRU II (100 health zones covered from 1985 to 1991)
- SANRU III (56 health zones covered from 2001 to 2006)
- PMURR (67 health zones covered from 2002 to 2008)
- AXxes (57 health zones covered from 2006 to 2009)
- Access to Health Care (20 health zones covered by 2008 to 2012)
- Integrated Health Project (79 health zones covered from 2010 to 2015).

The AXxes project, implemented by IMA World Health, covered Eastern provinces (West Kasai, East Kasai, South Kivu, Maniema, Katanga). The Integrated Health Project, funded by USAID and implemented by Management Sciences for Health, covered health zones in four provinces (East Kasai, West Kasai, Katanga, South Kivu).

The DFID-funded Access to Healthcare Program was implemented from 2008 to 2012 by the International Rescue Committee (IRC) and Medical Emergency Relief International (MERLIN) in 20 Health zones located in Kasai Occidental, Maniema, Orientale, and Sud Kivu provinces. The budget of the program was 80 million pounds (GBP) to support a comprehensive package aimed at improving access to basic health care with a particular emphasis on the vulnerable groups defined as pregnant women, children under five years of age, survivors of sexual violence and indigents.

The outputs of the program were: (1) increased access to antenatal and delivery services and the use of modern contraceptives; (2) increased access to child health services in target areas; (3) improved prevention, diagnosis and treatment of malaria in target areas; (4) enhanced capacity of local health authorities to effectively manage services and ensure quality health care delivery; and (5) strengthened community involvement in health activities.

Although the aims of the program were similar to those of ASSP, as described below, the Access to Healthcare Program took on a different approach. Like ASSP, the main interventions consisted of support to public primary health care centers and hospitals through the financing of day-to-day running costs; construction and rehabilitation of health facilities; provision of medical equipment; training of health workers; and provision of medicines and salaries supplements. However, through this program, the vulnerable groups received free health care while the rest of the population benefited from subsidized services. Moreover, the program also provided supplemental payments to health workers. Workers received a $75 fixed payment and a $25 performance-based payment, which was in addition to any government salaries the workers received. (Under ASSP, the payments were phased out by the implementing partners by $25 each month. Firstly, the $25 performance-based component of the payment was withdrawn two months after the start of the new ASSP project (in June 2013). Then the fixed income component was reduced by $25 every month thereafter, so all these payments to workers ended in September 2013).

Based on routine data extracted from the national health information system (SNIS) at the end of the program, it was has determined that the removal of user fees led to an immediate and sustained increase in service utilization (Maini et al., 2014). However, while there appeared to be good performance in process-oriented indicators (such as distribution of bed nets, vaccination of children or the holding of meetings and supervision visits), performance in their corresponding outcomes (such as the proportion of children sleeping under a bed net, the absence of measles outbreaks, consistency of drug supplies and adherence to treatment guidelines) appeared weaker than expected.

Concurrent projects

There were also other large health systems projects that were implemented with support from other donors during the period the ASSP project was implemented. Beginning in 2016, the World Bank in collaboration with the DRC government, introduced a performance-based financing (PBF) project in the DRC. The Health Strengthening for Better Maternal and Child Health Results Project (PDSS) was introduced is aimed to improve service delivery by awarding bonuses to health providers for achieving pre-specified service quality targets. The program is being implemented in 11 provinces (i.e. Mai-Ndombe, Kwilu, Kwango, Sud Ubangui, Tshuapa, Mongala, Equateur, Haut Katanga, Haut Lomami, Loualaba, and Maniema) targeting approximately 24 million people. The World Bank is in the process of evaluating the impact of the project. Their evaluation research design includes both health zones covered by PDSS as well as other health zones that are receiving additional health financing not linked to PBF.

In addition, in bilateral cooperation with the DRC, Belgium is funding the Support Program for Provincial Divisions. The program covers three provinces, Kwilu, South Ubangi and Tshopo, and aims to improve the performance of health zones in improving planning, the supervision of health facilities and the efficient management in order to health care quality and accessibility.

ii. ASSP Project Description

Overview, goals and objectives

As part of its program to assist the government in strengthening the country's health system, DFID awarded the five-year ASSP project to IMA World Health and its implementing partners and subcontractors in Fall 2012 (Table 1). The primary objective of the ASSP project was to improve RMNCH in the DRC while strengthening the health system through four main outputs:

- Output 1: Enhanced health service delivery and quality;
- Output 2: Increased empowerment and accountability in health service planning and delivery;

- Output 3: Improved access to health services; and
- Output 4: Increased and sustainable access to safe drinking water, improved sanitation.

The project was intended to build on DFID's previous projects aimed to improve access to health care and delivering health results in the DRC through its predecessor project, the Access to Health-care program, which ended in December 2012 but adopted a new approach of working more through Faith Based Networks (FBN) to improve the sustainability of the health system. ASSP interventions were designed to align with the government's health sector policy (IMA World Health, 2012).

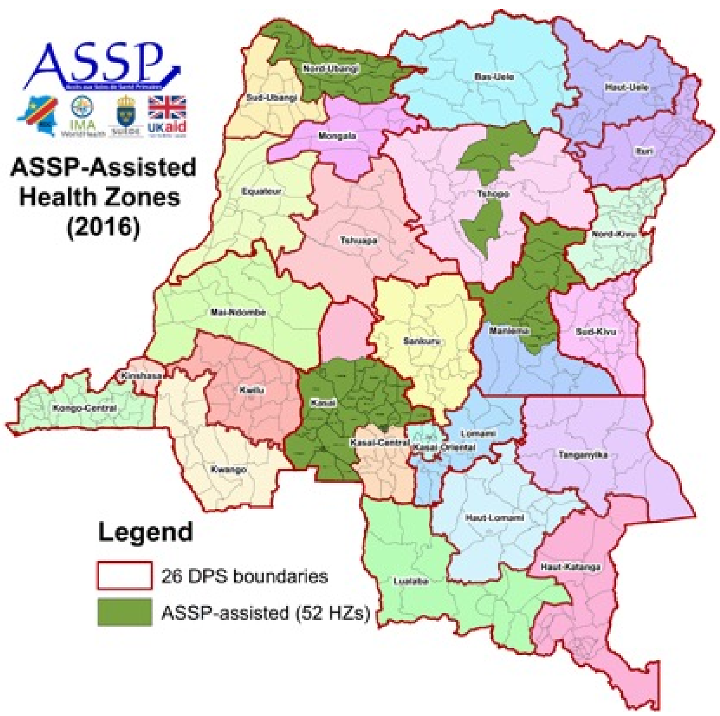
ASSP initially worked in 56 health zones that were purposively selected. These consisted of all the health zones that were part of the Access to Healthcare Program (Maniema (10), Kasai Central (3), Tshopo (3) and Sud Kivu (4)) and 36 additional health zones in Nord Ubangi, Kasai, and Kasai Central, which were considered to have relatively weak health systems. Of these 56 health zones, the four health zones from Sud Kivu were dropped after one year, leaving 52 health zones in the project Figure 1.1).[1] An estimated nine million people live in these health zones.

[1] In 2015, the 11 provinces of the DRC were divided into 26 provinces. In this report, we use the current province names.

Table 1.1. Organizations that make up the ASSP Consortium

Organization	Responsibility
IMA World Health	Project leadership and management
Tulane University	Impact evaluation and operations research (ORIE)
Pathfinder	Reproductive health and family planning
HISP	Health management information system (SNIS and DHIS2)
IntraHealth	Human resource information system (iHRIS)
SANRU	Implementing partner in Kasai-Occidental
CARITAS	Implementing partner in Orientale and Maniema
World Vision	Implementing partner in Equateur

Figure 1.1. Map of ASSP-assisted health zones



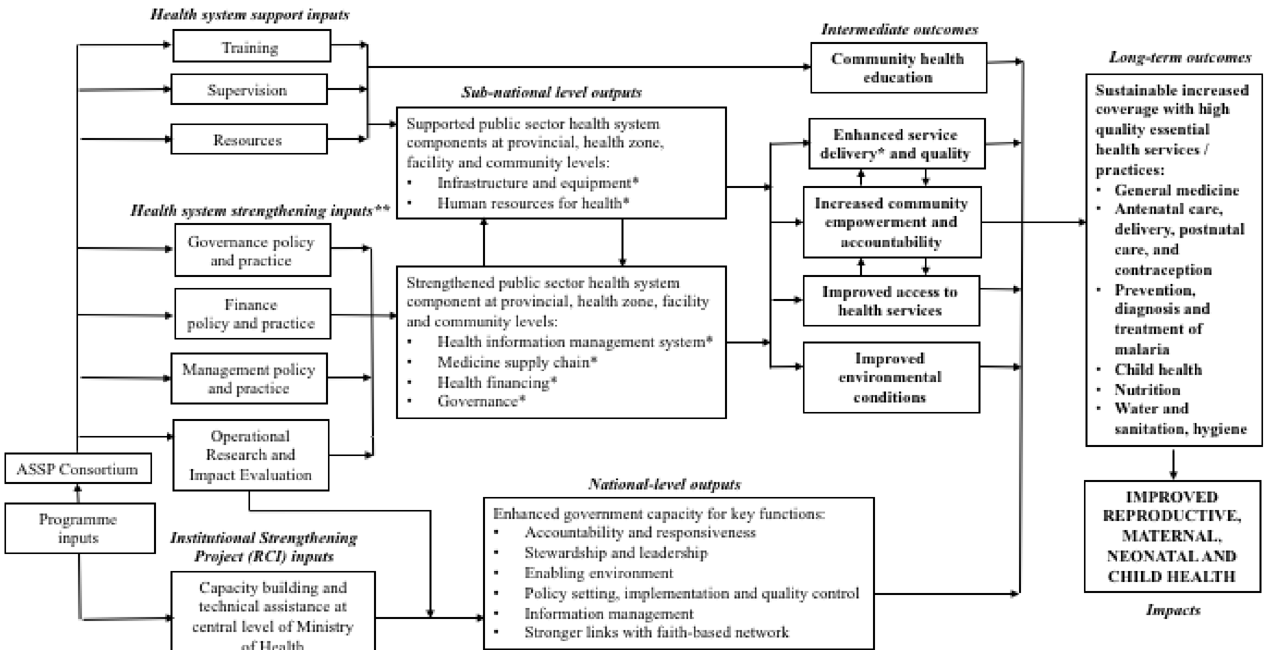
iii. Theory of Change

Figure 1.2 presents the ASSP Project's Theory of Change, which was developed by IMA World Health in consultation with DFID to provide a simplified overview of how the ASSP project was expected to have an impact on reproductive, maternal, neonatal, and child health outcomes. The Theory of Change presented here has been adapted from the original design to reflect changes made over the course of the project. As shown in Figure 1.2, ASSP consisted of a broad range of facility- and community-based strategies designed to:

1. Strengthen the public health sector at the provincial, *health zone*, facility and community level though improved availability of infrastructure, equipment, supplies and improved financial and managerial practices;
2. Improve environmental health in targeted areas via the introduction of "Village Assaini," a WASH approach supported by UNICEF; and
3. Broaden key governance functions, including accountability, governance, stewardship and leadership.

These health strategies, in turn, were expected to improve the availability, quality, and utilization of essential health services including antenatal care, deliveries, family planning services, diagnosis and treatment of malaria, and child health services, as well as to improve environmental health. The ultimate objectives of the overall package of interventions are to improve reproductive, maternal, neonatal and child health outcomes.

Figure 1.2. ASSP Project's Theory of Change



**Plan National de Développent Sanitaire*; (National Health Development Plan) priority pillar

***Health system strengthening:* comprehensive changes to policy and regulations, organizational relationships, and relationships in the health system that motivate changes in behaviour and/or allow for more effective use of resources to improve multiple health services (Chee et al, 2013).

Table 1.2 provides an overview of the types of interventions implemented by the ASSP project. The list of activities is organized by health sector pillars (listed in column 1), which the thematic areas of health systems strengthening that the government uses in its health sector strategy. In addition, each activity is linked to the Theory of Change as activities are targeted toward quality and access of service delivery, community engagement or environmental health.

As indicated in the table, ASSP covered a broad range of interventions, including: improving infrastructure and providing equipment to health facilities; enhancing the quality of service delivery and the range of services offered at the facility and community level; improving the medical supply chain procedures; providing trainings to increase human resource capacity; strengthening the health information system and human resource database to improve data quality; refining the governance of healthcare delivery to be more responsive to communities; increasing financial access to individual users and creating sustainable financial policies for health facilities; and introducing more innovate intersectional activities such as WASH and nutrition programs. Additionally, while certain activities will provide services to the general population, other activities were specifically focused on improving health outcomes for women and children.

Table 1.2. Overview of ASSP interventions and activities

Health sector pillar	Specific interventions or strategies	Description of activities and link to Theory of Change
Infrastructure and Equipment	Renovation and construction of health centers and hospitals	The project planned to build new health centers and hospitals, as well as provide the needed major and minor repairs in health establishments and selected nursing schools in supported health zones. The project also planned to build efficient incinerators and placenta pits for selected facilities. **This activity was expected to contribute to the improvement of service quality and access to healthcare.**
	Provision of equipment to health zones and related facilities	The project planned to provide medical equipment and supplies to 55 hospitals and 962 health centers: Medical equipment and supplies include: • Improved cold boxes and solar refrigerators • Kerosene and spare parts for cold chain equipment • Medical waste management supplies • General medical supplies • Laboratory equipment and supplies Facility supplies include: • Bicycles for community health workers • Laptops, networked sim cards and printers • Motorbikes and vehicles for selected health offices • Solar energy kits **This activity was expected to contribute to the improvement of service quality and delivery.**
Service Delivery	Provision of a minimum package of services	ASSP planned to ensure the minimum packages of services are available at all supported health facilities. This package includes basic curative care, preventative care, promotional activities, community activities, complementary package of activities to be established in hospitals and management/administrative activities. **This activity was expected to contribute to the improvement of service quality and access to healthcare.**
	Community-based interventions	ASSP planned to introduce and/or strengthen several community-based services, including: • Immunization: support immunization and Vitamin A distribution activities through the Reach Every District (RED) approach, and strengthen EPI micro planning at the health zone level and will facilitate vaccine transport from Kinshasa to the health zones. • Modern family planning: support the provision of modern family planning methods and increase their accessibility at the community level. • Mosquito-nets distribution: support the distribution of Long-Lasting Insecticide-treated Nets (LLTN) free of charge, and visit homes to help hang up the nets. • Community wide behavioral communication campaigns (BCC) to promote a range of healthy behaviors (contraceptive use, immunizations, antenatal care, malaria prevention, etc.). • Support groups for breastfeeding mothers

		This activity was expected to contribute to the improvement of service quality and access to healthcare.
Medicine Supply Chain	Medicine procurement and distribution, supply chain management	ASSP also planned to work with the existing regional centers for medicine procurement and distribution (CDR) to strengthen their capacity to continue supply chain management after the project ends. ASSP will planned work with the supported health facilities to ensure that all essential medications of good quality are purchased, properly transported and are reaching the target population. **This activity was expected to contribute to the improvement of service quality and access to healthcare.**
Human Resources	Pre-service training	ASSP will provide the following: • Support the nursing schools to produce well trained graduates • Provide scholarships for nurses **Pre-service training was expected to help improve health workers' knowledge and practices and hence improve the quality of services offered.**
	In-service training	ASSP also planned to provide the following training or training materials to health personnel in supported health zones: • Maternal and Child Health (MCH): Integrated management of childhood illness (IMCI), Prevention of Mother To Child Transmission (PMTCT) of HIV/AHDS, fistula repair, breastfeeding, maternal and newborn health, and emergency obstetric care • Family planning, reproductive health and post abortion care • Sexually transmitted infection care including post exposure prophylaxis (PEP) administration • Nutrition • Cervical cancer screening • Sexual and Gender Based Violence (SGBV) management • Drug management • Lab testing • Tuberculosis detection • Malaria detection • Behavior change communications • Financial management **In-service training is expected to help improve health workers knowledge and practices and hence improve the quality of services offered.**
Health Management Information	Strengthen the health information management system (SNIS)	ASSP planned to contribute to strengthening the existing SNIS with the following: • Provide information technology for electronic reporting • Provide SNIS tools and forms to health facilities • Implement DHIS2 software in all ASSP supported facilities which will serve as the electronic program for collecting SNIS data • Train health facility staff to use DHIS2 • Conduct regular quality audits to assess the routine data being collected by the project. **This activity was expected to contribute to the improvement of service quality by improving data quality.**

<table>
<tr><td></td><td></td><td></td></tr>
<tr><td></td><td>Human resources information system</td><td>ASSP planned to establish a human resources information system at the health zones and health facility level.

This activity was expected to contribute to the improvement of service quality by improving data quality.</td></tr>
<tr><td rowspan="5">Governance</td><td>Norms and guidelines</td><td>ASSP planned establish norms and guidelines for new programs and, where available, ensure that the national norms and guidelines are disseminated to health office and health facilities. They planned to conduct workshops to ensure that stakeholders are aware of these standards.

This activity was expected to contribute to the improvement of service quality.</td></tr>
<tr><td>Community evaluation and accountability</td><td>ASSP planned to implement the following activity to ensure that communities have opportunities to participate in evaluating the project and are empowered to hold the health system accountable:
• Establish a pilot community hotline, encouraging community members to signal poor management practices, mismanagement, fraud, theft, corruption and other dysfunctions; put pressure on health zone officials to improve governance; and hold health service officials accountable.
• Develop sustainable mechanisms for collecting information on community expectations and evaluations of health services
• Develop and promote a guidebook designed specifically for health zone officials on creative ways to actively invite and facilitate community participation in the health zone program
• Actively promote the theme of community ownership of the local health center through a variety of media including community radio, public billboards / posters, soccer balls and women's batik cloth and scarves.

This activity was expected to contribute to increase community empowerment.</td></tr>
<tr><td>Community health committees (CODESA)</td><td>ASSP planned to strengthen the governance and oversight capacity of the community health committees (CODESA) by:
• Training CODEAS members to organize and moderate village meetings
• Updating the CODESA guidelines to establish clear roles and responsibilities of the group
• Training CODESA members on performance improvement
• Encourage and facilitate training of CODESA members and health center staff in their respective roles and responsibilities in the co-management of health centers and the mobilizing of community partnerships

This activity was expected to contribute to increase community empowerment.</td></tr>
<tr><td>Planning and management</td><td>ASSP planned to work with individuals at multiple levels (national, provincial, health zone, community) to ensure the proper planning and management of the project including:
• Organizing workshops to coordinate the activities of the government, implementing partners, and local facilities
• Organizing regular informational meetings to engage stakeholders and partners at all levels
• Supporting provincial and district technical meetings
• Ensuring regular supervision is taking place at all levels of the health system including the provincial health offices, hospitals and health centers
• Supporting provincial heath districts and health zone teams

This activity was expected to contribute to the improvement of quality health care and community empowerment.</td></tr>
</table>

Finance	Primes/financial incentives	ASSP planned to provide primes (salary supplements) at a reduced rate to health workers and other health personnel in health zones where this practice has been previously established. However, in the course of the project, ASSP primes will be eliminated such that no health worker in ASSP supported zones will receive financial incentives from donors. **This activity was expected to contribute to the improvement of the access to health care and ensure sustainably.**
	User fees	ASSP planned to establish and disseminate guidelines for setting user fees to the provincial health offices **This activity was expected to contribute to the improvement of access to health care.**
	Mobilization of health financing through Community Health Endowments (CHE) (agricultural cooperatives)	ASSP planned to implement a community level income generating intervention that will provide additional finances to the health centers and reduce user fees for participants. **This activity was expected to contribute to access to health care and community empowerment.**
Community Health Education	Various	ASSP planned to revitalize CODESAs and recruit and train RECOs to delivery health messages to communities. Information campaigns on various health topics were also planned. **This activity was expected to contribute to health service utilization.**
Intersectional Collaboration	Water and Sanitation, Hygiene (WASH)	ASSP planned to implement a previously established WASH campaign, Village Assaini, as well as an alternative package of activities yet to be determined. Activities include: • Providing equipment and implementing activities related to water and sanitation • Training individuals on the Village Assaini approach and providing promotional materials for Village Assaini • Providing water monitoring kits to clusters of supported villages • Supporting community mobilization and initial WASH assessment efforts • Establishing regular water testing activities for facilities in supported health zones • Spring capping • Building home latrines for individual households and composing latrines at health facilities and schools • Building cisterns at schools and public facilities **This activity was expected to contribute to the improvement of environmental health.**
	Nutrition/Home gardening	ASSP's nutrition project involves promoting home gardening activities indented to produce quality and nutritious food for household consumptions. Activities include: • Training Community Health Workers (CHW) on how to implement the home gardening project at the household level, nutrition education and home visits to monitor child malnutrition • Equip each health zone with a trained nutritionist • Provide nutrition education materials to health centers **This activity was expected to contribute to access to health care and community empowerment.**

iv. Linkages to international priorities

The ASSP project is in line with DFID's global policy to improve health systems generally, and health outcomes linked to malaria, reproductive, maternal and child health specifically. In addition, the project reflects DFID's commitments to:

- Honor international commitments to meet health related development goals, such as the Millennium Development Goals and the subsequent Sustainable Development Goals, specifically by (a) increasing access to clean water, sanitation, healthcare and education, (b) reducing maternal and infant mortality, and (c) restricting the spread of major diseases like HIV/AIDS, tuberculosis and malaria.

- Lead international action to improve the lives of girls and women, specifically by leading international action to improve maternal health and access to family planning.

Although DFID's approach of shifting away from vertical assistance to a more integrated model of service delivery is not new, interest in integrated models has increased, especially because of the desire of many governments to accelerate progress on reaching the health-related Millennium Development Goals and the subsequent Sustainable Development Goals and the promise this model holds on attaining those goals in an efficient manner (Pronyk et al., 2012; Bhutta et al., 2008). The rationale is that the management and delivery of multiple services (e.g., family planning and immunization) within the same health center is more efficient than having a client travel to separate specialist clinics for each service because of a reduction in both financial and time costs (Briggs and Garner, 2006). Integrated delivery can also reduce duplication of services and improve the overall quality of care received (Briggs and Garner, 2006).

v. Major events that have impacted the implementation of ASSP

Political tension and violence

Since 2013, political tension and violence have repeatedly and significantly interrupted ASSP operations, with at least eight occurrences of demonstrations[2] occurring in DRC's major cities and at least five instances of "dead city"[3] occurring. These events were met with substantial responses by government security forces, resulting in several casualties and the arrests of scores of political and civil society leaders.

[2] The eight demonstrations took place in December 2013, January 2015, March 2015, May 2016, September 2016, November 2017, December 2017, and January 2018.

[3] Paralysis of administrative and economic activities occurred in August 2013, February 2016, August 2016, October 2016, April 2017, and August 2017.

Conflict in Kasai

In August 2016, civil war erupted in Kasai Central following the killing of Kamuina Nsapu, a traditional chief. This event triggered violent conflict, characterized by the disruption of normal activities, interruption of health service delivery, and population movements. From Kasai central, the conflict spread to Kasai and Kasai oriental provinces. Of note, ASSP operations in Greater Kasai, specifically in the new provinces of Kasai and Kasai Central, cover 28 health zones representing more than half of the 52 health zones supported by the project. ASSP operations were seriously hampered between August 2016 and July 2017. In consequence, despite a pilot survey being conducted in October 2017, the ASSP impact evaluation was not carried out in Kasai due to inability of data collectors to return to Kasai to carry out the endline survey.

Ebola and yellow fever outbreaks

During the course of ASSP, two Ebola outbreaks occurred respectively in Boende, Tshuapa province (July 2014) and in Likati, Bas Uele province (May 2017). They were effectively contained by the Ministry of Health with assistance from international expertise and support. On the contrary, cholera control has been less successful. Large outbreaks have occurred every year in several provinces since 2013. While Ebola and cholera did not particularly affect ASSP operations, the project has contributed staff time and resources to fighting the outbreaks.

Program management issues

In Year Five[4] of the projects, program management issues led to drastic reduction of ASSP funded activities in Maniema during several months. This interruption ended when IMA World Health took over CARITAS, the initial Implementation Partner in Maniema. Another consequence of this event was a delay in transferring funds from Tulane to the Kinshasa School of Public Health (KSPH) for the endline study data collection. Hence, KSPH's supervisors did not receive funds on a timely basis to remunerate data collectors, and they were stranded in Nord and Sud Ubangi, Tshopo, and Maniema, resulting in increased field operation costs. Additionally, during ASSP Year Five, World Vision, the ASSP Implementation Partner in Nord Ubangi, ended collaboration with IMA World Health. This development slowed down the implementation of ASSP activities in the province until SANRU took over.

Continued issues in Eastern DRC

Throughout the implementation of ASSP, Eastern DRC provinces, specifically Ituri, Nord Kivu, Maniema and Sud Kivu, have experienced insecurity due to several instances of political violence. These attacks

[4] ASSP's Year Five covered the period from April 1, 2017 to March 31, 2018.

resulted in slowing down ASSP operations as caution was exercised to minimize the exposure of staff members to militia violence.

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Chapter 2
Impact Evaluation Design

Abbreviations

ASSP	Access to Primary Health Care (Project)
BCZ	Bu*reau central de zone* (Health zone central office)
CDR	*Centre de distribution regionale* (Regional drug distribution center)
CODESA	*Comité de développement de l'aire de santé* (Health area development committee)
DFID	United Kingdom Department for International Development
DRC	Democratic Republic of Congo
IMA	Interchurch Medical Assistance (dba IMA World Health)
IP	Implementing partner
IT	*Infirmiere Titulaire* (Head nurse)
ITN	Insecticide-Treated Net
KSPH	Kinshasa School of Public Health
MCZ	*Médecin Chef de Zone* (Health zone medical officer)
MOH	Ministry of Health
RECO	*Relais Communautaire* (community health volunteer)

i. Purpose, scope, and objectives

Tulane University's School of Public Health and Tropical Medicine (Tulane) is responsible for developing and carrying out a robust, state-of-the-art evaluation of the overall impact of ASSP's comprehensive package of interventions to improve health care service utilization, quality of care and health outcomes.

The evaluation is prepared for DFID DRC and IMA, who will use the findings to understand the degree to which the ASSP project met its objectives and to inform the goals and design of current and future programs in the DRC. More widely, this work will be of interest to the DRC's Ministry of Health (MOH) and other international health partners.

ASSP is a complex project, consisting of a wide array of programmatic and health systems interventions with multiple interacting outputs and impacts. Therefore, to understand the full impact of ASSP as well as the factors enabling or limiting its success, it is necessary to assess the full range of intermediate outcomes, long-term outcomes, and impacts illustrated within the theory of change using a mix of quantitative and qualitative data sources. All of the activities within the ASSP project are intended to improve one or more of these outcomes and impacts; therefore, the full range of ASSP activities are encompassed in this evaluation. Further, the evaluation is conducted using data from a baseline and the final year of ASSP in order to allow the interventions as much time as possible to have an impact prior to the close of the project. It should be noted that at the time that the baseline survey was conducted, some project activities had already taken place. The specific activities that occurred before the baseline are listed in each of the results chapters in this report, and the direction of the suspected bias, if any, is discussed.

Tulane is committed to the Organization for Economic Co-operation and Development's Development Assistance Committee criteria for evaluating development assistance which are *relevance, effectiveness, efficiency, impact,* and *sustainability* (Development Assistance Committee, 1991). The impact evaluation gauges the ASSP's *impact* on coverage of health services and improved reproductive, maternal, neonatal and child health. *Sustainability* is addressed through other intervention-specific studies that are part of Tulane's research portfolio for the ASSP project as well as the impact evaluation.[5]

This evaluation was conducted in accordance with the Paris Declaration on Aid Effectiveness. The Ministry of Health was consulted during the evaluation design and will be engaged again as the results are disseminated. The evaluation measured changes in development incomes including health status, service utilization, and health system functionality. Although the national data system (DHIS2) was installed during the ASSP project and therefore could not be used for this work, the evaluation incorporated local systems by contracting the Kinshasa School of Public Health to lead both waves of quantitative data collection.

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[5] Tulane also conducted intervention-specific operations research studies (user fees, community health endowment, health workers' salaries/incentives, family planning, water, sanitation and hygiene, governance, accountability and community engagement studies) that explore ASSP's *effectiveness* at meeting its objectives in those specific areas. *Efficiency* is assessed through a value for money analysis.

ii. Evaluation objectives

The evaluation is designed to assess the impact of the ASSP project in the following areas, and to identify the factors that facilitated or inhibited the project in its effort to meet its goals:

- Child health and nutrition outcomes
- Maternal and child health care utilization
- Household out-of-pocket health expenditures
- Availability and use of modern contraceptive methods
- Access to and use of improved environmental health conditions
- Quality of facility-based services
- Community's level of participation in health services and health behavior change

Gender is of particular interest to the MOH, the ASSP project and DFID; therefore, the evaluation also investigates whether ASSP reduces gender disparities in the use of selected health care services and health outcomes. Gender is approached as an issue that cuts across all of ASSP's activities, rather than as a single topic of focus.

iii. Outcome indicators

Tables 2.1-2.3 list the intermediate output, long-term output, and impact indicators of focus, sorted by the component of the theory of change that they measure. The report chapter in which the analysis related to each indicator is presented is also indicated.

Table 2.1. Intermediate output indicators

TOC component	Indicator	Chapter
Community health education	Mean number of contraceptive methods known among women age 15-49.	Family planning
	Percentage of households that are informed about health care services offered in the community	Service quality
Enhanced service delivery and quality	Percentage of health centers with adequate equipment	Service quality
	Percentage of health centers with adequate drug supplies	Service quality
	Percentage of health centers offering the minimum package of services required to provide preventive care	Service quality
	Percentage of health centers offering the minimum package of services required to provide curative care	Service quality
	Percentage of health facilities with malaria diagnostic capabilities	Service quality
	Percentage of individuals who were sick or injured in the last four weeks who were satisfied with services received	Health care utilization
	Percentage of individuals who were hospitalized in the last six months who were satisfied with services received	Health care utilization
	Percentage of women who gave birth in the past two years who were satisfied with delivery services received	Health care utilization
	Percentage of health workers satisfied with specified aspects of the work environment, including financial and non-financial aspects	Service quality
	Percentage of health workers receiving salaries	Service quality
Increased community empowerment and accountability	Percentage of households that are satisfied with their involvement in decision making regarding health care	Service quality
Improved access to services	Average out-of-pocket household health expenditures per episode of illness/injury	Health care utilization
	Average expenditure on ANC during pregnancy for the most recent live birth	Health care utilization
	Percent distribution of most recent live births to women ages 15-49 in the two years preceding the survey in ASSP areas by expenditure on the most recent birth	Health care utilization
	Percentage of households with at least one insecticide-treated net (ITN)	Maternal health
Improved environmental health (conditions)	Percentage of households with improved sources of drinking water	Environmental health
	Percentage of households with improved sanitation facilities	Environmental health
	Percentage of households with hand-washing materials in dwelling/yard/plot	Environmental health

Table 2.2. Outcome indicators

TOC section	Indicator	Chapter
General health care services	Percentage of individuals sick or injured in the last four weeks who sought care	Health care utilization
	Percentage of individuals who were hospitalized in the last six months	Health care utilization
Antenatal care, delivery and postnatal care	Percentage of women ages 15-49 years with a birth in the last two years who had at least four antenatal care visits	Health care utilization
	Percentage of women who had a live birth in the two years preceding the survey who received an antenatal visit during the first trimester for the most recent live birth among women ages 15-49	Health care utilization
	Percentage of women with a live birth in the past two years who delivered with assistance from a skilled birth attendant	Health care utilization
	Percentage of women age 15-49 with a live birth delivered in the past two years that received at least one postnatal care visit	Health care utilization
Contraception	Percentage of women age 15-49 currently using any modern method of family planning	Family planning
Malaria	Percentage of pregnant women who used an ITN last night	Maternal health
	Percentage of children under age 5 with fever during the past two weeks who received antimalarial treatment	Health care utilization
Child health	Percentage of children 12-23 months who have received all specified vaccinations	Health care utilization
	Percentage of children under age 5 with diarrhea during the past two weeks who received either oral rehydration salts or recommended home solution	Health care utilization
	Percentage of children with suspected pneumonia during the past two weeks who received antibiotics	Health care utilization
Nutrition	Among last-born children who were born in the two years preceding the survey, the percentage who were ever breastfed.	Child nutrition
	Among last-born children who were born in the two years preceding the survey, the percentage who started breastfeeding within one hour of birth	Child nutrition
	Percent distribution of youngest children 0-23 months living with their mother according to type of foods consumed in the day or night preceding the survey	Child nutrition
Water, sanitation, and hygiene	Percentage of households in which proper handwashing was observed	Environmental health

Table 2.3. Impact indicators

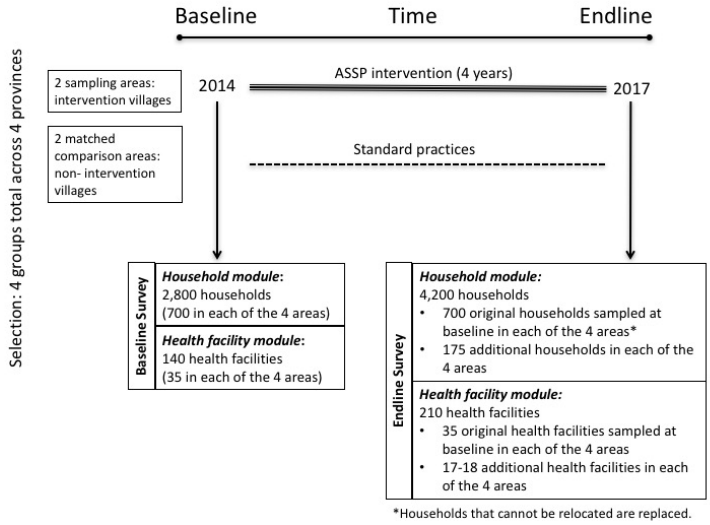
TOC section	Indicator	Chapter
Maternal health	Not assessed quantitatively	Maternal health
Neonatal health	Not assessed quantitatively	Child health
Child health	Percentage of children under age 5 underweight	Child nutrition
	Percentage of children under age 5 stunted	Child nutrition
	Percentage of children under age 5 wasted	Child nutrition
	Percentage of children under age 5 with diarrhea in the past 2 weeks	Child health
	Percentage of children age 6-59 months with malaria parasite in their blood	Child health
	Percentage of children under 5 with suspected pneumonia in the past 2 weeks	Child health
	Percentage of children 6-59 months with anemia	Child health
	Percentage of children under age 5 with fever in the past 2 weeks	Child health

iv. Study design

The evaluation employs a mixed-methods design. Tulane, in partnership with the Kinshasa School of Public Health (KSPH), conducted a population-based survey consisting of household, women, health facility, health worker, and community leader modules in April-May, 2014 and in July-September, 2017, the final year of the project. The endline survey included additional modules for hospitals, hospital workers, pharmaceutical depots, and health zone central offices. All survey modules were administered face-to-face using paper forms or electronic means. Qualitative data was collected at endline from community members, community and facility-based health workers, government officials, and implementing organizations through key informant interviews and focus groups. The quantitative data were analyzed to determine the impact of ASSP on key outcomes and impacts, using statistical techniques described below. Findings from the qualitative data were used to explain the reasons why the expected changes were or were not observed in utilization of services within the key areas of maternal health, child health, and child nutrition.

The quantitative component of the evaluation used a quasi-experimental panel design with constructed treatment and comparison groups (Figure 2.1). This was coupled with appropriate data analysis strategies to assess the plausible attribution of ASSP support on outcome and impact indicators.

Figure 2.1. Quasi-experimental partial panel design with intervention and matched comparison groups



The ASSP project intervened in health zones in five provinces. Unfortunately, civil unrest in two provinces, Kasai and Kasai Central, prevented the impact evaluation from being carried out in those areas; although the baseline survey was conducted in those regions, the endline survey was not. The remaining provinces were treated as two sampling areas for the purpose of this evaluation. The first sampling area[6] consisted of health zones within Nord Ubangi,[7] and the second consisted of health zones within Maniema and Tshopo.[8] A matched comparison group consisting of randomly selected villages within matched health areas outside of ASSP-supported health zones that did not receive the ASSP intervention package was also selected.[9]

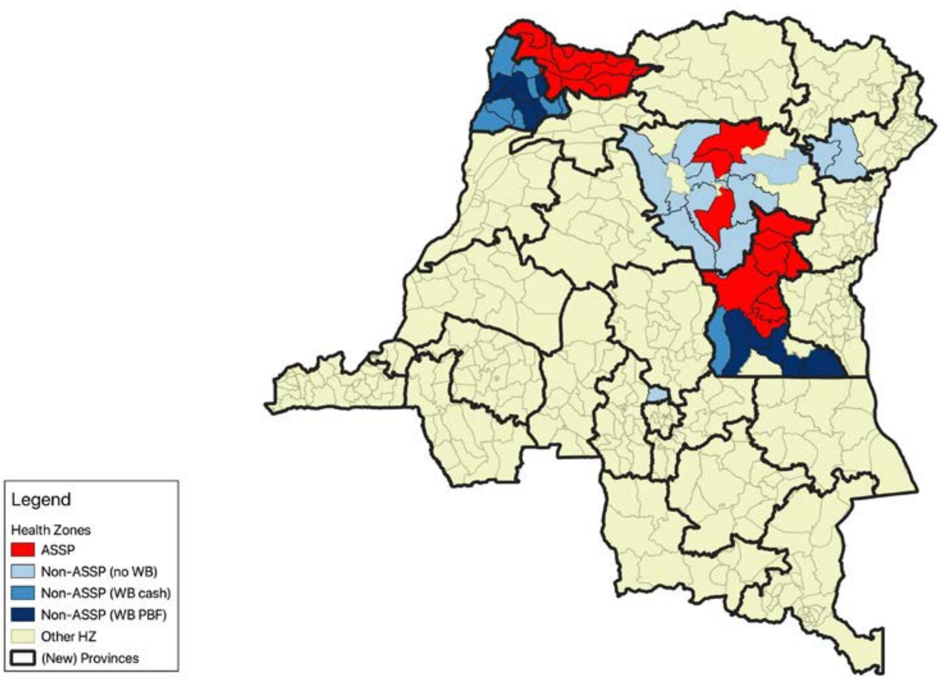
Given that socio-demographic and behavioral factors likely differ between the provinces, the creation of two separate sampling areas and two matched comparison groups reduced potential confounding and control for secular trend differences influencing observed changes in outcomes in the respective geographic areas. Furthermore, it allowed for geographically representative estimates of population coverage and outcomes to be made for the intervention sampling areas. Data was collected within four distinct groups (an intervention sampling area and a matched comparison group in each of the major geographic areas) to ascertain population point estimates for all health and intervention coverage outcomes and impact level indicators at baseline and follow-up.

As mentioned above, a quasi-experimental partial panel design was used for the quantitative component of the study. Villages selected for inclusion in the baseline were also visited at endline.

[6] In this context, a "sampling area" is synonymous with a "survey domain."
[7] Formerly Equateur
[8] Formerly Province Orientale
[9] ASSP-supported health zones in Nord Ubangi were matched with non-ASSP health zones in Sud Ubangi. ASSP-supported health zones in Maniema and Tshopo were matched with non-ASSP health zones within those provinces.

Where possible, households surveyed at baseline were surveyed again at endline. Those households that could not be located were replaced with a randomly-selected household within the same village. Additionally, new villages were selected at endline to compensate for the loss of the Kasai region from the study. By collecting data from additional households and health facilities in the remaining sample provinces that can be revisited, it will be possible to conduct a difference-in-difference approach to estimate impact by comparing intervention areas with matched comparison areas. Health zones in ASSP and non-ASSP areas that were selected for the survey are shown in Figure 2.3. Non-ASSP health zones are coded to indicate the degree to which they received the World Bank intervention.

Figure 2.3. Map of ASSP and non-ASSP health zones selected for the survey



The qualitative component employed a mix of research methods including key informant interviews and focus groups, with separate study designs for each sub-component (e.g. maternal health, child health, child nutrition).

v. Quantitative component

To investigate the overall impact of the project, Tulane has conducted a population-based evaluation consisting of household, women's, health facility, health provider, and community leader modules in April-May, 2014 (Tulane School of Public Health and Tropical Medicine, 2015) and at the end of the project in July-September, 2017. The endline survey included additional modules for hospitals, regional centers for medicine distribution and procurement (CDRs), and health zone central offices (BCZs).

Questionnaires were pretested in a rural health zone outside of Kinshasa. Data collection was conducted in French or local languages (Lingala in Nord and Sud Ubangi and Swahili in Maniema and Tshopo) by data collectors local to the survey areas. All data collectors underwent training on interview techniques, privacy, confidentiality and consent procedures. The study team obtained oral informed consent from each survey respondent. No incentives were offered for participation, and apart from participants' time, there was no cost to participate. Each module is described in detail below.

Household module:

Description: The household module covers major health topics of interest under the ASSP project including access to safe drinking water, immunizations, child malaria parasite prevalence, and child nutrition and well as community engagement, health care utilization for acute and chronic health problems and health care financing. Wherever appropriate, the module uses similar indicators and collection protocols as the Demographic and Health Survey and Malaria Indicator Cluster Survey, to ensure comparability of data and processes. It also draws on questionnaires used by IMA and DFID in previous Knowledge-Practice-Coverage studies in the DRC. This module was administered at baseline and endline.

Sampling: At baseline, a two-stage sampling strategy was used in intervention areas. At first stage, the sampling frame consisted of a full list of all villages with population estimates for each ASSP supported health area provided by IMA's needs assessment, which was conducted in June 2013. Villages were then dividedto create two separate lists of all possible villages in Nord Ubangi and Maniema/Tshopo.[10] Next, for each sampling area, 35 villages were selected using probability proportional to size to maximize sampling efficiency. This means a total of 70 villages were selected (35 in each of the two sampling areas) for the intervention area. The second-stage sampling frames were created in the provinces where the survey teams mapped village boundaries and then enumerated all households in the village. Following complete enumeration, a constant number of 20 households was systematically selected from each village at the second stage to meet the desired sample size of 700 households in each sampling area.

A three-stage sampling design was necessary in matched comparison areas, as a complete list of villages with population estimates was not available. At the first stage, a comparison health area was matched to each health area that contained a selected village in the corresponding intervention sampling area. This was done using a list of health areas with population estimates obtained from the MOH. Health areas were matched based on four criteria: geographic location, health area population size, health area urban/rural status, and health zone vaccination coverage.[11] Matched health areas were then randomly selected within each comparison group from listings of all health areas with the same four characteristics as the selected health area in

[10] This process was also carried out in Kasai; however, an evaluation of Kasai is not in the scope of this report.

[11] Health zone vaccination coverage was used as a proxy as information on health area coverage was not available. Information on vaccination coverage was obtained from the national Extended Programme on Immunization.

the corresponding intervention sampling area. Thirty-five matched health areas were selected within each comparison group, one for each of the health areas containing a selected village in the corresponding intervention group (none of the health areas selected at baseline contained more than one village). This means a total of 70 health areas were selected (35 in each of the two comparison groups) for the comparison area.

At the second stage, once teams were deployed, a detailed list of villages with population estimates was obtained from the health area office in the selected matched comparison health areas. One village was randomly selected from the list using simple random sampling. All households within each selected village were then enumerated in the same manner as in intervention sampling areas. In the third stage, 20 households were systematically selected from each village to meet the desired sample size of 700 households in each comparison group. The sample size calculation can be found in the study protocol in Appendix A.

At endline, it was necessary to expand the sample size to compensate for the loss of Kasai, which could not be revisited due to security concerns. An additional 35 intervention villages and 35 matched comparison villages were selected in the two sampling domains (18 pairs in Nord Ubangi and 17 pairs in Maniema/Tshopo). Intervention villages were selected PPS, and control villages were matched using the original four criteria. The sampling procedures described above were carried out to select a total of 700 additional intervention households and 700 additional matched comparison households.

Data collection procedures: The head of each selected household was interviewed. All individuals who slept in the household last night (the de facto population), as well as usual household members (the de jure population) were considered household residents. Information for all children under five years of age who are household members was also be collected. When possible, this was done by interviewing the mother. However, in a case where no mother was present, the primary caregiver was interviewed to take into account vulnerable children, orphans and child-headed households.

Height and weight data for children 0 to 59 months of age was collected using standard scales and height measurement tools in order to assess child nutrition status. This information was used to generate standardized measures for weight-for-height, weight-for-age and height-for-age. Finger pricks were performed on all children age 1 to 59 months who were household members and whose guardian consented to the procedure. The blood drops were tested for hemoglobin level and for malaria using a rapid diagnostic test. Children who tested positive for malaria, anemia, or edema were referred to the nearest health center.

Women's module**:** The women's module collected data related to reproductive health, family planning, the health and nutrition of their children, marriage and sexual activity, work, and attitudes toward violence against women. Wherever appropriate, this module also used similar indicators and collection protocols as the Demographic and Health Survey. The women's module was administered at baseline and endline.

All female household members of reproductive age (15-49 years) residing in selected households were invited to participate in this survey module. When possible, the questions were administered out of earshot of other members of the household.

Health facility module: The health facility module obtained information about staffing, patient volume, services performed, maternal and neonatal care, vaccination, infrastructure, equipment, laboratory, pharmacy, availability of drugs and supplies, medical waste treatment, management and supervision, and community financing initiatives. It was administered to the government health center designated to serve each village selected for the household module. Data collectors administered the questionnaire to the nurse in charge of each facility. The health facility module was administered at baseline and endline, with the same facilities visited in both waves.

Hospital module: The hospital module included all applicable questions from the health facility module. Additional questions related to user fees and health information technology are included. Tulane took a random sample of 32 health zones containing villages had been chosen for the household survey. The sample was taken to contain 8 health zones in ASSP areas and 8 health zones in non-ASSP areas in both the Nord/Sud Ubangi and Maniema/Tshopo survey domains. The government hospital within each health zone was surveyed. Data collectors administered the questionnaire to the physician in charge of each facility. This module was administered during the endline wave.

Health worker module: The health worker module contained questions related to training, job duties, supervision, compensation and sources of income, and job satisfaction and motivation. This module was administered at baseline and endline; however, the individuals who responded to the baseline wave were not necessarily the same respondents in the endline wave.

All health workers on duty at selected health facilities the day of the survey were invited to participate in the health worker survey. Individuals responsible for providing health care services (e.g., doctors, nurses, midwives) are considered to be health workers. A random sample of 4 physicians and 4 nurses at each selected hospital were also surveyed at endline only.

Community leader module: The community leader module collected community-level data on community characteristics, sources of water, access to health care, development projects operating in the area, and community participation in development. A minimum of two community leaders were surveyed in each selected village. Attempts were made to survey one health zone or health area official and one CODESA member. If no CODESA member was available, another prominent member of the community such as a village chief or teacher was interviewed. This module was administered at baseline and endline, however, the individuals who responded to the baseline wave were not necessarily the same respondents in the endline wave.

Health zone central office module: This module was used to collect organization-level information and assess ASSP's level of influence on the performance of the BCZ. Specifically, the module covered staffing, infrastructure, user fee policies, supervision and community engagement, community funding initiatives, health information systems, and support and assistance from ASSP. Data collectors surveyed the central offices within the randomly-selected subset of 32 health zones.[12] The Chief Physician of the Health Zone or a designee responded to the survey. This module was administered during the endline wave.

Regional centers for medicine distribution and procurement (CDR) module: The CDR module contained questions related to the CDR's infrastructure, staffing, stock management, product availability, procurement and distribution systems, quality assurance practices, sources of financing, challenges faced, and support and assistance from ASSP. All seven regional centers for medicine procurement and distribution that serve the sampled health zones were surveyed. The director of the CDR or a designee responded to the questionnaire. This module was administered during the endline wave.

Analytic approach

The evaluation employs a quasi-experimental research design based on population-based household survey data linked with health facility survey data. This design is complemented by a qualitative research component, as explained below. The use of multiple data analysis methods provided a robust and comprehensive assessment of the plausible impact of the overall package of ASSP-supported interventions on a range of indicators. Analyses were conducted at the individual-, household-, facility-, and health worker-levels, depending on the outcome of interest. (See Table 2 for a summary of outcome indicators and their respective units of analysis).

All point estimates from surveys were weighted to correct for differences in sampling area sizes and inaccurate estimates of village sizes. All standard errors were empirically estimated to account for correlated data at the village-level. Differences in key outcome indicators of interest between intervention areas and comparison groups and between baseline and follow-up surveys were assessed with multivariate regression modeling to account for potential confounding factors. This approach is necessary, given the non-randomized study design. Such models will also allow us to assess the association of exposures to interventions and risk factors on health outcomes.

In order to assess the impact of the ASSP project, a difference-in-differences analysis with a multiplicative interaction term in models for representing time*group assignment was used. In this way, the net program effect can be distinguished from the gross program effect, thereby limiting the bias of

[12] The same health zones were visited for the hospital and health zone central office modules.

secular drift, external confounding factors, and potential confounding factors, to the extent possible. For all models, the different levels of analysis (e.g. village or individual) can have an impact on how one needs to adjust the standard errors. To account for this, standard errors were adjusted for clustering at the village-level using the survey commands in Stata. Many of the analyses, when appropriate, was stratified by gender, wealth groups, and province, to assess whether the project had differential impacts across various sub-groups. Additionally, controls for the presence of the World Bank intervention were included in all models.

To assess the impact of ASSP on the amount of out-of-pocket expenditure, a generalized linear model (GLM) with log link was used, which can account for zero expenditures as well as the skewed distribution of spending. The results are reported as marginal effects and statistical tests are against the null hypotheses of equal spending between the ASSP and non-ASSP groups. A guide to interpreting the statistical results in this report can be found in Appendix B.

It is important to point out that the difference-in-differences modeling approach hinges on the assumption that the effects of selection conditional on unobservable factors is solely through a time-invariant trend term. This is admittedly a strong assumption, which is difficult for us to verify in the absence of suitable pre-baseline trend data for ASSP and non-ASSP areas. For example, it is possible that if the treatment areas had worse health outcomes at baseline than the matched comparison areas, then they might also have had slower rates of improvement than matched comparison areas. Unfortunately, this assumption could not be rigorously tested due to the unavailability of survey data prior to the baseline.

After conducting the baseline survey, the Tulane team learned that the World Bank planned to assist the government to introduce a performance-based financing (PBF) project in some of the matched comparison areas covered by the ASSP baseline survey. Tulane later learned that the contracts that stipulate the payment of performance-based bonuses to health staff in health zones that were included in the ASSP impact evaluation were not signed until the summer of 2017, around the time the endline survey was carried out. Because there is a possibility that the program may have influenced the results of the ASSP impact evaluation, we included in our regression models an indicator that controls for exposure to both modes of World Bank support. Of the 62 health zones in non-ASSP areas surveyed for the endline, 9 received cash only and 12 received the full PBF intervention.

vi. Qualitative component

The qualitative component is focused on aspects of the ASSP theory of change related to a) the delivery and utilization of maternal services, b) the delivery and utilization of child health services, and c) child nutrition. The research used theme-specific conceptual models to examine ASSP-supported strategies in these thematic areas.

The three-delay model (Thaddeous & Maine, 1994) is applied to the examination of facility-based services (maternal health care, treatment and prevention of child illness). The three-delay model identifies the following elements identified as key determinants of health service utilization:

- Decisions whether to seek health care and the type of services to seek (influenced by socio-economic, cultural factors)
- Accessibility of services (financial and physical accessibility)
- Quality of care (adequate and appropriate treatment and preventive care, interpersonal communications with the health provider)

The UNICEF conceptual framework designed to assess determinants of child malnutrition was used to analyze child nutrition services (United Nations Children's Fund, 2015). These determinants include:

- Dietary intake focusing on changes in food consumption related to the ASSP activities
- Access to food, care for women and children, health services
- Access to resources and control of health care and food intake (human, economic, and organizational resources)

Data and Sampling

A mix of qualitative research methods was employed, with separate study designs for each sub-component (e.g. maternal health, child health, child nutrition). The research was carried out in the provinces of North Ubangi and Maniema where percentages of women delivering in health facilities vary from 61 percent in North Ubangi to 27 percent in Maniema (Tulane University School of Public Health and Tropical Medicine, 2015). In each province, one high performing health zone (where facility-based deliveries have increased during the ASSP intervention) and one low performing health zone (where facility-based deliveries have plateaued or decreased during the ASSP intervention) were selected. Additionally, interviews with IMA staff, DFID staff, and MOH officials in Kinshasa were conducted.

Data collection for all study sub-components was carried out in the same research zones but in different health areas over a two-week period, with the maternal health component carried out in one health area, the child health component in a second health area, and the child nutrition component conducted in a third health area in the same health zone. Data collectors conducted interviews and focus groups with the aid of pre-developed discussion guides; these guides were pre-tested in Kinshasa prior to data collection. Efforts were made to identify differences between ASSP project approaches and actual implementation and why these discrepancies occurred. A description of the study design and target population for each sub-component is as follows:

Maternal health

The sampling framework included women who either delivered in a health area facility or at home within the last six months. In-depth interviews were carried out to examine a range of topics including knowledge of antenatal and facility-based care, household decision-making regarding utilization of facility-based maternity care, the number and timing of ANC visits and why these visits were made, barriers to accessing antennal and delivery care, perceptions of quality of care in the health facilities, and the cost of maternity care and how costs were covered. In addition, in-depth interviews were conducted with facility-based service providers including the *Infirmier Titulaire de l'Aire de Santé* (IT) and midwife and *relais communautaires* (RECOs) to assess ASSP project activities such as equipment and supplies received, training, workload, salary support or other forms of motivation, referral systems during complicated deliveries and supervision of health workers. In-depth interviews were administered with members of the CODESA to evaluate training they have received, changes in their role in overseeing health activities, and perceptions of the ASSP approach.

Key informant interviews were conducted to assess program implementation since the inception of the project, perceptions of ongoing activities, opinions related to barriers to achieving outcome indicators, and recommendations for future activities. Key informants included representatives of the MOH at the MCZ, provincial, and national levels, implementing partners collaborating on activities, and IMA representatives.

Women who have delivered in the area health facility or at home in the past six months were interviewed to assess barriers and motivations to delivering in a health center or at home. The sampling framework in each of four health zones included 2-3 women who delivered in a health area facility within the last six months and 2-3 women who delivered at the household level in the last six months to understand factors affecting decision making regarding place of delivery. All respondents were permanent residents of the health area. Women who had delivered in the health facilities were purposively selected from facility records. Women who delivered in households were identified through records maintained by the RECOs.

In-depth interviews were conducted with facility-based service providers involved in maternal health care including the IT and a midwife or nurse and 1-2 randomly-selected RECOs in each of the four health zones to assess ASSP project activities. In addition, one CODESA member was interviewed.

Key informants were selected purposively based on their expertise in maternal health and involvement in the ASSP project activities. Respondents included representatives of the MOH at the BCZ (1-2 in each of the four health zones), provincial (1 in each of the two provinces), and national level (1), implementing partners collaborating on activities (1-2 in each province), and IMA representatives (1-2).

Child health services

In-depth interviews were carried out with facility-based service providers (the IT and other nurses working in the facilities) offering services for children under five years of age and RECO to assess a range of activities designed to strengthen the provision of curative and preventive care implemented at the facility and community level according to the ASSP project design. Discussion topics included training and perceptions of training conducted; supplies, equipment and medication received during the course of the project; salaries or other factors motivating health workers to provide services; and obstacles to the provision of preventive and curative care. Once again, CODESA members were questioned about any training they have received, changes in their role, and perceptions of the ASSP approach.

Focus group discussions were conducted with two groups of caregivers (mothers and grandmothers) of children under five years of age in each health zone. Each group was carried out in a different village either near to or far from the health center. Topics examined included decision making to seek health care, barriers to care-seeking (e.g. cost, distance, perceptions of services, etc.), descriptions of the health facilities, quality of care related to waiting time to receive care, communication with health providers, supplies/medications available, and cleanliness, cost, and satisfaction with the care.

Health providers offering preventative care and treatment to children under five years of age working in the health area center were purposively selected for the in-depth interviews. Respondents included the IT and possibly one other nurse, depending on the health center. We will interview 1-2 randomly-selected RECOs in each of the four health zones to assess ASSP project activities, as well as one CODESA member.

In each health zone, one village closest to the health center and one village farthest away from the health center were identified as sites for focus group discussions with child caregivers including mothers and grandmothers. Each group was comprised of 6-12 participants. Caregivers must have had a child under five years of age living in their household and be a permanent resident of the health area. Caregivers were purposively selected by the RECOs working in their village; experienced caregivers who are willing to share their opinions and experiences related to child health and care-seeking in a group setting were recruited.[13]

Child nutrition

In the same health zone, RECOs assisted with the selection of children between 12-60 months of age identified as malnourished within the last six months whose mothers were invited to enroll in project activities and who at the time of the interview either a) maintain a garden; or b) do not maintain a garden (either never started or quit). In-depth interviews were administered to mothers who maintain a garden to assess when they started gardening, why they decided to have a garden, the time they spend gardening, training, tools, and seeds received as part of the project, vegetables/crops produced in the garden, family members involved and their time commitment, utilization of garden produce, particularly related to feeding the young child, decision making regarding what to do with the food produced, perceived benefits to the malnourished child, and overall perceptions of the gardening approach. Mothers of malnourished children who chose not to maintain a garden were asked about whether they ever tried to maintain a garden, the duration of gardening activities and foods produced, and decisions related to whether or not to garden. In addition, mothers who do and do not garden were asked about the frequency of household visits carried out by the RECOs and what they entail. An additional set of questions related to health facility visits were also posed, including the frequency of visits to health facilities, services provided (e.g. weighing, education sessions or counseling, distribution of supplies such

[13] Due to budgetary and time constraints, interviews were not conducted with key informants representing the MOH, implementing partners, or IMA for this component of the study.

as plumpy nut) and perceptions of the services provided. Information on perceptions of changes in the child's condition, perceptions of the nutrition approach, and understandings of malnutrition and appropriate feeding for the malnourished child were also collected.

In addition, in-depth interviews were administered to facility-based service providers and RECOs who have participated in training related to the child nutrition project. Topics explored included their role in the project, the training received and the perceived quality of the training, equipment or supplies they have received in order to carry out their work, views on participation of the beneficiaries, supervision of the health workers, monitoring and evaluation of the child nutrition activities, challenges they face in carrying out the nutrition activities, and their perceptions of the approach.

We also conducted key informant interviews with implementing partners working in the province, MOH staff at the provincial and zonal level, and IMA representatives to understand perceptions of program activities related to planned and actual implementation, challenges faced, and recommendations for improvement of the ASSP project activities. A MOH staff at the national level will be interviewed to assess the government perspective of child nutrition programs, including the ASSP approach, and visions for the future.

In the same health zone, children between 12-60 months of age identified as malnourished within the last six months whose mothers were invited to enroll in the nutrition project activities were purposively selected. Malnourished children were identified through lists maintained by the health workers in the health facilities. Subsequently, the RECOs advised as to which mothers a) maintain a garden; or b) do not maintain a garden (either never started or quit) at the time of the study. Two to three mothers who have a garden and 2-3 mothers who do not have a garden were approached for interviews in each of the health zones studied.

Facility-based service providers who have been trained on the child nutrition activities for interviews were purposively selected. One or two RECOs who have received training on the nutrition project activities were randomly selected for in-depth interviews.

Purposive sampling was used to identify implementing partners working in each province (1-2), BCZ staff at the zonal level (1-2), and IMA representatives (1-2) overseeing the child nutrition activities, and a MOH staff member in each province and in the country capital who was primarily working on child nutrition programs. Table 2.4 presents the sample sizes for each topic.

Table 2.4. Targets for key informant and in-depth interviews and group discussions by research theme and respondent type.

Respondent category	In-depth interviews (N)	Key informant interviews (N)	Group discussions (N)
Maternal Health			

Women who have delivered in the past six months (age 18 or older)	16-24	0	0
Facility-based health workers	4-8	0	0
RECO	4-8	0	0
CODESA members	4	0	0
Representatives of the MOH, IPs, IMA	0	8-15	0
Child Health			
Female caregivers of young children < 5 years old (age 18 or older)	0	0	8
Facility-based health workers	4-8	0	0
RECOs	4-8	0	0
CODESA members	4	0	0
Child Nutrition			
Mothers of children 12-60 months of age identified as malnourished	16-24	0	0
Facility-based health workers	4-8	0	0
RECOs	4-8	0	0
Representatives of the MOH, IPs, IMA	0	8-13	0

Data collection procedures

Three data collectors traveled two each of the two research provinces, with one more senior person acting as supervisor of each data collection team. Initial data collection involved key informant interviews at the provincial and zonal level. Interviews were carried out in respondent's offices or in another location where privacy could be maintained. During initial key informant interviews, guides were used. As the study progressed, subsequent questioning of the key informants focused on clarification and interpretation of information gathered through the other data collection methods. An iterative process involving the review of completed interviews and additional questioning continued until data saturation is reached.

Research assistants were each assigned a theme (e.g. maternal health, child health, or child nutrition) on which to focus during data collection, with one research assistant primarily responsible for carrying out the required in-depth interviews and focus group discussions for each study theme. In-depth interviews with health providers were carried out in the health area facility, while interviews with mothers will be conducted in their homes. Data collectors followed a semi-structured guide.

Group discussions were comprised of 6-12 child caregivers and held in a space where relative privacy can be maintained, such as a school or church. Discussions were led by a moderator who guided the questioning; a second research assistant recorded notes to facilitate data transcription. A guide based on the research objectives and primary themes and preliminary study results procured through the other data collection methods were used.

Data analysis

Data from focus groups and key informant and in-depth interviews was recorded, transcribed, and translated. For each sub-study, data transcripts of the key informant, in-depth interviews and focus group discussions generated were reviewed and a coding system was developed. Coding categories were derived from the initial research themes and questions, as well as from key concepts that emerged during data collection. Content analysis was used to identify trends of concepts in and across individual codes. The combination of data, environmental and methodological triangulation allows for the analysis of data across different research methods (e.g. key informant and in-depth interviews) and sites and across and between respondents.

Ethics and the protection of human subjects

Equity in selection

All potential respondent meeting selection criteria were invited to participate in the evaluation, irrespective of health status or other characteristics. No sub-population was deliberately included or excluded from the study.

Risk mitigation and reporting

Physical risks to the household participants/respondents associated with a finger stick from blood drop collection were not considered more than minimal. Blood was collected using standard hygienic practices (e.g., one needle per child, disinfecting finger using alcohol swabs, etc.) and materials were disposed of according to national guidelines. The risk to data collectors of needle sticks involving HIV positive individuals and the risks of transmission were minimized as the study will use trained health personnel.

Results from the anemia testing and malaria RDTs were available immediately. Anyone testing positive for malaria or found with hemoglobin levels of less than 7g/dl were given written results and referred to the nearest health facility where treatment will be provided based on national guidelines. Anyone with severe malaria was referred to the closest hospital.

The risk of breach of confidentiality or privacy during the data collection or storage process; processes to mitigate these risks are detailed below. Household interviews were conducted in the respondent's home. Data collectors verified that no males were present before asking sensitive questions in the women's module. Focus groups were held in a semi-private location without non-participants present.

Data was kept in data collectors' possession during fieldwork. Electronic data was transmitted to a secure server. Only key personnel and data managers had access to collected data. The use of unique identifiers ensured that no data were linked to individuals.

Informed consent

The study team obtained verbal informed consent from each survey respondent and provided a local investigator's contact information. Respondents did not receive remuneration for their participation and there was no cost to participate.

Language

While the DRC's official language is French, the four national languages, Kikongo, Swahili, Tshiluba, and Lingala, are the languages predominating spoken in different regions of the country. For the propose of this study, all survey instruments, discussion guides, and consent transcripts were professionally translated from English to French and reviewed by the Tulane ORIE Research Director based in Kinshasa, as well as the KSPH researchers. The household, woman's and community leader's surveys and accompanying consent transcripts were then translated from French into Swahili, Tshiluba, and Lingala by local translation teams consisting of professional multi-lingual translators whose first language was the local language of interest. Selected questions were back-translated, and the local language translations were reviewed for accuracy. Household members and community leaders will be given the choice of language for the interview. Health facility and health worker surveys, the CDR and the BCZ surveys were administered in French. All data collectors were fluent in French as well as the dominant local language spoken in the area to which they are assigned.

Data collector training and supervision

All data collectors underwent extensive training on interview techniques, privacy, confidentiality, and the consent procedure. Health personnel were trained on the collection of biological samples. Trainings utilized standard materials developed by USAID's MEASURE/DHS Project, which carried out nationally representative household surveys in DR-Congo in 2007 and 2013.

Stakeholder involvement and investigator independence

Tulane consulted with DFID and IMA in the development of research questions and the scope of the evaluation; however, the researchers remain independent in decisions pertaining to research procedures. The methods used, strategies and activities assessed, data collection sites visited, subjects interviewed, types of data collected, and results and analysis reported are at the sole discretion of Tulane. KSPH was contracted to plan and carry out quantitative data collection. A team of independent medical anthropologists was retained to design and conduct the qualitative component of the endline. Tulane consulted with faculty members at KSPH and other Congolese experts in the interpretation of results.

Structure of the report

The first two chapters of this report describe the background and methods of the impact evaluation. Following these, the General Characteristics chapter summarizes descriptive statistics from the baseline and endline surveys. The results chapters that follow summarize the quantitative and, when available, the qualitative findings related to the impact of the ASSP project on specific topical areas. Each results chapter summarizes ASSP's approach in that area, summarizes the findings from the analyses, and concludes with a discussion explaining the findings in context and offering recommendations for future health programming in the DRC. The results chapters are designed to stand alone so that readers with interest in a specific topic area are not required to read the full report. Figures are integrated into the body of the chapter, while tables are annexed at the end of each chapter due to the large quantities of tables. The report concludes with a discussion chapter that synthesizes the findings from each of the topic areas.

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Chapter 3
General Characteristics

Acronyms

ASSP	Access to Primary Health Care (Project)
BCZ	Bu*reau central de zone* (Health zone central office)
CDR	*Centre de distribution regionale* (Regional drug distribution center)
DHIS2	District health information system 2
DPS	*Division Provinçiale de Santé* (Provincial health division)
FEDECAM	Federation of Essential Drugs Procurement Centers
NGO	Non-governmental organization
SNIS	Système National d'Information Sanitaire (National health information system)

i. Household characteristics

Table 3.1 shows the household response rates from the baseline and endline surveys in ASSP and non-ASSP areas. The response rates were above 98 percent in all cases.

Table 3.1. Household response rates in 2014 and 2017 between ASSP and non-ASSP areas.

	2014		2017	
Characteristics	**ASSP**	**Non-ASSP**	**ASSP**	**Non-ASSP**
Household Interviews				
Household selected	1,400	1,400	2,160	2,065
Household occupied	1,395	1,385	2,149	2,046
Household interviewed	1,394	1,380	2,149	2,045
Response rates	99.6	98.6	99.5	99.0

The characteristics of members of surveyed households are shown in Table 3.2. There were no significant differences between ASSP and non-ASSP areas in age, sex, mean number of members per household, wealth quintile or the educational attainment of the head of household. This was true both at baseline and endline.

Table 3.2. Comparison of individual-level characteristics in 2014 and 2017 between ASSP and non-ASSP areas.

	2014		p-value	2017		p-value
Characteristics	**ASSP**	**Non-ASSP**		**ASSP**	**Non-ASSP**	
Age group			0.422			0.598
<5	19.9	22.1		21.3	21.4	
5-9	17.9	17.7		18.3	17.8	
10-14	13.3	13.8		13.7	14.2	
15-19	9.2	9.7		8.5	9.1	
20-24	6.2	6.4		6.3	6.0	
25-29	6.9	6.8		5.1	5.3	
30-34	5.7	5.3		5.9	6.5	
35-39	4.2	4.5		4.9	4.6	
40-44	4.0	3.7		3.4	3.8	
45-49	2.7	2.4		2.2	2.2	
50-54	3.7	3.0		4.1	3.6	
55-59	2.5	1.9		2.5	2.7	
60-64	1.9	1.2		1.8	1.4	
65+	1.8	1.6		2.0	1.6	
Setting			**0.015**			0.239
Rural	88.1	97.3		87.2	94.1	
Urban	11.9	2.7		12.8	6.0	

Table 3.2 (con't). Comparison of individual-level characteristics in 2014 and 2017 between ASSP and non-ASSP areas.

	2014		p-value	2017		p-value
Characteristics	**ASSP**	**Non-ASSP**		**ASSP**	**Non-ASSP**	
Sex			0.163			**0.013**
Female	49.9	51.4		50.7	48.7	
Male	50.1	48.6		49.3	51.3	
Mean number of residents per household	5.1	5.5	**<0.001**	5.3	5.6	**<0.001**
Wealth quintile			0.803			0.241
Low	18.7	20.1		21.1	12.9	
Low middle	19.7	17.5		19.5	18.1	
Middle	17.9	15.0		18.1	20.9	
High middle	16.1	16.2		16.9	18.9	
High	27.7	31.2		24.5	29.2	
Education attained**			0.804			0.215
No education	15.0	13.0		17.3	12.4	
Some primary	24.3	23.6		21.8	23.2	
Complete primary	50.6	52.9		58.3	60.8	
Complete secondary	10.1	10.5		2.6	3.6	

*Note: Statistical significance is considered at $p<0.05$.

**Restricted to household members ages 15-49

Figure 3.1 illustrates the age profile of the de facto household populations at baseline and endline.

Figure 3.1. Age profile of de facto household population

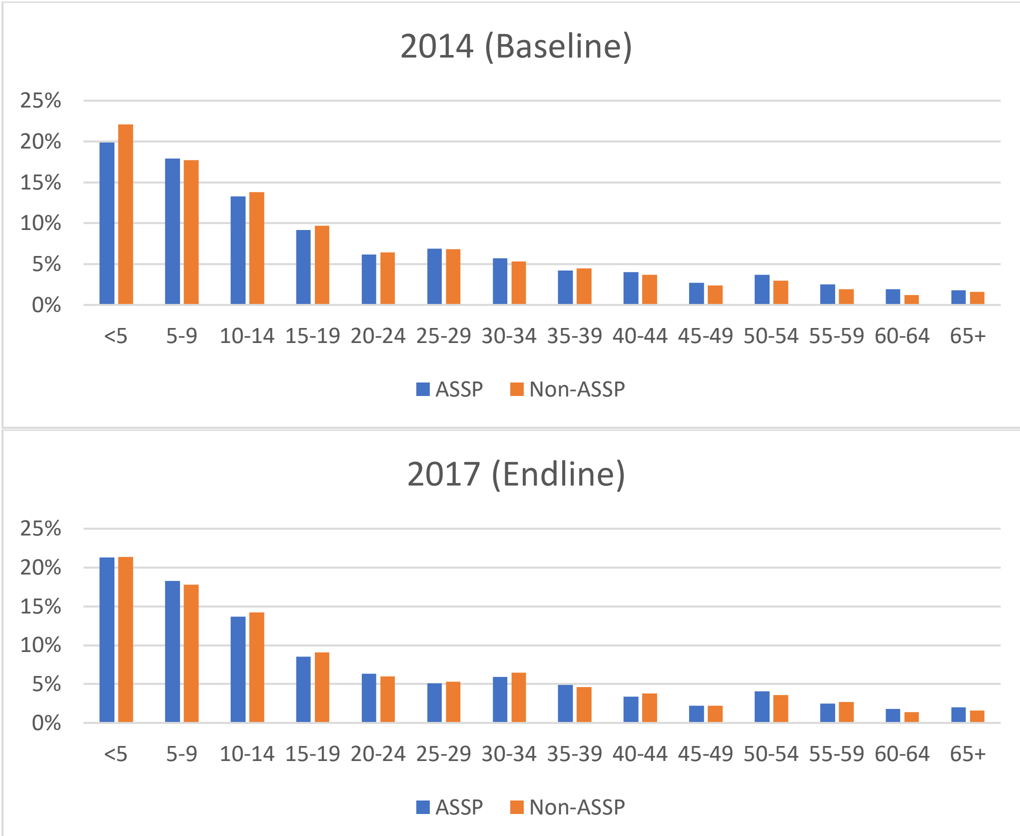


Table 3.3 shows characteristics of surveyed households. A significantly higher percentage of ASSP households cooked outside at both baseline and endline.

Table 3.3. Comparison of household-level characteristics in 2014 and 2017 between ASSP and non-ASSP areas.

	2014		**p-value**	**2017**		**p-value**
Characteristics	**ASSP**	**Non-ASSP**		**ASSP**	**Non-ASSP**	
Electricity	6.2	6.9	0.903	7.5	9.4	0.581
Rooms for sleeping			0.450			0.177
1	22.1	23.8		16.8	17.8	
2	38.3	33.9		33.5	27.1	
3+	39.6	42.3		49.7	55.1	
Main fuel for cooking			0.149			0.383
Charcoal	2.6	5.4		4.4	6.9	
Wood	97.2	94.2		95.5	93.0	
Other fuel	0.2	0.4		0.1	0.1	
Location of cooking			0.375			**0.002**
In the house	19.3	24.3		18.7	36.9	
In a separate house	23.6	27.5		21.0	20.5	
Outside	57.1	48.2		60.4	42.6	

*Note: Statistical significance is considered at p<0.05.

ii. Characteristics of women of reproductive age

The response rates for the women's module are shown in Table 3.4. Of all eligible women identified, over 92 percent responded in all cases.

Table 3.4. Women of reproductive age response rates in 2014 and 2017 between ASSP and non-ASSP areas.

	2014		2017	
Characteristics	**ASSP**	**Non-ASSP**	**ASSP**	**Non-ASSP**
Interview results				
Women eligible	1,445	1,527	2,110	2,055
Women interviewed	1,359	1,410	1,975	1,935
Response rates	94.0	92.3	93.6	94.2

Characteristics of respondents to the women's module are displayed in Table 3.5. At endline, there were significant differences between ASSP and non-ASSP areas in women's education level.

Table 3.5. Characteristics of women of reproductive age in 2014 and 2017 between ASSP and non-ASSP areas.

	2014			2017		
Characteristics	**ASSP**	**Non-ASSP**	**p-value**	**ASSP**	**Non-ASSP**	**p-value**
Setting			**0.045**			0.220
Rural	88.6	96.8		85.4	93.3	
Peri-urban	11.4	3.2		14.7	6.8	
Wealth quintile			0.824			0.355
Low	6.0	4.3		21.2	14.6	
Low middle	18.5	19.7		18.2	17.0	
Middle	28.3	27.1		16.7	22.3	
High middle	23.6	22.2		16.7	17.8	
High	23.7	26.8		27.2	28.4	
Education attained			0.898			0.484
No education	25.5	23.6		27.1	22.6	
Some primary	30.4	30.9		36.3	41.1	
Completed primary	40.5	41.3		35.8	35.3	
Completed secondary	3.7	4.3		0.8	1.0	

*Note: Statistical significance is considered at $p<0.05$.

Table 3.5 (con't). Characteristics of women of reproductive age in 2014 and 2017 between ASSP and non-ASSP areas.

	2014			**2017**		
Characteristics	**ASSP**	**Non-ASSP**	**p-value**	**ASSP**	**Non-ASSP**	**p-value**
Marital status			0.563			0.626
Never married	18.0	19.3		13.9	15.4	
Married/In a union	71.3	72.1		78.6	78.0	
Divorced/Widowed/ Separated	10.7	8.6		7.5	6.6	
Number of living children			0.862			0.852
0	27.3	27.4		24.8	25.8	
1-3	39.3	38.8		39.4	38.8	
4-6	27.0	26.2		28.7	29.1	
7-9	6.0	6.7		6.5	6.0	
10+	0.5	0.9		0.5	0.3	

*Note: Statistical significance is considered at p<0.05.

iii. Health facility characteristics

Characteristics of the health facilities surveyed at baseline and endline are summarized in Table 3.6. At both baseline and endline, there were significant differences in whether there was a health worker present at all times for emergencies. In both waves, ASSP facilities were more likely to have a health worker on duty at all times.

Table 3.6. Characteristics of facilities in ASSP and non-ASSP areas

	2014			2017		
	ASSP	**Non-ASSP**	**p-value**	**ASSP**	**Non-ASSP**	**p-value**
Facility type						
Reference health center	13.0	19.4	0.151	12.4	12.5	0.985
Health center	82.6	80.6		85.2	85.4	
Health post/other	4.4	0.0		2.5	2.1	
Setting						
Rural	85.5	94.12	**0.096**	87.4	93.75	0.137
Peri-urban	14.5	5.88		12.6	6.25	
Trained health worker assigned to and present at the facility at all times for emergencies						
Yes, duty schedule observed	65.2	50.0	**0.008**	74.7	47.4	**0.001**
Yes, duty schedule not observed	30.4	27.9		13.8	31.6	
No	4.35	22.06		11.5	21.1	
Total facilities (n)	**69**	**68**		**87**	**96**	

*Note: Statistical significance is considered at p<0.10.

Table 3.7 tabulates the services offered at health facilities. No significant differences were found.

Table 3.7. Services offered in facilities in ASSP and non-ASSP areas

	2014			**2017**		
	ASSP	**Non-ASSP**	**p-value**	**ASSP**	**Non-ASSP**	**p-value**
General outpatient	100.0	97.1	0.357	100.0	100.0	n/a
General inpatient medical	20.3	30.9	0.155	25.3	22.1	0.614
General inpatient surgical	13.0	16.2	0.604	11.5	12.6	0.814
Total facilities (n)	**69**	**68**		**87**	**96**	

*Note: Statistical significance is considered at p<0.10.

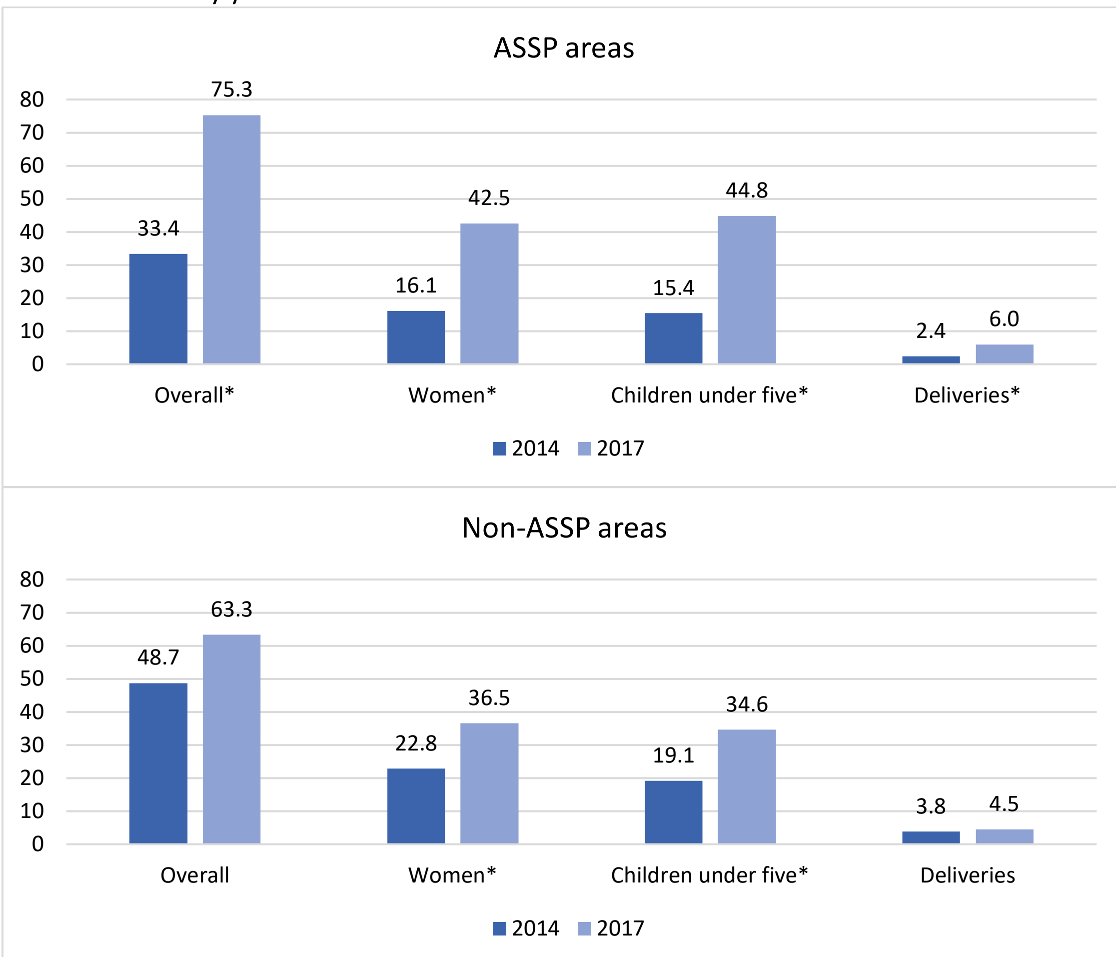
The mean population of the catchment area (i.e. health area), as reported by respondents, and the volumes of services provided, are shown in Table 3.8. The volume of deliveries and outpatient visits for women were significantly higher in non-ASSP areas at baseline. By endline, there were no significant differences between ASSP and non-ASSP areas. Figure 3.2 shows changes over time within sampling domains. ASSP areas saw significant increases in all four visit types; non-ASSP areas saw significant increases in visits by women and children under five.

Table 3.8. Mean population of catchment area and number of consultations and deliveries per 1,000 people in one month preceding the survey

	2014			**2017**		
	ASSP	**Non-ASSP**	**p-value**	**ASSP**	**Non-ASSP**	**p-value**
Population of catchment area (respondent estimate)	6,226	5,839	0.671	3,906	4,985	0.237
Total outpatient visits	33.4	48.7	0.131	75.3	63.3	0.550
Total outpatient visits by women	16.1	22.8	**0.092**	42.5	36.5	0.450
Total outpatient visits by children under five	15.4	19.1	0.373	44.8	34.6	0.907
Total deliveries	2.4	3.8	**0.031**	6.0	4.5	0.641
Total facilities (n)	**69**	**68**		**87**	**96**	

*Note: Statistical significance is considered at p<0.10.

Figure 3.2. Outpatient visits per 1,000 people in one month preceding the survey in ASSP and non-ASSP areas by year



*Difference between 2014 and 2017 levels statistically significant at *p*<0.10

Table 3.9 describes the source of electricity at health facilities. There was only one significant difference between ASSP and non-ASSP areas at baseline (presence of a solar panel). By endline, however, significantly higher percentages of ASSP facilities had a source of electricity, electricity that was functioning at the time of the survey, solar panels, and solar panel batteries.

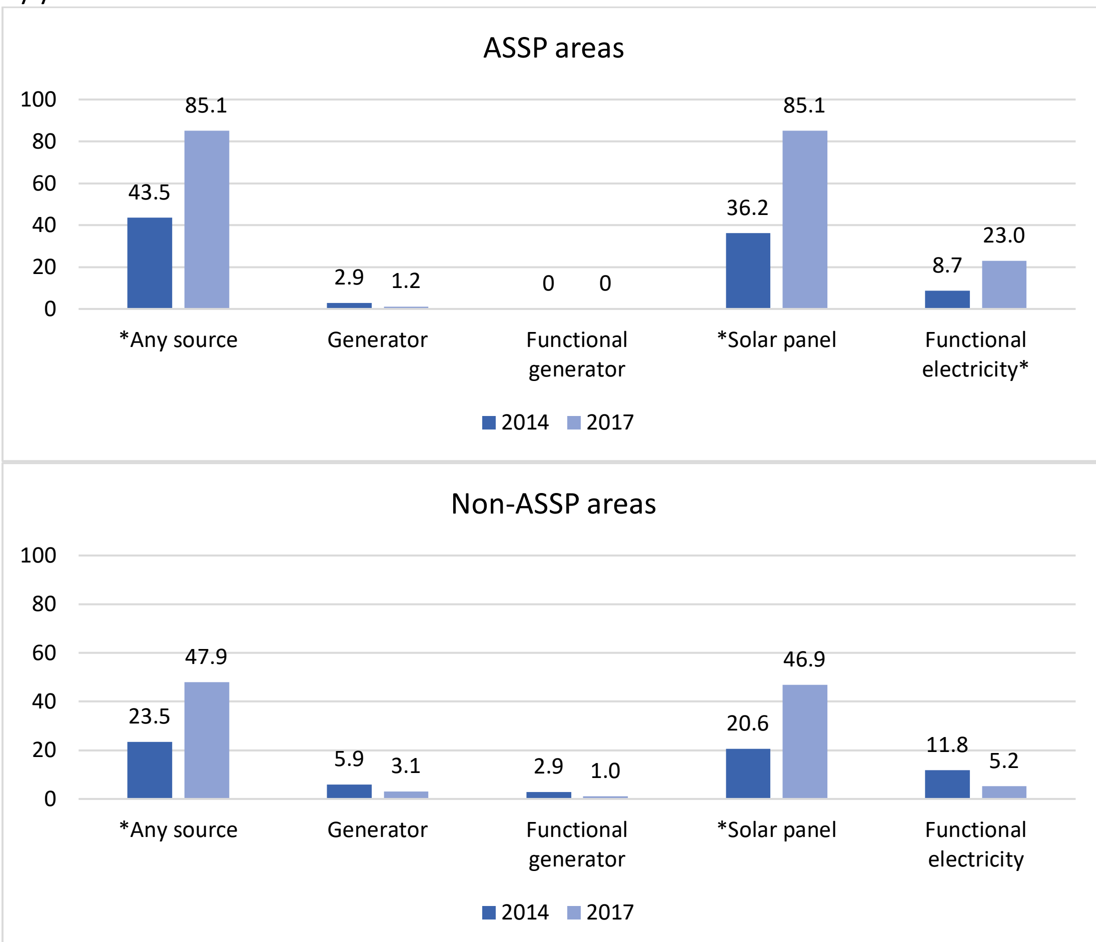
Table 3.9. Sources and functionality of electricity in health facilities in ASSP and non-ASSP areas

	2014			2017		
	ASSP	**Non-ASSP**	**p-value**	**ASSP**	**Non-ASSP**	**p-value**
General						
Any source*	43.5	23.5	**0.013**	85.1	47.9	**<0.001**
Power cuts occur during working hours	15.9	8.8	0.287	6.9	1.04	**0.001**
Functional electricity at time of survey	8.7	11.8	0.143	23.0	5.2	**0.001**
Backup Generator						
Presence of generator	2.9	5.9	0.393	1.2	3.1	0.414
Functional and fueled generator at time of survey	0.0	2.9	0.357	0.0	1.0	0.558
Solar panel						
Presence of a solar panel	36.2	20.6	**0.042**	85.1	46.9	**<0.001**
Solar panel batteries	30.4	16.2	0.118	75.9	32.3	**<0.001**
Total facilities (n)	**69**	**68**		**87**	**96**	

Notes: Statistical significance is considered at p<0.10. *Includes surveyor observation, generator, or solar panel.

Figure 3.3 shows the sources and functionality of electricity in health facilities within ASSP and non-ASSP areas. Both ASSP and non-ASSP areas saw significant increases in having any source of electricity, having a solar panel. ASSP areas also saw increases in the percentage of facilities with functional electricity on the day of the survey. Overall, a higher percentage of facilities in ASSP areas had electricity compared with non-ASSP areas.

Figure 3.3. Sources and functionality of electricity in health facilities in ASSP and non-ASSP areas by year



*Difference between 2014 and 2017 levels statistically significant at $p<0.10$

Table 3.10 describes the water and sanitation infrastructure of health facilities. At endline a significantly higher percentage of ASSP facilities had sanitary toilets and separate toilets for men and women compared with facilities in non-ASSP areas.

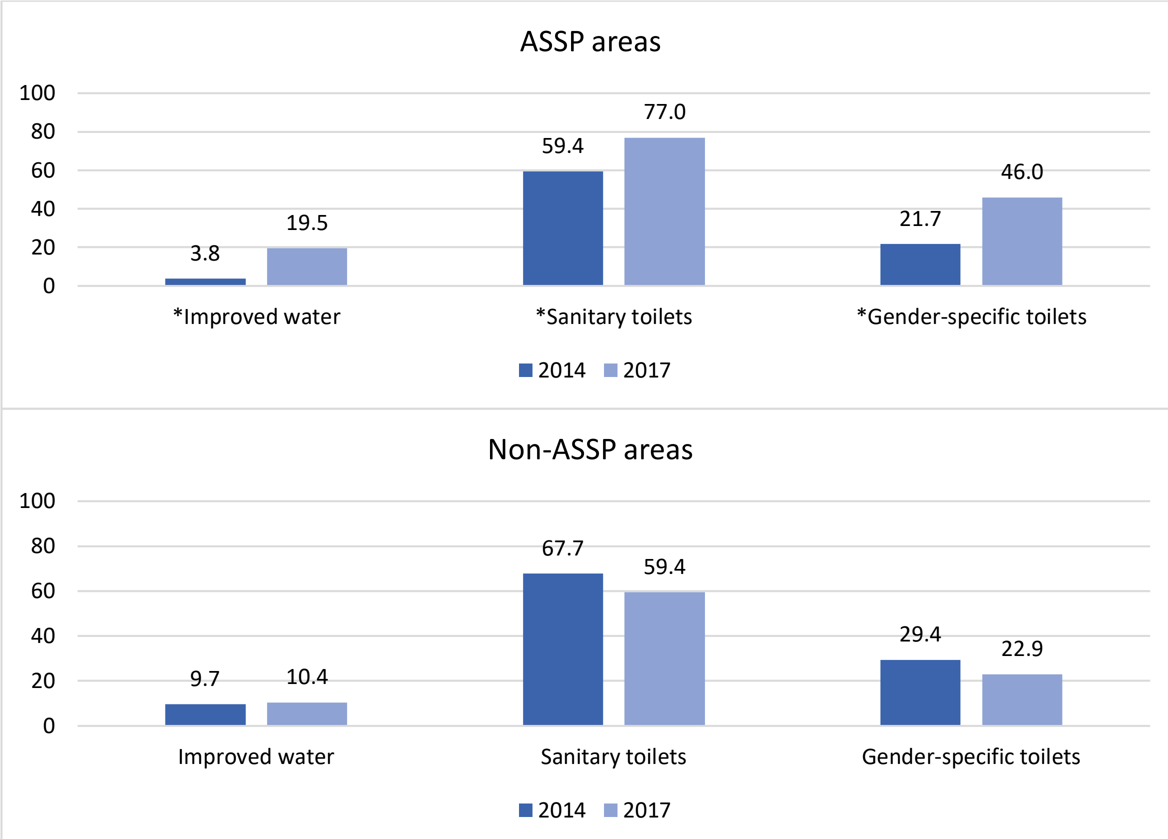
Table 3.10. Water and sanitation condition of facilities in ASSP and non-ASSP areas

	2014			2017		
	ASSP	**Non-ASSP**	**p-value**	**ASSP**	**Non-ASSP**	**p-value**
Water						
Drinking water available	21.7	17.7	0.494	33.3	20.8	0.057
Improved source	3.8	9.7	0.192	19.5	10.4	0.137
Unimproved source	18.1	20.4		13.8	10.4	
Sanitation						
Sanitary toilets available for patients	59.4	67.7	0.317	77.0	59.4	**0.011**
Separate toilets for men and women	21.7	29.4	0.490	46.0	22.9	**0.003**
Total facilities (n)	**69**	**68**		**87**	**96**	

*Note: Statistical significance is considered at p<0.10.

Figure 3.4 displays changes over time in ASSP and non-ASSP areas with regards to water and sanitation at health facilities. ASSP-supported facilities had significant increases in the availability of improved drinking water, in sanitary toilets for patients, and separate toilets for men and women. Non-ASSP facilities did not have any significant changes. Overall, water and sanitation conditions were better in ASSP facilities compared with non-ASSP facilities at endline.

Figure 3.4. Water and sanitation at health facilities in ASSP and non-ASSP areas by year



*Difference between 2014 and 2017 levels statistically significant at *p*<0.10

Table 3.11 shows the percentage of health facilities with equipment needed for basic services, infection control, normal deliveries, and complicated deliveries. There were no significant differences between ASSP and non-ASSP areas at baseline. In contrast, at endline, a significantly higher percentage of ASSP facilities had equipment for infection control and normal deliveries.

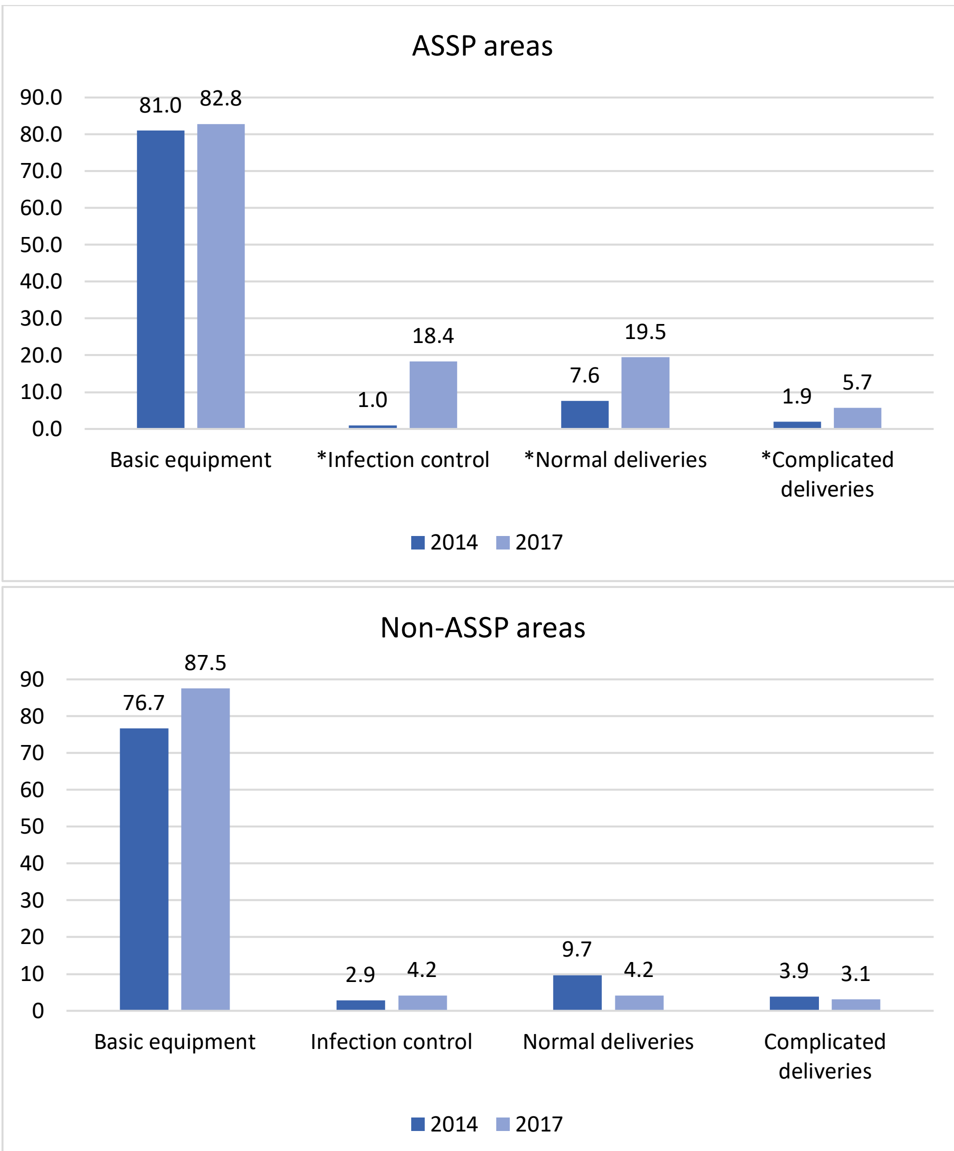
Table 3.11. Equipment available at facilities in ASSP and non-ASSP areas

	2014			**2017**		
	ASSP	**Non-ASSP**	**p-value**	**ASSP**	**Non-ASSP**	**p-value**
Basic equipment	81.0	76.7	0.453	82.8	87.5	0.366
Infection control	1.0	2.9	0.303	18.4	4.2	**0.002**
Normal deliveries	7.6	9.7	0.592	19.5	4.2	**0.001**
Complicated deliveries	1.9	3.9	0.394	5.7	3.1	0.386
Total facilities (n)	**69**	**68**		**87**	**96**	

*Note: Statistical significance is considered at p<0.10.

Figure 3.5 illustrates the changes in availability of equipment at health facilities in ASSP and non-ASSP areas over time. Overall, rates of basic equipment were high (>75 percent) and neither area experienced significant change between baseline and endline. Availability of equipment for infection control, normal deliveries, and complicated deliveries increased significantly in ASSP areas only. At endline, higher proportions of ASSP-supported facilities had all types of equipment assessed except for basic equipment.

Figure 3.5. Equipment available at health facilities in ASSP and non-ASSP areas by year



*Difference between 2014 and 2017 levels statistically significant at $p<0.10$

The presence of family planning commodities in health facilities is described in Table 3.12. At baseline, a significantly higher proportion of ASSP facilities had oral contraceptives, intrauterine devices, and implant kits. By endline, a significantly higher proportion of ASSP facilities had all family planning commodities assessed: condoms, oral contraceptives, intrauterine devices, intrauterine device kits, and implant kits.

Table 3.12. Family planning commodities in facilities in ASSP and non-ASSP areas

	2014			2017		
	ASSP	**Non-ASSP**	**p-value**	**ASSP**	**Non-ASSP**	**p-value**
In stock on day of survey						
Condoms	46.4	51.5	0.551	74.7	53.1	**0.004**
Oral contraceptives	30.4	13.2	**0.050**	78.2	16.7	**<0.001**
Intrauterine device	14.5	10.3	0.627	40.2	11.5	**<0.001**
All three contraceptives	8.7	8.8	0.979	29.9	8.3	**<0.001**
In stock over past month*						
Condoms	45.7	38.3	0.315	73.6	46.9	**<0.001**
Oral contraceptives	30.5	20.4	**0.095**	71.3	14.6	**<0.001**
Intrauterine device	16.2	6.8	**0.034**	37.9	10.4	**<0.001**
All three contraceptives	10.5	3.9	**0.006**	27.6	7.3	**<0.001**
Any functional kits						
Intrauterine device	7.3	2.9	0.253	20.7	7.3	**0.008**
Implant	15.9	4.4	**0.026**	26.4	6.3	**<0.001**
Total facilities (n)	**69**	**68**		**87**	**96**	

Note: Statistical significance is considered at p<0.10. *Includes the day of the survey.

Figure 3.6 shows changes in availability of family planning commodities over time. Facilities in non-ASSP areas did not experience any significant changes. All three commodities increased significantly in prevalence in ASSP areas. Overall, ASSP had much higher levels of availability of family planning commodities at endline.

Figure 3.6. Family planning commodities in facilities in ASSP and non-ASSP areas by year

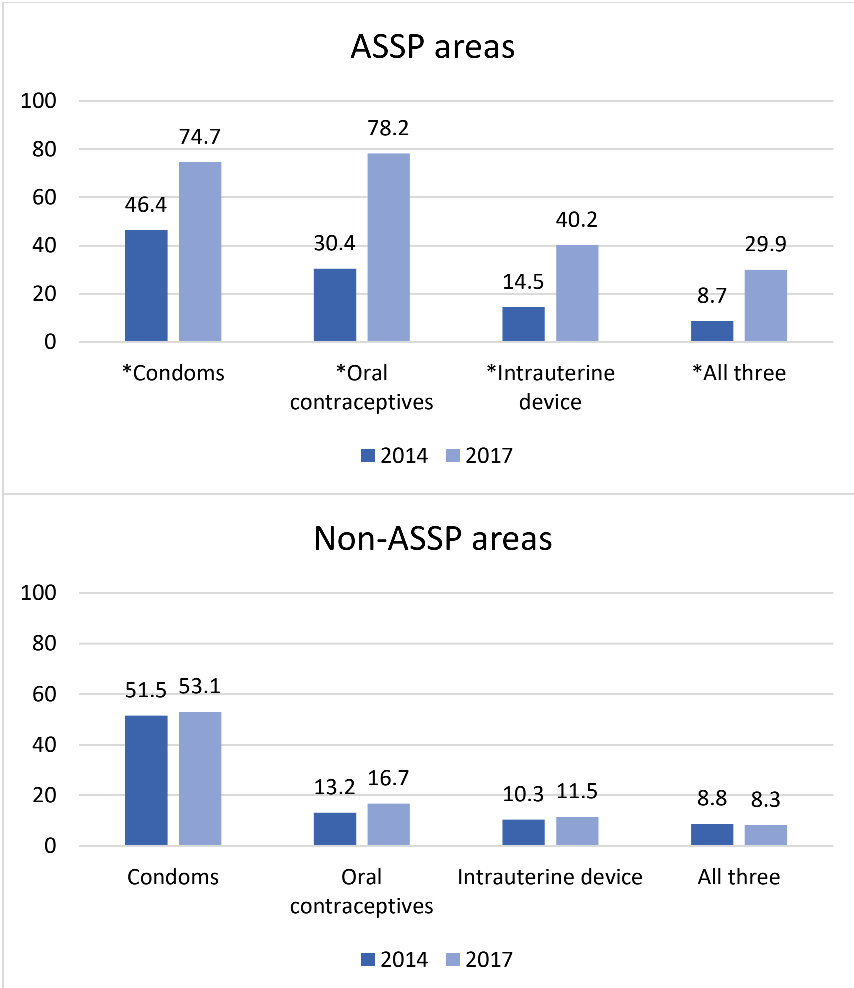


Table 3.13 shows the availability of family planning commodities on the day of the survey in ASSP-supported facilities by sampling domain. Condoms were the most prevalent commodity. All three commodities increased in availability between baseline and endline in both domains. IUD's remained lowest in terms of availability. In all cases, Nord Ubangi had lower levels of family planning commodities in-stock compared with Maniema/Tshopo.

Table 13.3. Availability of family planning commodities in ASSP-supported facilities on the day of the survey, by year and sampling domain

	Maniema/Tshopo		Nord Ubangi	
	2014	**2017**	**2014**	**2017**
Condoms	59.4	64.8	38.8	62.1
Oral contraceptives	40.6	52.3	3.0	39.1
Intrauterine devices	21.7	35.2	3.0	15.3

Table 3.14 displays the availability of essential medicines in facilities on the day of the survey and continuously over the past month. Findings were mixed; at baseline, ASSP facilities were significantly more likely to have Oxytocin and Ciprofloxacin and less likely to have Ibuprofen on the day of the survey. At endline ASSP facilities were significantly less likely to have Diazepam and more likely to have Ibuprofen or paracetamol. Significantly higher percentages of ASSP facilities had Oxytocin in stock over the past month; this was true at both baseline and endline.

Table 3.14. Availability of essential medicines in facilities in ASSP and non-ASSP areas

	2014			2017		
	ASSP	**Non-ASSP**	**p-value**	**ASSP**	**Non-ASSP**	**p-value**
In stock on day of survey						
Oxytocin	87.6	67.0	**<0.001**	75.9	64.6	**0.097**
Sulphadoxine Pyrimethamine	74.3	79.6	0.362	73.6	62.5	0.110
Diazepam	74.3	76.7	0.686	46.0	65.6	**0.007**
Ibuprofen or paracetamol	70.5	85.4	**0.009**	90.8	82.3	**0.094**
Cotrimazole	63.8	73.8	0.121	51.7	57.3	0.450
Ciprofloxacin	60.0	42.7	**0.013**	23.0	29.2	0.343
Amoxicillin	54.3	67.7	0.108	69.8	65.6	0.551
Atenolol	5.7	1.9	0.157	0.0	0.0	n/a
In stock over past month*						
Oxytocin	78.1	52.4	**<0.001**	69.0	50.0	**0.009**
Sulphadoxine Pyrimethamine	64.8	68.0	0.625	67.8	49.0	**0.010**
Diazepam	56.2	63.1	0.309	29.9	57.3	**<0.001**
Ibuprofen or paracetamol	58.1	67.0	0.185	72.4	62.5	0.154
Cotrimazole	45.7	52.3	0.333	46.0	47.9	0.793
Ciprofloxacin	50.5	34.0	**0.016**	12.6	24.0	**0.049**
Amoxicillin	34.3	44.1	0.237	55.8	47.9	0.287
Atenolol	2.86	1.0	0.322	0.0	0.0	n/a
Total facilities (n)	**69**	**68**		**87**	**96**	

*Including day of survey

*Note: Statistical significance is considered at p<0.10.

v. Health zone central office (BCZ) characteristics

Among the BCZs serving the villages selected for the household survey 15 were randomly selected for the BCZ module. Twelve were in ASSP areas and 13 were in non-ASSP areas. The survey covered topics including basic infrastructure, participation in training, health information systems, supervision, user fee guidelines. ASSP-supported facilities were asked about ASSP support and participation in ASSP initiatives.

Table 3.15 shows the level of basic infrastructure of each BCZ. ASSP areas were significantly less likely to have cell phone reception and more likely to have internet access in the office.

Table 3.15 Basic infrastructure

	2017		
	ASSP (n=12)	Non-ASSP (n=13)	p-value
Cell phone reception	0.0	41.7	**0.009**
Electricity	46.2	58.3	0.543
Currently functioning electricity	30.8	50.0	0.416
Power cuts (excluding electricity supplied by a generator backup) during the hours when the facility is open	30.8	25.0	0.391
Office generator for electricity	23.1	16.7	0.429
Currently functioning generator with fuel	7.7	8.3	0.709
Functional solar panel	46.2	58.3	0.543
Functional battery for solar panel	46.2	58.3	0.543
Internet in the office	100.0	66.7	**0.023**

*Note: Statistical significance is considered at p<0.10.

The types of training that BCZ staff received during the last 12 months are shown in Table 3.16. The most common training in both ASSP and non-ASSP areas was District Health Information System 2 (DHIS2) training, with well over half of offices participating.

Table 3.16. Trainings attended by respondents during the last 12 months

	2017		
	ASSP (n=12)	Non-ASSP (n=13)	p-value
DHIS2	69.2	58.3	0.571
SNIS	30.8	50	0.327
Clinical practices	15.4	41.7	0.144
Management/ administration practices	15.4	33.3	0.294
Simplified community scorecard*	15.4	N/A	N/A
CODESA revitalization	15.4	25	0.548
Community health endowment*	7.69	N/A	N/A

*Indicates an activity limited to ASSP areas
*Note: Statistical significance is considered at p<0.10.

Table 3.17 describes the use of HIS in surveyed BCZs. All offices reported using the harmonized National Health Information System (SNIS) reporting tool and using DHIS2 software in the BCZ. Offices in ASSP areas were significantly more likely to report the DHIS2 to be functioning on the day of the survey and to be able to log in successfully.

Table 3.17. Health information systems

	2017		
	ASSP (n=12)	Non-ASSP (n=13)	p-value
Utilization of the harmonized SNIS reporting tool		100.0	100.0
Frequency of required submission of SNIS reports to the BCZS by health facilities			0.588
Once per month	84.6	91.7	
More than once per month	15.4	8.3	
Use of DHIS2 software in BCZ	100.0	100.0	
Functionality of the DHIS2 software on day of survey	92.31	16.7	**< 0.001**
Respondent demonstrated logging into the system on day of survey	91.7	25.0	**0.001**

*Note: Statistical significance is considered at p<0.10.

Characteristics of management and supervision within the BCZs are summarized in table 3.18. All BCZs held routine managerial meetings with minutes available and made monthly meetings with health facilities for which reports were available.

Table 3.18. Management and supervision

	2017		p-value
	ASSP (n=12)	Non-ASSP (n=13)	
Routine meetings for reviewing managerial or administrative matters held	100.0	100.0	
Meetings occur monthly or more often	84.6	100.0	0.157
Meeting minutes available	100.0	100.0	
Supervisory visits			
Supervisory visits to health facilities occur	100.0	100.0	
Supervisory visits occur monthly or more often	100.0	100.0	
Supervisory reports available	100.0	100.0	

*Note: Statistical significance is considered at p<0.10.

The survey assessed whether BCZs had guidelines for user fees, both generally and for indigent patients, and if so where the guidelines originated (Table 3.19). All ASSP-supported BCZs reported having user fee guidelines in place, the majority of which were established by the DPS. Interestingly, none of the guidelines in the non-ASSP areas came from the Provincial Health Division (DPS). Non-ASSP BCZs more frequently reported having guidelines for indigent patients.

Table 3.19. User fees

User fees	2017		p-value
	ASSP (n=12)	Non-ASSP (n=13)	
User fee guidelines in place			0.153
Yes, guidelines observed	61.5	50.0	
Yes, not observed	38.5	25.0	
No guidelines	0.00	25.0	
Origination of the user fee guidelines			**0.003**
DPS	69.2	0	
ASSP project	15.4	0	
National Ministry of Health	7.7	16.7	
Other	7.7	33.3	
BCZ creates the guidelines	0	25	
No guidelines	0	25	
Separate fee schedule for indigent patients	46.2	75.0	0.141
Guidelines on the exemption of payments for indigent patients			0.834
Yes, guidelines observed	23.1	16.7	
Yes, not observed	30.8	41.7	
No guidelines	46.2	41.7	
Origination of the exemption guidelines			**0.003**
DPS	53.9	0.00	
National Ministry of Health	0.00	8.3	
Other	0.00	33.3	
BCZ creates the guidelines	0.00	16.7	
No guidelines	46.2	41.7	

*Note: Statistical significance is considered at p<0.10.

ASSP-supported BCZs reported the types of support that ASSP had provided over the course of the project (Table 3.20). All offices reported receiving training, equipment, and financial assistance, and the majority reported expert assistance as well.

Table 3.20. Support and assistance received from ASSP/IMA (n=12)

Support type	Percent
Training	100.0
Equipment	100.0
Financial assistance	100.0
Expert assistance	76.1

Offices reported the ways in which they had used their financial support from IMA (Table 3.21). The most frequently-listed use was the purchase of office equipment, followed by salary support for existing staff and the purchase of information technology.

Table 3.21. Ways in which ASSP financial assistance for the office has been used

Usage category	Percent
Purchase of office equipment (desk, cars, motorcycles)	69.2
Salary support for existing staff	61.5
Purchase of information technology (computer, printers, software, internet)	61.5
Transportation costs	61.5
Training/ education	38.5
Salary support for additional staff	30.8
Improvements to buildings, electricity supply, or water system.	7.7

Finally, the BCZs were asked about their level of awareness of and participation in ASSP's simplified community scorecard initiative (Table 3.22). Nearly all had heard of the simplified community scorecard and over three in four reported participation within their health zone. Ninety percent of BCZs with participating health areas had received at least one report from the simplified community scorecard exercise.

Table 3.22 Knowledge of and participation in ASSP initiatives (2017)

Knowledge/participation	Percent
Awareness of a program called the simplified community scorecard	92.3
Participation in a simplified community scorecard meeting by facilities/health areas in your health zone	76.9
Level of participation in the simplified community scorecard in this health zone	
No health areas	23.1
Some health areas	30.7
The majority of health areas	23.1
All health areas	15.4
Do not know	7.7
Ever received a report about the community scorecard activity from a health area, among those with any participation	90.0

Chapter 4
Maternal Health

Acronyms

AHC	Access to Health Care project (project which proceeded project ASSP)
AMF	Against Malaria Foundation
AMTSL	Active Management of the Third Stage of Labor
ANC	Antenatal Care
ASSP	Access to Primary Health Care (Project)
BCC	Behavior Change Communication
B-EmONC	Basic Emergency Obstetric and Newborn Care
C-EmONC	Comprehensive Emergency Obstetric and Newborn Care
DFID	Department for International Development
DHIS2	District Health Information System (Software) (DHIS2)
DHS	Demographic and Health Survey
DID	Difference-in-Differences
DRC	Democratic Republic of Congo
EmONC	Emergency Obstetric and Newborn Care
GLM	Generalized Linear Model
IEC	Information Education Communication
IMA	Interchurch Medical Assistance (dba IMA World Health)
IMAI	Integrated Management of Adolescent and Adult Illness
IMPAC	Integrated Management of Pregnancy and Childbirth
ITN	Insecticide-treated Net
LLIN	Long-Lasting Insecticidal Nets
MOH	Ministry of Health
NGO	Non-Governmental Organization
PBF	Performance-based financing
PDCU	Post-distribution Check-up
PMI	President's Malaria Initiative
PMTCT	Prevention of Mother to Child Transmission (PMTCT)
PNDS	National Health Development Program
PNSR	National Reproductive Health Program
RECO	Community Health Volunteer
SE	Standard Error
SNIS	National Health Information System
UNFPA	United Nations Population Fund
WHO	World Health Organization

i. Overview of the ASSP approach

According to the government's official approach, maternal health consists of four components: the prenatal consultation, childbirth assistance, the postnatal consultation, and community-based activities that include home visits. The prenatal consultation consists of four visits, the initial consultation – where pregnancy is confirmed – and consultations 2, 3, and 4. All four prenatal consultations are used to detect signs or symptoms of malaria or other health conditions, identify chronic illnesses, detect pregnancy complications, estimate the delivery date or the gestational age, and determine whether the evolution of the pregnancy is normal and the fetus is growing and moving properly. The fourth prenatal consultation additionally serves to identify multiple pregnancies, detect complications, evaluate the pelvis, determine whether a vaginal delivery is likely to take place, encourage women to develop a birth plan with skilled birth attendants, and schedule a possible additional visit in case the delivery does not take place within 10 days of the anticipated date. Delivery assistance includes provision of quality care for the pregnant woman during labor and childbirth, as well as for the new mother and newborn during the immediate postpartum period. The goal is to provide delivery and postnatal care that best ensures a favorable outcome for the mother and newborn, thereby contributing to reduced maternal and neonatal morbidity and mortality. The goal of the community-based interventions is to promote the participation of individuals, families, and communities in best practices related to prenatal care, childbirth and neonatal care. In order to carry out prenatal consultations, childbirth assistance, and postnatal consultations, at least two midwives at the A1 or A2 level are necessary, or, failing that, two nurses at least at the A2 level. Qualified health workers should be trained in Integrated Management of Pregnancy and Childbirth (IMPAC) and Integrated Management of Adolescent and Adult Illness (IMAI), including Active Management of the Third Stage of Labor (AMTSL), Emergency Obstetric and Neonatal Care (EmONC) and Prevention of Mother to Child Transmission (PMTCT).

The Access to Primary Health Care (ASSP) maternal health approach included elements related to prenatal consultation, assisted childbirth, and postnatal consultation, as well as community services involving home visits, health education, a breastfeeding support group, and trainings. To support improved access to and utilization of health care services, ASSP program interventions sought to address gaps in drug supplies, management capacity, and health worker motivation while also tackling physical, cultural and geographical barriers to obtaining maternal health care. Other activities such as data monitoring and evaluation, supportive supervision, behaviour change communication (BCC) involving awareness-raising campaigns and home visits, and reductions in fees for maternal health services were established to increase utilization.

From the outset, and in keeping with the goals of the National Health Development Program (PNDS), construction activities were launched to rehabilitate and equip health facilities in ASSP-assisted health zones. During this initial period, health facility equipment was procured, which included supplies aimed to ensure that maternities were better equipped. Specifically, ASSP renovated and constructed maternities, and provided equipment, medication, and training for health providers to improve the readiness of at least five health facilities per zone to deliver the Ministry of Health (MOH) *paquet complémentaires d'activités* (package of complementary activities) including basic emergency obstetric and newborn care (B-EmONC) and comprehensive emergency obstetric and newborn care (C-EmONC).

Solar lighting was supposed to be installed in the delivery rooms of all maternities (for night-time labor and deliveries), and operating rooms in hospitals were improved and equipped for emergency deliveries. Large referral hospitals received anaesthesia machines and held trainings for staff in the use of new equipment. Ultrasound equipment was distributed to more than 65 health facilities, and training of at least three staff in each ASSP-assisted hospital – typically the hospital director (a physician) or the chief of staff (also a physician), the head nurse and the maternity ward nurse – was provided on the use of obstetric ultrasound for monitoring pregnant women and their unborn babies. The project also provided refresher courses for healthcare workers on safe deliveries and revised the user fee schedule to make services more affordable.

Following focus group discussions in Nord Ubangi conducted by Pathfinder in collaboration with IMA World Health, which revealed the cultural importance of being well dressed when leaving the maternity center, a six-month pilot distribution of birth delivery kits was launched to encourage increased utilization of maternity services. The birth delivery kits included soap, towels, a scalpel, wire cord, and compresses. Hats, baby clothes, and a blanket were included for the baby and, for the mother, a *pagne* (i.e. a two-by-six-yard cut of patterned cotton fabric) was added to approximately half of the kits to assess whether they provided an additional incentive to women to come to the health facility for assisted deliveries. To further address cultural barriers, the ASSP program trained community leaders and community relays to sensitize the population about the benefits of deliveries assisted by skilled birth attendants. The project also continued working with health workers and community health volunteers (RECOs) to improve communication strategies, launching a major radio campaign with Development Media International to promote improved care-seeking behaviors.

To support improvements in the quality of reproductive health and neonatal care, trainings for health providers and supervisors were conducted with a focus on EmONC, including assisted births and the use of the World Health Organization (WHO) partograph tool. A facility assessment of the provision of C-EmONC in ASSP-assisted health zones was conducted and followed by a training program, which was implemented in collaboration with the National Reproductive Health Program (PNSR) and clinical experts from the University Clinics of Kinshasa and Congolese Society of Obstetricians and Gynecologists. Refresher trainings for providers were held, in addition to the distribution of additional supplies and equipment, to cover gaps and improve provision and quality of EmONC in the targeted referral facilities. A seminar on BCC was also held to support the reinforcement of information, education, communication (IEC)/BCC activities to promote reproductive, maternal, newborn and child health in the ASSP-supported health zones.

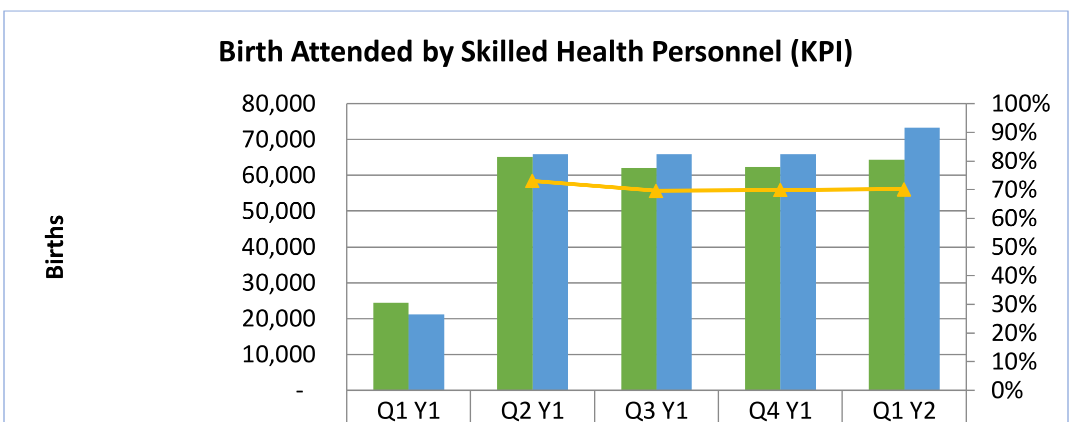
Finally, collaboration with different donor representatives – including, the Global Fund and the President's Malaria Initiative (PMI) – was established to improve logistics for the distribution of malaria commodities, to prevent stockouts despite supply chain delays and, generally, to support the ASSP drug supply. In addition to routine distribution of insecticide-treated nets (ITNs) in PMI-supported health zones, IMA World Health, in partnership with the Department for International Development (DFID) and the Against Malaria Foundation (AMF), launched a mass distribution campaign for long-lasting insecticidal nets (LLINs) using a hang-up strategy. This "hang-up" initiative, which aimed to ensure that LLINs were properly used, was complemented by post-distribution check-ups (PDCU) to assess bed net distribution, utilization and condition. Check-ups were supposed to be performed every 6 months after the mass distribution campaign. BCC interventions were initiated during check-up visits to improve household awareness about the importance of using mosquito nets, proper use of mosquito nets, and maintenance principles for preserving functional nets in the home.

Notably, throughout years 1 through 4 of the ASSP project, program support for malaria interventions targeted 19 health zones (8 in Maniema, 1 in Kasai Central and 10 in Kasai). As noted previously, Kasai and Kasai Central were excluded from all analyses due to civil unrest which precluded endline data collection.

Summary of ASSP activities prior to the baseline survey

According to ASSP's quarterly reports, the project extended assistance to an additional 36 health zones, 11 of which were in North-Ubangi, Equator provinces. The majority of these new ASSP-assisted health zones had received limited or no assistance over the last decades, which inevitably resulted in lower performance compared to health zones supported by the preceding Access to Health Care (AHC) project. Notably, the 20 HZs which were assisted by the prior AHC project maintained acceptable performance for both preventive and curative activities, including delivery in the presence of a skilled attendant, pregnant women's receipt of two doses of intermittent presumptive treatment for malaria (IPTp), pregnant women's receipt of at least three doses of iron folate, and provision of Emergency Obstetric Care (EmOC) in assisted health facilities, including general referral hospitals. Figure 4.1 below depicts quarterly progress on births attended by skilled health personnel. The chart (taken from April – June 2014 quarterly report) depicts results by quarter, up until the baseline survey in Quarter 1 Year 2.

Figure 4.1. Quarterly progress on births attended by skilled health personnel.

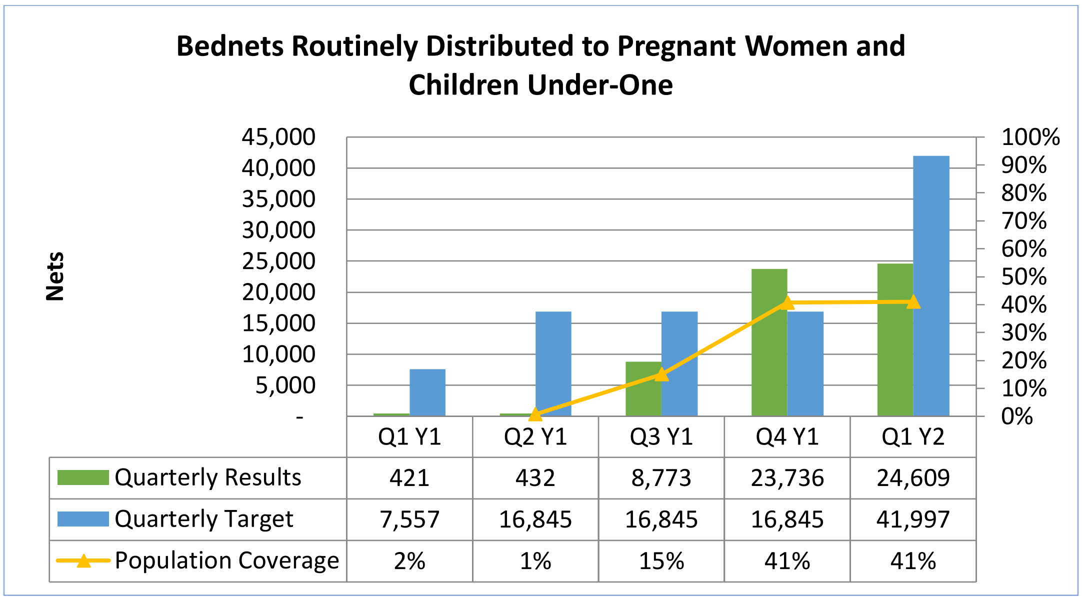


	Q1 Y1	Q2 Y1	Q3 Y1	Q4 Y1	Q1 Y2
Quarterly Results	24,393	65,085	61,988	62,250	64,393
Quarterly Target	21,145	65,848	65,848	65,848	73,356
Population Coverage	92%	73%	70%	70%	70%

Over the course of Year 1, the ASSP program paid performance primes, running costs and supervision expenses, and negotiated changes in user fees. The ASSP program also supported routine distribution of LLINs to pregnant women during ANC consultations. However, due to overlapping geographical targeting with the Global Fund and PMI, ASSP reduced its malaria programming to Maniema (8 HZs). By the end of Year 1 – following a decision by provincial authorities in Maniema to cease bed net distribution in Q3 while a mass distribution was expected to be implemented – monitoring data suggested that the ASSP program met 57 percent of target, resulting in coverage of 17 percent of the total targeted population at risk.

Figure 4.2 below depicts quarterly progress on routine distribution of bed nets to pregnant women and children less than 1 year of age. The chart (taken from April – June 2014 quarterly report) depicts results by quarter, up until the baseline survey in Quarter 1 Year 2.

Figure 4.2. Quarterly progress on distribution of bed nets to pregnant women and children under-1.



	Q1 Y1	Q2 Y1	Q3 Y1	Q4 Y1	Q1 Y2
Quarterly Results	421	432	8,773	23,736	24,609
Quarterly Target	7,557	16,845	16,845	16,845	41,997
Population Coverage	2%	1%	15%	41%	41%

Data on ANC consultations are all reported through the National Health Information System (SNIS) and later keyed into the District Health Information System (Software) (DHIS2). While all data are now extracted from the DHIS2, IPs would previously collect data from local EPI antennas with a parallel data collection system (before the DHIS2 was fully functional in all ASSP-assisted health zones) and report these to IMA when confronted with low reporting rates and /or completeness. ANC tracking tools include an ANC card or form which is kept at the health facility, an ANC appointment card kept by the woman, and an ANC register kept at the facility. In addition, there is an ANC reporting form used to forward health facility ANC data to the health zone central office where it is entered into DHIS2.

ii. Quantitative findings

Maternal health refers to the health of women during pregnancy, childbirth and the postpartum period. This chapter presents findings on several service coverage indicators including antenatal care (ANC), facility deliveries and postpartum care. The use of ITNs by pregnant women and data on women's perceptions of the quality of care during delivery are also presented.

ASSP modules collected information on all live births that occurred in the five years prior to the module. In an effort to minimize recall bias, however, information on ANC as well as the amount of money spent on delivery was only collected for the most recent live birth. While some indicators (e.g. mean expenditure on ANC during pregnancy for the most recent birth) were calculated using data on the most recent live birth in the five years prior to the survey, other indicators (e.g. percentage of women with a live birth in the last two years who reported four or more ANC visits) are limited to live births in the two years preceding the survey.

Probit models, using a difference-in-differences (DID) estimation strategy, were fit for each maternal health indicator, except those indicators related to out-of-pocket cash expenditures. Specifically, for the out-of-pocket cash expenditure analyses, responses to questions on the total amount spent on ANC (including consulting fees, drugs, tests, and transportation) were dichotomously categorized based on whether the woman incurred any expenses. Continuous indicators reflecting the total amount spent per ANC visit (in US dollars) were also created, using exchange rates of 900 Congolese Francs per US dollar and 1,400 Congolese Francs per US Dollar for the years 2014 and 2017, respectively. Out-of-pocket expenditures on delivery were similarly treated based on information regarding the total amount spent on the most recent delivery, including the consulting fee and any expenses for other items such as drugs, tests, and transportation. For these health expenditure analyses, a generalized linear model (GLM) with a log link function was estimated, using the DID estimation strategy. These GLM log-link models account for zero expenditures as well as the skewed distribution of spending. The results of these DID models allowed for assessment of the ASSP project impact on relevant maternal health outcomes, with the DID estimator being represented by a multiplicative interaction term between the time (i.e. survey wave) and group assignment (i.e. ASSP vs. non-ASSP) variables.

All DID models controlled for potentially relevant confounding factors, including sampling domain, setting (i.e. peri-urban or rural) and wealth quintile. The World Bank introduced a performance-based financing (PBF) project in some non-ASSP areas with an aim to improve service utilization, quality of care, and health behaviors. Given the potential of this World Bank program to influence results of the ASSP impact evaluation, all DID models include a categorical indicator to control for the two modes of World Bank support (i.e. cash support only or the full PBF intervention). DID models for sub-groups of the population (based on wealth, and sampling domain) are also presented. While the study was powered to detect overall differences between intervention and control groups however, it was not powered to detect differences according to sub-groups, which may have required a larger sample size. Finally, in addition to results from DID models, descriptive tables are also presented for each maternal health indicator, illustrating changes in the relevant outcome, at endline compared to baseline, in both ASSP and non-ASSP areas.

Antenatal care

Receiving regular and comprehensive care during pregnancy can reduce risks and complications both during delivery and postpartum (World Health Organization, 2007). The WHO recommends a minimum of four ANC visits for women with an uncomplicated pregnancy, in addition to timing the first visit early so that potential complications can be detected in the early stages of pregnancy. Specifically, the WHO recommends the first visit occur in the first trimester or within the first three months of pregnancy (World Health Organization, 2007).

Findings from the fully-adjusted DID models indicated that while the ASSP program had no statistically significant impact on mean expenditure per ANC visit or receipt of the first ANC visit within the first trimester of pregnancy, it decreased the likelihood of a woman receiving four or more ANC visits (Figure 4.3).

Figure 4.3. Direction of impact of ASSP overall and on antenatal care by wealth and domain.

	At least 4 ANC visits	At least 3 ANC visits	1st ANC visit within the 1st trimester	Mean expenditure per ANC visit (USD)
Overall DID results	Worsened	No impact	No impact	No impact
Wealth				
Low & Low middle wealth quintiles	No impact	No impact	No impact	No impact
Middle, High-middle, and High wealth quintiles	Worsened	No impact	No impact	No impact
Domain				
Nord/Sud Ubangi	No impact	No impact	No impact	No impact
Maniema/Tshopo	Worsened	No impact	Worsened	No impact

*Impact is determined by statistical significance ($p<0.05$).

First of all, the fully adjusted DID model indicated that the probability of receiving at least 4 ANC visits declined by 10.8 percentage points in ASSP areas compared to non-ASSP areas (Table 4.1, p = 0.015). Sub-analyses revealed that the probability of receiving at least 4 ANC visits declined in ASSP areas compared to non-ASSP areas, among those in the top 60 percent wealth quintile (Table 4.3, marginal effect: -12.1, p=0.025) and those in Maniema/Tshopo (Table 4.5, marginal effect: -12.7, p=0.019).

There was no statistically significant program effect on receipt of at least three ANC visits, among women with a birth in the past two years (Table 4.7). Furthermore, sub-analyses revealed no statistically significant differences in receipt of at least three visits by wealth (Tables 4.8 and 4.9) or domain (Tables

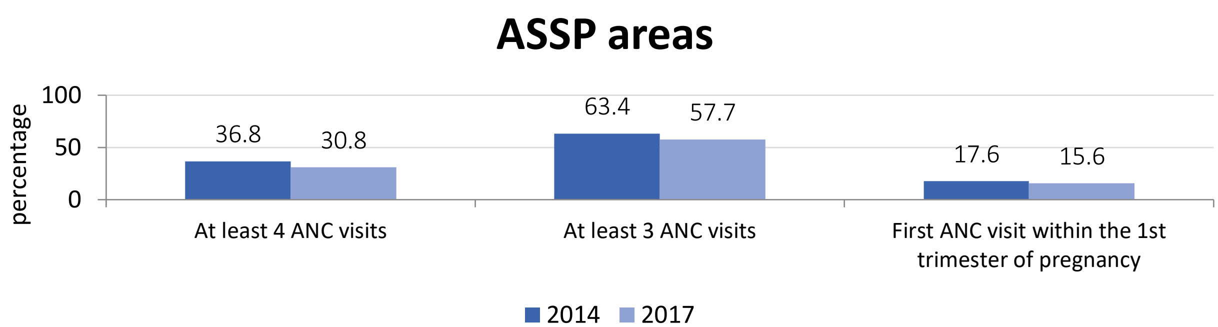
4.10 and 4.11). Both models, however (i.e. examining receipt of at least 4 ANC visits vs. receipt of at least 3 ANC visits), indicated that increasing wealth and higher levels of education among mothers were significantly associated with receipt of multiple ANC visits (Table 4.1 and Table 4.7).

With regard to the timing of ANC visits, the fully-adjusted DID model indicated no significant program effects on receipt of the first ANC visit within the first trimester of pregnancy (Table 4.13). However, a significant inverse association between timing of the first visit and birth order was evident, suggesting that women were less likely to receive their first ANC visit within the first trimester of pregnancy for their later-born children (Table 4.13, $p<0.05$). Moreover, sub-analyses indicated that the probability of receiving the first ANC visit within the first trimester of pregnancy declined in ASSP areas compared to non-ASSP areas, among women from Maniema/Tshopo (Table 4.17, marginal effect: -9.6, $p=0.042$).

There was no statistically significant program effect on mean cash expenditure per ANC visit (Table 4.19) and sub-analyses revealed no statistically significant differences in mean expenditure per ANC visit by wealth quintiles (Tables 4.20 and 4.21) or domain (Tables 4.22 and 4.23).

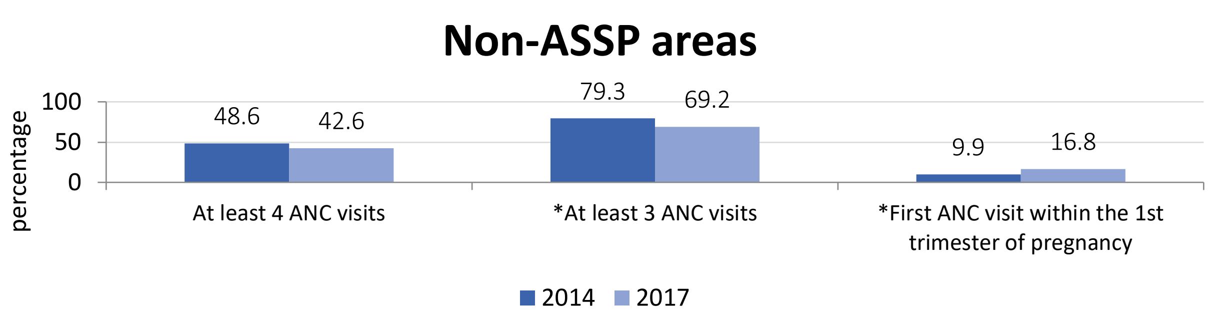
Descriptive data indicated that there was no statistically significant change in utilization of ANC services in ASSP areas (Figure 4.4), although some variation in ANC service use did occur in non-ASSP areas, at endline compared to baseline (Figure 4.5).

Figure 4.4. Changes in ANC service utilization indicators in ASSP areas, by year.



*Difference between 2014 and 2017 levels statistically significant at $p<0.05$

Figure 4.5. Changes in ANC service utilization indicators in non-ASSP areas, by year.

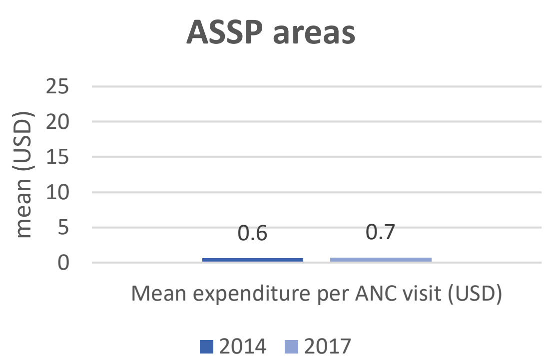


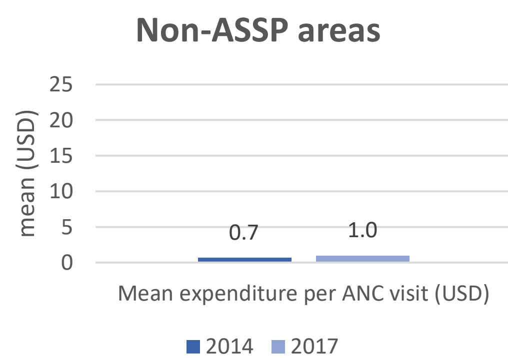
*Difference between 2014 and 2017 levels statistically significant at $p<0.05$

Specifically, with regard to the recommended number of ANC visits, the proportion of women with a live birth in the past two years who received at least four ANC visits declined at endline compared to baseline, in both ASSP and non-ASSP areas, although neither change was statistically significant (Table 4.6). There was no statistically significant difference in the timing of the first ANC visit, at endline compared to baseline, among women in ASSP areas (Table 4.18). In non-ASSP areas, however, a significantly greater proportion of women received their first ANC visit within the first trimester of their pregnancy (Table 4.18, 2014: 9.9 percent vs. 2017: 16.8 percent; p = 0.013).

There was no change in mean expenditure per ANC visit at endline compared to baseline, in either ASSP or non-ASSP areas (Figure 4.6 and Table 4.25).

Figure 4.6. Changes in mean expenditure per ANC visit in ASSP and non-ASSP areas, by year.





A registration fee was required for ANC consultations, although this fee was minimal and reported to be set at around 500 Congolese francs. Further, the absolute changes in ASSP and non-ASSP areas, from 2014 to 2017, suggest that a significantly greater proportion of women incurred ANC expenses (i.e. did not receive services free of charge or make an in-kind payment) (Table 4.24).

Key Points

- The ASSP program had a negative but significant effect on the receipt of at least 4 ANC visits, among women giving birth in the last two years (marginal effect: -10.817; p=0.015).
- There was no statistically significant program impact on receipt of at least 3 ANC visits, among women giving birth in the last two years.
- There was no statistically significant program impact on receipt of the first ANC visit within the first trimester of pregnancy or on mean expenditure per ANC visit.

Robustness checks

As a robustness check, the DID models for all ANC indicators were estimated with the inclusion of a variable indicating the straight-line distance between the woman's household and the nearest governmental health facility. While the distance variable was a significant predictor in some of the models (i.e. increasing distance was inversely associated with receipt of at least 4 ANC visits and receipt of at least 3 ANC visits), neither the significance nor direction of the DID estimate was affected by inclusion of this variable. In addition, there were no statistically significant differences in distance to the health facility, between baseline and endline, in either ASSP or non-ASSP areas (results not shown).

Use of ITNs

The Democratic Republic of the Congo (DRC) is one of the largest malaria-endemic countries in sub-Saharan Africa, with pregnant women, children under five years of age, and marginalized or mobile/migrant populations among the high-risk populations susceptible to morbidity from the disease (United States Agency for International Development (USAID), 2015). Notably, sleeping under ITNs has proven to be one of the most effective and cost-effective ways of reducing malaria incidence in sub-Saharan Africa (Lengeler, 2004; White, Conteh, Cibulskis, & Ghani, 2011; Yukich et al., 2008).

Respondents were asked whether they possessed a bed net and, among those who owned at least one bed net, information on the number and type of bed net was obtained. Interviewers asked to see each net to confirm ownership and respondents were also asked to list everyone who slept under each bed net the night before they were questioned.

Findings from the fully-adjusted DID models indicated that the ASSP program had no impact on pregnant women's use of an ITN the previous night or household ownership of at least one ITN (Figure 4.7).

Figure 4.7. Direction of impact of ASSP overall and use of ITNs by wealth, and domain.

	Pregnant women's use of an ITN the previous night	**Household ownership of at least one ITN**
Overall DID results	No impact	No impact
Wealth		
Low & Low middle wealth quintiles	No impact	No impact
Middle, High-middle, and High wealth quintiles	No impact	No impact
Domain		
Nord/Sud Ubangi	No impact	Worsened
Maniema/Tshopo	No impact	No impact

*Impact is determined by statistical significance (p<0.05).

There was no statistically significant program effect on use of ITNs among pregnant women (Table 4.26) and sub-analyses revealed no statistically significant differences in use of ITNs by pregnant women according to wealth (Tables 4.27 and 4.28) or domain (Tables 4.29 and 4.30).

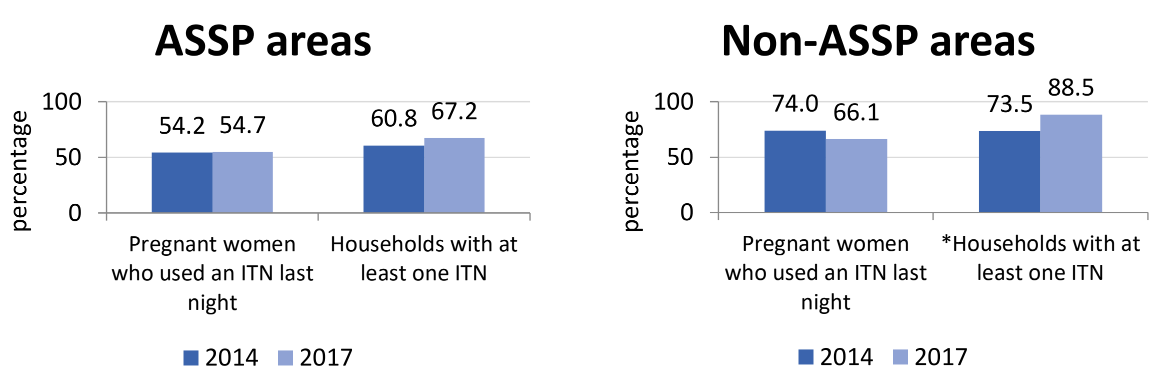
Similarly, the fully adjusted DID model indicated that there was no statistically significant program effect on household ownership of at least one ITN (Table 4.32). Notably, however, the DID model indicated that household ownership of at least one ITN was significantly associated with increasing wealth (p <0.001), increasing education (p <0.001), and increasing size of the household (p<0.05). Furthermore, sub-analyses indicated that the probability of household ownership of at least one ITN declined in ASSP areas compared to non-ASSP areas, among those living in Nord/Sud Ubangi (Table 4.35, marginal effect: -16.3, p<0.001).

Descriptive data indicated that use of ITNs by pregnant women did not change in either ASSP areas or non-ASSP areas (Figure 4.8). On the other hand, absolute changes in household ownership of at least one ITN suggested improvements from 2014 to 2017, in both ASSP and non-ASSP areas, although the difference was only statistically significant in non-ASSP areas (Table 4.37, 2014: 73.5 percent vs. 2017: 88.5 percent; p=0.001).

Key Points

- There were no statistically significant program effects on the use of ITNs among pregnant women or household ownership of at least one ITN.

Figure 4.8. Changes in use of ITNs in ASSP and non-ASSP areas, by year.



*Difference between 2014 and 2017 levels statistically significant at p<0.05

Delivery

Location and assistance in delivery care are very important factors for improving maternal and child health outcomes. Delivering in a health facility and having a birth assisted by a *skilled birth attendant* can reduce the risk of death during delivery and better manage complications that may arise (Gabrysch

& Campbell, 2009; Ronsmans, Graham, & Lancet Maternal Survival Series steering group, 2006). Following revision by the WHO, and endorsement by the United Nations Population Fund (UNFPA) and the World Bank, the term *skilled birth attendant* has been noted to refer only to "an accredited health professional — such as a midwife, doctor or nurse — who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns" (Adegoke & van den Broek, 2009; World Health Organization, 2004). The definition does not include trained birth attendants. The woman's questionnaire allowed a mother to report all persons present at delivery, with options including a (1) doctor, (2) nurse, and/or (3) trained birthing attendant/midwife. The woman's questionnaire thus did not allow for distinctions to be made between trained birth attendants and midwives. Further, the literature notes that trained birth attendants often have minimal schooling and receive limited training (Garces et al., 2012; ten Hoope-Bender, Liljestrand, & MacDonagh, 2006). Accordingly, given WHO criteria, in addition to the fact that identification of the type of attendant at delivery was based only on the mother's subjective report and not on any objective records of the attendant's training and proficiency level, only doctors and nurses were included in the definition of *skilled birth attendant.* In keeping with ASSP's goal to increase the number of deliveries occurring within a health facility, however, we also examined changes in the number of facility deliveries as an additional outcome.

Notably, although the period soon after childbirth poses substantial health risks for both mother and newborn infant, postpartum and postnatal care often receive less attention than pregnancy and childbirth (World Health Organization, 2010). As a critical yet often neglected phase in the lives of mothers and newborn babies, postpartum and postnatal care delivered by *skilled* providers is especially important to ensure improved maternal and newborn health outcomes (World Health Organization, 2010, 2014). For the following analyses, a *postpartum care* visit was defined as an examination of the mother's health by a doctor or nurse, in the two days following childbirth, while a *postnatal care* visit was defined as a health examination of the baby, by a doctor or nurse, in the two days following delivery.

Findings from the fully-adjusted DID models indicated varying impacts of the ASSP program on delivery care (Figure 4.9).

Figure 4.9. Direction of impact of ASSP overall and on delivery care by wealth, and domain.

	Delivery within a health facility	Facility delivery in the presence of a skilled birth attendant	At least 1 postpartum care visit for the mother	At least 1 postnatal care visit for the baby	Mean expenditure on delivery (USD)
Overall DID results	Improved	No impact	No impact	Worsened	No impact
Wealth					
Low & Low middle wealth quintiles	Improved	No impact	No impact	No impact	No impact
Middle, High-middle, and High wealth quintiles	No impact	No impact	No impact	Worsened	No impact
Domain					
Nord/Sud Ubangi	No impact	No impact	No impact	No impact	No impact
Maniema/Tshopo	No impact	No impact	No impact	No impact	No impact

*Impact is determined by statistical significance ($p<0.05$).

The fully adjusted DID model indicated that the ASSP program had a statistically significant and positive impact, increasing the likelihood of a facility delivery by 14.1 percentage points in ASSP areas compared to non-ASSP areas (Table 4.38, $p<0.001$). Furthermore, the model suggested that facility deliveries were significantly and positively associated with increasing wealth ($p<0.001$) and higher education levels of mothers ($p<0.01$). The DID model further suggested that the World Bank PBF initiative, which was being implemented in non-ASSP areas, was associated with an increased likelihood of facility delivery ($p<0.01$). Notably, sub-analyses indicated that the probability of a facility delivery increased in ASSP areas compared to non-ASSP areas, among those in the bottom 40 percent wealth quintile (Table 4.39, marginal effect: 32.6, $p<0.001$).

With regard to delivery assistance, however, the fully adjusted DID model indicated no statistically significant program impact on the presence of a skilled attendant at delivery (Table 4.44) and sub-analyses revealed no statistically significant differences according to wealth (Tables 4.45 and 4.46) or domain (Tables 4.47 and 4.48).

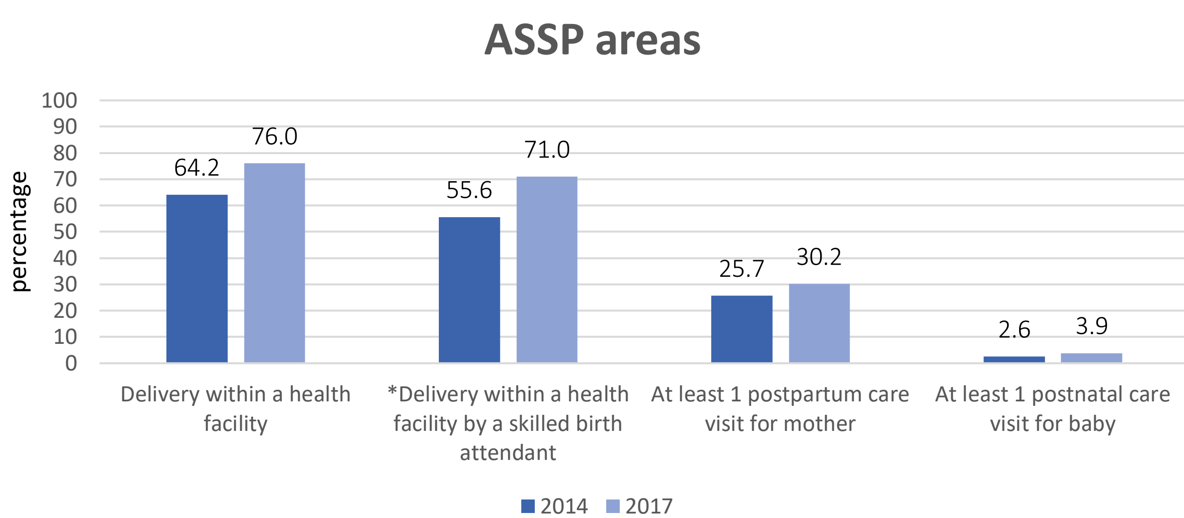
Regarding the period soon after childbirth, the fully adjusted DID model revealed that the ASSP program had no statistically significant effects on receipt of post-partum care (Table 4.50). Sub-analyses also revealed no statistically significant differences in receipt of at least one post-partum care visit, according to wealth (Tables 4.51 and 4.52) or domain (Tables 4.53 and 4.54).

However, the fully adjusted DID model indicated that the probability of the baby receiving a post-natal care visit within two days of delivery declined by 4.6 percentage points in ASSP areas compared to non-ASSP areas (Table 4.56; $p<0.01$). Here, sub-analyses revealed that the probability of the baby receiving a post-natal care visit within two days of delivery declined in ASSP areas compared to non-ASSP areas, among those in the top 60 percent wealth quintile (Table 4.58, marginal effect: -4.9, $p=0.016$).

There was no statistically significant program effect on mean cash expenditure for delivery (Table 4.62) and sub-analyses revealed no statistically significant differences according to wealth (Tables 4.63 and 4.64) or domain (Tables 4.65 and 4.66).

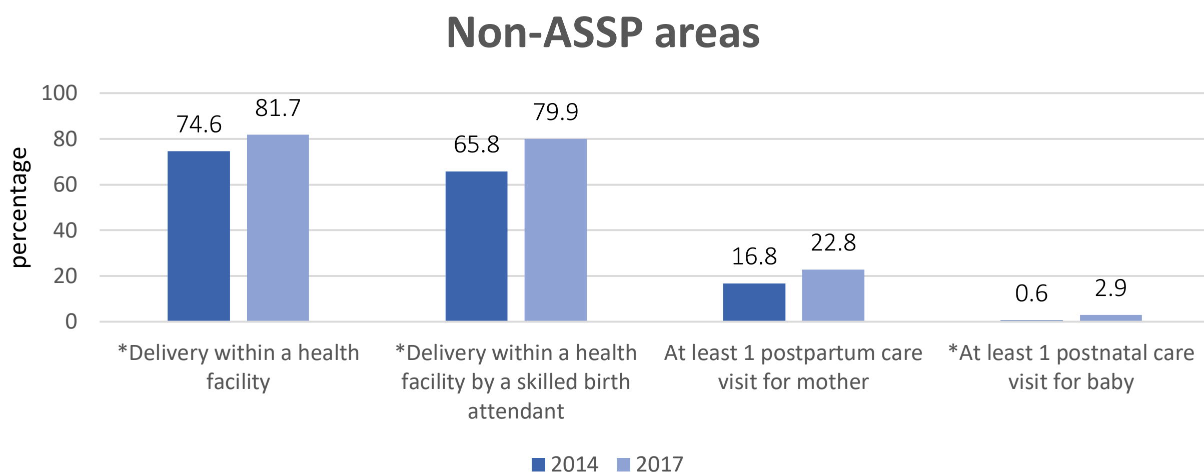
Changes in delivery care indicators at baseline and endline, are illustrated in Figure 4.10 and Figure 4.11, for ASSP and non-ASSP areas, respectively.

Figure 4.10. Changes in delivery care indicators in ASSP areas, by year.



*Difference between 2014 and 2017 levels statistically significant at $p<0.05$

Figure 4.11. Changes in delivery care indicators in non-ASSP areas, by year.



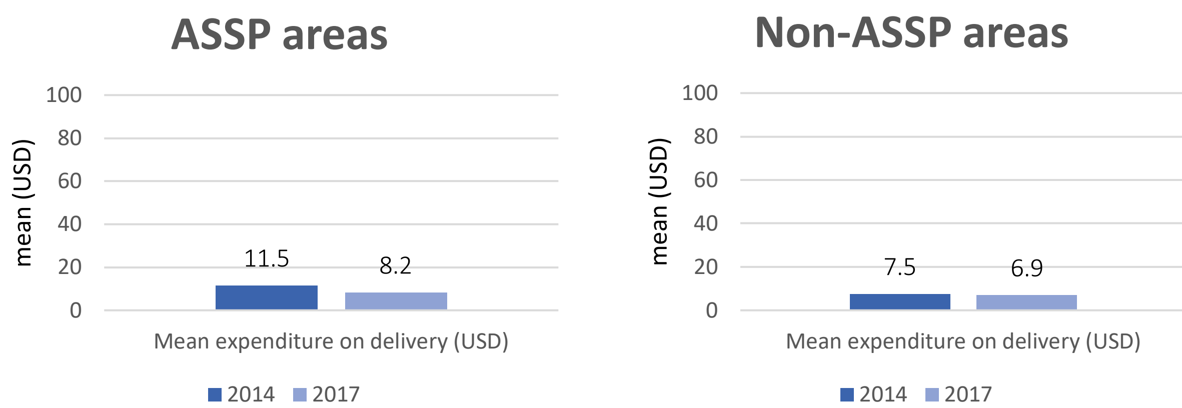
*Difference between 2014 and 2017 levels statistically significant at $p<0.05$

In both ASSP and non-ASSP areas, the proportion of live births delivered within the past two years in a health facility increased at endline compared to baseline. Although the magnitude of this change was larger in ASSP areas, it was only statistically significant in non-ASSP areas (Table 4.43). Among these facility deliveries, the proportion of women reporting the presence of a skilled birth attendant increased significantly at endline, compared to baseline, in both ASSP and non-ASSP areas (Table 4.49).

Trends also suggested an increase in receipt of postpartum care (Table 4.55) and post-natal care (Table 4.61), in both ASSP and non-ASSP areas, from 2014 to 2017. However, these differences were not statistically significant except in non-ASSP areas with regard to receipt of at least one post-natal care visit for the baby. Specifically, in non-ASSP areas, a significantly greater proportion of babies received a health examination from a doctor or nurse within two days of delivery; notably, these differences were based on relatively few observations (Table 4.61, 2014: 0.6 percent vs. 2017: 2.9 percent; $p = 0.004$).

There was no change in mean cash expenditure on delivery, at endline compared to baseline, in either ASSP or non-ASSP areas (Figure 4.12 and Table 4.67).

Figure 4.12. Changes in mean expenditure on delivery in ASSP and non-ASSP areas, by year.



<u>Robustness checks</u>

As a robustness check, the DID models for all delivery indicators were estimated with the inclusion of a variable indicating the straight-line distance between the woman's household and the nearest governmental health facility. While the distance variable was a significant predictor in some of the models (i.e. increasing distance was inversely associated with facility deliveries), neither the significance nor direction of the DID estimate was affected by inclusion of this variable. In addition, there were no statistically significant differences in distance to the health facility, between baseline and endline, in either ASSP or non-ASSP areas (results not shown).

Perceptions of quality during delivery

Quality of care, defined by the Institute of Medicine as "the degree to which health services for individuals and population increases the likelihood of desired health outcomes", is most commonly evaluated using the triad of structure, process, and outcome, originally proposed by Donabedian (Ayanian & Markel, 2016). This Donabedian model posits that the attributes of the setting in which care is delivered (i.e. the structure) affect the care delivered and adherence to good medical practices (i.e. processes) which in turn affects the health status (i.e. outcomes) that reflect improved quality of care (Donabedian, 1966). Structural and process-level elements of quality care are often readily assessed using either objective measures of quality or patients' perceptions of quality. When the latter approach is used, research cautions

<u>Key Points</u>

- The ASSP program had a significant and positive effect on the probability of facility deliveries in ASSP areas compared to non-ASSP areas (marginal effect: 14.128; p <0.001).
- The ASSP program had a significant, negative impact on the probability of receipt of at least one post-natal care visit for the baby (marginal effect: -4.471; p =0.008).
- There was no statistically significant program effect on receipt of at least one post-partum care visit for the mother or mean expenditure on delivery.

that patient expectations of health services, including personal and environmental-level factors, also be considered as important drivers of patients' perceptions of quality (Wisniewski, Diana, Yeager, & Hotchkiss, 2018).

Given ASSP program investments in health worker trainings, facility infrastructure and provision of commodities, analyses sought to assess the project impact on women's perceptions of structural and process-level elements of quality, including equipment availability, adequacy of drug supplies, nature of the healthcare interaction, and overall facility cleanliness. The DID models for indicators regarding patient perceptions of quality all controlled for personal (e.g. needs of the patient, individual characteristics, knowledge of what to expect) and environmental-level factors (e.g. reputation of provider, social/cultural norms) known to affect patient's expectations of the healthcare experience and potentially influence their perceptions of quality (Wisniewski et al., 2018).

Findings from the fully-adjusted DID models indicated varying impacts of the ASSP program on perception of quality during delivery (Figure 4.13).

Figure 4.13. Direction of impact of ASSP overall and on perceptions of quality by wealth, and domain.

	Adequate competence of person assisting delivery	Adequate availability of equipment	Adequate availability of drug supplies	Adequate manner in which health situation explained	Adequate cleanliness of health facility
Overall DID results	No impact	Improved	No impact	No impact	Improved
Wealth					
Low & Low middle wealth quintiles	No impact	No impact	No impact	No impact	No impact
Middle, High-middle, and High wealth quintiles	No impact	Improved	No impact	No impact	No impact
Domain					
Nord/Sud Ubangi	No impact	No impact	No impact	No impact	No impact
Maniema/Tshopo	No impact	Improved	No impact	Improved	No impact

*Impact is determined by statistical significance ($p<0.05$).

The ASSP project had no statistically significant impact on the perceived competence of persons assisting with delivery (Table 4.68) and sub-analyses revealed no statistically significant differences according to wealth (Tables 4.69 and 4.7) or domain (Tables 4.71 and 4.72).

Notably, however, the DID model indicated that the ASSP program had a significant and positive impact, increasing the probability of perceived adequacy in availability of equipment by 8.6 percentage points in ASSP areas, compared to non-ASSP areas (Table 4.74; $p<0.01$). Sub-analyses revealed that the probability of perceived adequacy in availability of equipment increased in ASSP areas compared to non-ASSP areas, among those in the top 60 percent wealth quintile (Table 4.76, marginal effect: 10.4, $p=0.002$) and those in Maniema/Tshopo (Table 4.78, marginal effect: 16.8, $p<0.001$).

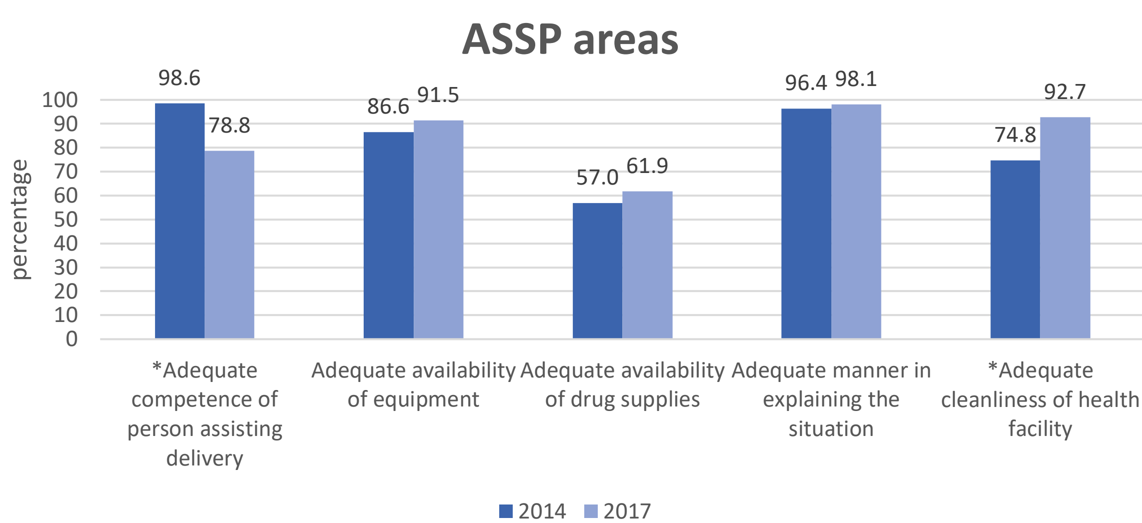
With regard to perceived adequacy in the availability of drugs, the fully adjusted DID model indicated no statistically significant project impact (Table 4.8) and sub-analyses similarly revealed no statistically significant differences according to wealth (Tables 4.81 and 4.82) or domain (Tables 4.83 and 4.84).

With regard to whether the health provider explained the health situation adequately, however, while the fully adjusted DID model indicated no statistically significant project impact (Table 4.86), sub-analyses revealed that the probability of perceived adequacy of the health care interaction increased in ASSP areas compared to non-ASSP areas, among those in Maniema/Tshopo (Table 4.90, marginal effect: 4.1, $p=0.026$).

Finally, the fully adjusted DID model indicated that the ASSP program had a significant and positive impact, increasing the likelihood of reporting adequate cleanliness of the health facility by 14.3 percentage points (Table 4.92; $p<0.001$). However, sub-analyses revealed no statistically significant differences according to wealth (Tables 4.93 and 4.94) or domain (Tables 4.95 and 4.96).

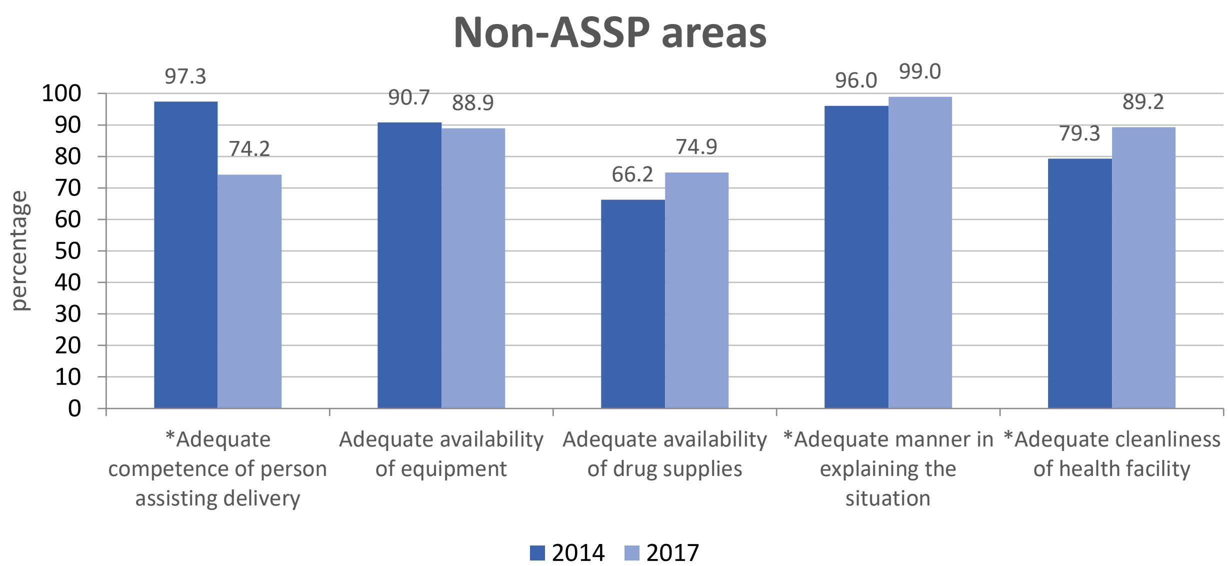
Figures 4.14 and Figure 4.15 below illustrate changes in perceptions of quality of care at baseline and endline, for ASSP and non-ASSP areas, respectively.

Figure 4.14. Changes in perceptions of quality of care in ASSP areas, by year.



*Difference between 2014 and 2017 levels statistically significant at $p<0.05$

Figure 4.15. Changes in perceptions of quality of care in non-ASSP areas, by year.



*Difference between 2014 and 2017 levels statistically significant at $p<0.05$

In ASSP areas, women's perceptions of quality of various structural and process-level elements encountered during their most recent live birth generally improved; although this positive change was only statistically significant for perceptions of adequate cleanliness of the health facility.

Specifically, perceptions of adequate competence of the person assisting delivery were initially high at baseline, in both ASSP and non-ASSP areas, but significantly declined in both areas, by endline (Table 4.73; $p<0.001$).

There were no statistically significant differences in perceived availability of equipment (Table 4.79) or perceived availability of drug supplies (Table 4.85), at endline compared to baseline, in either ASSP areas or non-ASSP areas.

With regard to perceptions of the health care interaction, initial reports were high, with 96.4 percent and 96 percent of participants in ASSP areas and non-ASSP areas, respectively, reporting at baseline that the health care provider explained the situation in an adequate manner. However, perceptions of adequacy of the health care interaction significantly improved in non-ASSP areas only (Table 4.91).

Finally, perceived cleanliness of the health facility significantly improved at endline compared to baseline, in both ASSP and non-ASSP areas (Table 4.97; $p<0.01$).

Key Points

- The ASSP program had a positive and significant effect on perceptions of adequate availability of equipment during delivery (marginal effect: 8.580; $p<0.01$).
- The ASSP program had a positive and significant effect on perceptions of adequate cleanliness of the health facility (marginal effect: 14.263; $p<0.001$).
- There were no statistically significant program impacts on perceptions of adequate competence of the person assisting delivery, perceptions of adequate availability of drugs, or perceptions of adequacy in which the health care provider explained the situation.

Robustness checks

As a robustness check, the DID models for all perceptions of quality during delivery indicators were estimated with the inclusion of a variable indicating the straight-line distance between the woman's household and the nearest governmental health facility. While the distance variable was a significant predictor in some of the models (i.e. increasing distance was inversely associated with perceived adequacy of equipment and perceived adequacy of availability of drugs), neither the significance nor direction of the DID estimate was affected by inclusion of this variable. In addition, there were no statistically significant differences in distance to the health facility, between baseline and endline, in either ASSP or non-ASSP areas (results not shown).

iii. Qualitative findings

Research methods

Fifty respondents participated in the qualitative study. We interviewed sixteen key informants working on maternal health including national and provincial level government health representatives, IMA staff at the national and provincial level, representatives of the IMA implementing partners, and chief medical doctors and nurse supervisors working at the health zone level. Sixteen in-depth interviews were conducted with health workers including four head nurses, three midwives, four members of the Community Health Development Committee (CODESA), and five community health workers. In addition, in-depth interviews were carried out with eighteen mothers who had given birth either in a health facility or at home within six months prior to the interview.

<u>Health Workers & Key Informants</u>

Implementation

Respondents reported that maternal health activities were launched in 2013 in the four research sites. Of the sixteen interviewed service providers, two head nurses and one midwife had completed training on providing care during uncomplicated births, prenatal consultations, EmONC, the BCC approach, and community support groups; one midwife had completed training on HIV/AIDS, and one community health worker had completed training on family planning. The other health worker respondents had arrived in the health areas after the start of ASSP and training on maternal health had been completed, highlighting the high turnover that occurs among health workers. Those respondents who participated in the training noted that the duration of the ASSP trainings ranged from between 5 and 7 days. Common complaints about the training included: (1) supplies (e.g. suctions cups and resuscitation kits) were promised but never delivered; and (2) topics were covered superficially, with essential details not provided. In addition, some key informants indicated that the training sessions were overly ambitious for the short time frames allotted, indicating that too much information was provided at once and raising questions about the ability of the trainees to retain the information provided. Some participants from North Ubangi reported that trainings failed to consider cultural practices and how to deal with them, often making it difficult to successfully implement approaches as recommended during the training sessions.

Facility-based respondents indicated that they were able to provide prenatal consultations and childbirth assistance for normal deliveries as recommended according to the official ASSP approach. All health centers included in the study had established a referral system for complicated cases that exceeded the capabilities of the health center. It was noted that transport for referral cases is the responsibility of the pregnant woman and her family and that referrals are typically made to the General Reference Hospital of the health zone in which the health center is located. Respondents noted that the distance to the Reference Hospital is variable, generally ranging from 5 and 50 km, with some indicating that the distance can be greater than 50 km. In one of the health zones studied, one health center was 200 km from the General Reference Hospital.

In most of the health centers included in the study, Thursdays were reserved for the first prenatal consultation (i.e. new cases), while prenatal consultations 2, 3, and 4 generally took place on Fridays. Respondents noted that while consultations were scheduled to start at 6.30 am, women tended to arrive later in the morning, thus forcing consultations to start around 10 am and end between 11 am and noon. All of the health providers included in the study reported to have the basic equipment necessary to carry out prenatal consultations and non-complicated deliveries, although frequent shortages of medicines and materials were reported. Furthermore, it was observed that centers often did not have comfortable and adequate seating to accommodate pregnant women attending prenatal consultation. For example, in one health center located in a low-performing zone, we observed that pregnant women were forced to sit on a wall while waiting to be called for antenatal consultations. During observations, we also noted that the place where ANC was offered was frequently both messy and dirty.

Respondents indicated that postnatal consultations, breastfeeding support groups, and health education sessions often did not take place. In general, respondents described shortages of supplies needed for postnatal consultations such as vitamin A, folic acid, and especially iron, noting that many service providers refused to offer this activity because they had nothing to give women who might attend. At the time of this study, a respondent based at the central health zone level revealed that one zone comprised of seventeen health areas had been out of iron and folic acid for over six months. In North Ubangi, it was reported that postnatal consultations were not attended due to a widespread cultural practice called *Buakelé*. The practice stipulates that women remain in the household for a year after giving birth, with the mother (and newborn) returning to and living in her parents' house during this period. After completion of the reclusion period, the husband organizes a party to celebrate the lives of his wife and their baby and to welcome the mother and child back into his household. In regard to health education sessions, we were told that sessions are not given at the community level, while health providers only occasionally conduct educational sessions at the time of antenatal consultations.

Respondents also clarified health worker roles within the ASSP program. It was noted that the head nurse plans the maternal health activities and schedules, consults patients, assists childbirth, delegates responsibilities to other service providers, and supervises health workers. With assistance from the CODESA president, the head nurse is also responsible for programming awareness campaigns and household visits. In addition, the head nurse is in charge of writing monitoring reports submitted to the Central Health Zone offices on a monthly basis. Midwives consult patients and administer treatment, assist deliveries, lead prenatal and postnatal consultations, and provide family planning. The CODESA president co-manages the health center with the service providers, verifies the drug requisitions and deliveries, resolves conflicts between health center personnel and the community, assures that pregnant women are accompanied by either a RECO or the CODESA president when transferred to the General Reference Hospital or elsewhere, and assigns community health workers activities and tasks as part of the health center strategy. Respondents noted that the community health workers are supposed to identify pregnant women in the community, raise awareness with pregnant women about the importance of attending prenatal consultations and delivering in the health center, promote exclusive breastfeeding of babies up to 6 months, and provide information on appropriate care for young babies. Community health workers also try to motivate men to get involved in the care of their wives and children by encouraging them to follow the evolution of pregnancies of women participating in prenatal consultations, to attend prenatal consultation sessions, and to take part in meetings convened by the head nurse or the CODESA president.

Respondent explained that there are two types of supervision: (1) those carried out by the Central Health Zone Offices; and (2) those conducted by the Provincial Department of Health and implementing partners. The latter take place once per trimester while the supervisions conducted by the Central Zonal Offices are conducted monthly. Respondents indicated that the duration of supervisions depend on the purpose, with supervisory visits focusing on a range of issues including an assessment of materials and supplies available in the health centers, the development and implementation of activities, and/or the way in which medicines are prescribed.

Monitoring and evaluation of data collected at the community and health center level focuses on a variety of activities related to maternal health such as newly pregnant women, numbers of women attending prenatal consultations, receipt of vaccinations, facility- or home-based childbirth, and postnatal consultations. Respondents admitted that they fail to receive information on many women giving birth at home, particularly women who set up temporary camps adjacent to their fields and miss being detected due to the long distances that community workers must travel to reach them and the fact that only a limited number of community health workers are dedicated to maternal health. In order to identify recently pregnant women to participate in prenatal consultations, local women are asked to report pregnant women, with those women identified advised to attend the prenatal consultations. Respondents reported challenges in identifying women early in the pregnancy due to taboos about sharing a new pregnancy with other people, especially men, during the first three months when the pregnancy is still not visible. Further, respondents indicated that newly pregnant women are reluctant to share their condition with male community health workers carrying out home visits, making it difficult to locate and motivate women to attend prenatal consultations during the first trimester.

The management teams in the two health zones in North Ubangi reported organizing awareness campaigns twice a month, which involved carrying out home visits to share information on appropriate maternal health care. However, no awareness-raising activities were reported by the respondents working in the Maniema health zones. Moreover, while each head nurse was supposed to implement a BCC strategy, only one head nurse from North Ubangi had developed a formal plan, which involved broadcasting information on maternal health by local radio station twice a week and household visits. While household visits were supposed to be an integral part of the BCC approach, the data suggest that they are not conducted systematically, with respondents even unable to clarify what exactly is done during home visits. We found that a very small number of the community health workers were assigned specifically to maternal health activities, with the vast majority of community health workers primarily in charge of nutrition but also expected to engage in activities related to maternal health. Respondents informed us that it was not possible for them to cover both nutrition and maternal health activities simultaneously. In addition, most of the community health workers were men and therefore experienced limitations with regard to promoting maternal health care.

Respondents indicated that different approaches to building and renovating maternity clinics were used, reporting that IMA appeared to have a larger budget and to pay better rates to contractors bidding on construction contracts, while the implementing partners had smaller budgets and were, therefore, able to offer smaller salaries and invest less in construction projects. This was particularly problematic when contracts were being offered by both IMA and the implementing partners in the same geographic area. In general, three difficulties affecting construction and renovations were reported: (1) a conflict between the IMA and NGO partners related to differences in their construction budgets which affected the selection of contractors and construction contracts; (2) discontent among health workers with respect to the selection of sites where new maternity clinics were to be built or repaired; and (3) cases of maternity clinics where construction began but was never completed or construction was promised but never carried out. Across sites, questions were raised about the criteria used to determine when a new maternity or renovation would be carried out, with health workers expressing frustration about the non-transparency of the selection process and claiming that decisions were inequitable. Our respondents indicated that often maternities selected to be renovated were in comparatively better condition than those which were not provided assistance, raising questions about the approach. In addition, there were complaints about unfulfilled promises or the fact that some construction projects were never completed. For example, one of the high-performance health zones in the study had not benefitted from the construction or renovation of any maternity clinics. While two maternity clinics were supposed to be built and four others repaired, construction on the two new maternity clinics had started but stopped after the structure foundations were installed, and work on the four maternity clinics had never even started.

The ASSP program provided the studied health structures with furniture and equipment to carry out maternal health activities. The project distributed solar panels to the four health centers included in the study, of which three had functional solar kits (one is in a high-performance zone and two in low-performance zones) at the time of the study. Only one of the four health centers included in the study (a high-performance health zone) had received a refrigerator (actually, they had received two refrigerators because the first refrigerator stopped working). Respondents reported that some equipment provided to the health centers proved to be inadequate or inappropriate. For example, one birthing bed delivered to a health center was never placed in the delivery room because the door was too small for the bed to enter. In certain maternity clinics, respondents reported that the beds were insufficient for the numbers of women giving birth. In addition, community health workers reported difficulties raising awareness due to lack of visual aids.

Fees for maternal health services were reduced subsequent to agreements made between community members and the implementing partners. Specifically, prenatal consultation fees were fixed at 500 CF in North Ubangi and the rural site in Maniema, while the peri-urban site in Maniema charged 600 Cf. In addition, fees for a normal facility-based delivery were fixed at 1000 Cf. Postnatal consultations were free of charge. While the approach mandated that rates be posted in all of the ASSP supported health centers, our respondents reported complications involving the rates: (1) the long lag time for health authorities to authorize the rates; (2) certain health centers refusing to post the fee schedule; and (3) non-adherence to the fee schedule, which was detected in the health structures studied.

The ASSP project implemented a strategy which involved using revenue generated through the health center on a monthly basis for payment of health workers and ongoing needs to ensure proper functioning of the health structure. Specifically, the project proposed use of monthly revenue as follows: 73 percent goes to salaries of service providers, 10 percent to the medicine supply, 15 percent to the functioning of the structure, and 2 percent to the Community Health Development Committee. Government health personnel participating in project activities were generally dissatisfied that they did not receive regular salary supplements through the project. Specifically, health zone and DPS personnel had the opportunity to receive a performance-based prime, while those at the national level only received per diems during field missions. Health area health workers reported that the monthly revenue generated by the health centers was insufficient, particularly since the vast majority of facility-based personnel are not paid by the government. They indicated that it is not possible to survive on revenue obtained from prescriptions and user fees, which must be divided amongst other health workers, particularly in rural areas where utilization of services is lower and people are extremely poor. Furthermore, regular stock-outs affected health care utilization and the revenue generated. As a result, the majority of service providers expressed discontent regarding compensation and job satisfaction.

Reports indicated that the drugs supplied for prenatal consultations, childbirth, and postnatal consultations followed general IMA policy. Specifically, health center head nurses are responsible for generating drug requisitions under the supervision of the CODESA president, which are sent to the Central Health Zone offices and subsequently forwarded to the Provincial Health Department. The Provincial Health Department then submits all drug orders to the provincial medicine distribution centers. Drugs are delivered following the same procurement chain, with the last step involving drug distribution to the health centers. Respondents noted that even though the health structures submit drug requisitions on a monthly basis, drug deliveries are rarely made each trimester, with some respondents indicating that drugs can arrive 6-7 months after submitting orders, thus leading to drug shortages in the health centers. Three major problems concerning drug orders and distribution were reported: (1) shortages; (2) failure to respect the drug orders; and (3) late deliveries. In three sites, respondents felt that supply shortages constituted the primary obstacle to utilization of health services, including maternal health care. The majority of head nurses and CODESA presidents affirmed that the drugs received were frequently deficient in relation to the orders, and at times, essential medicines were not delivered, which was reported to interfere with delivery of appropriate care to pregnant women and during childbirth. In the majority of instances, it was reported that drug deliveries were delivered late and did not follow a trimester-based schedule. For example, at the time of this study, several respondents noted that, although it was the end of the fourth trimester, drug deliveries for the third trimester still had not been received.

Perception of the Approach

Health providers receiving training and many key informants reported that the ASSP project had helped to improve the ability of trained personnel to provide appropriate care due to the knowledge they had attained during trainings. A majority of the health workers trained claimed to be satisfied with the subjects they were taught, the duration of the training, and the quality of the instructors. However, the research team speculated that the stipends paid after each training may have contributed to their satisfaction, especially for personnel not paid by the government or who are volunteers. Moreover, the majority of our respondents had arrived after the start of the ASSP project and therefore had not participated in training on maternal health activities. All the service providers indicated that supervisions were very important because they identified weaknesses in the implementation of maternal health services and served to motivate health workers to make appropriate changes and better apply themselves. The community health workers, however, stated that supervisors did not visit the community and therefore they were not supervised. Some also noted that the supervisors need to get to the field to better understand the context. Several respondents indicated that the maternal health program had improved accessibility to maternal health services, particularly with the changes in prenatal consultation and delivery fees, which are more affordable. Some claimed that before ASSP, particularly in North Ubangi, most women gave birth at home, with many not knowing that pregnant women were supposed to deliver in the presence of a trained service provider. However, information regarding increased accessibility of maternal health services was based on perceptions rather than evidence. In fact, our data suggest that many women are still giving birth at home, with those living in more remote areas not monitored by the program, and that most women do not attend postnatal consultations. All respondents showed appreciation for improvements in the delivery infrastructure and availability of quality equipment needed for maternal health services. Nevertheless, the majority of respondents contended that the project was not able to resolve all problems associated with maternal health in the sites studied due to several weaknesses as follows:

- The majority of health providers interviewed were not stationed at the health facility where the interviews took place at the beginning of the ASSP activities. As a result, the vast majority of respondents interviewed had not received training specific to maternal health. Those who did participate in training stated that the series of training sessions and the superficial treatment of training topics made it impossible to master all of the information taught to the service providers. Weaknesses in the background of the health providers interfered with their ability to supervise other work and the overall quality of services provided;
- There was an insufficient number of trained community health workers assigned to maternal health, especially female community health workers. As a result, community activities appeared to be limited, particularly in more remote locations. As a result, it is likely that many women are not monitored during pregnancy and childbirth;
- In certain places (e.g. North Ubangi), being assisted by a man during childbirth continues to be a major obstacle to utilization of health facilities, causing women living in health areas where there are no female midwives to choose to give birth at home. Furthermore, the project fails to consider many cultural practices that can interfere with utilization of formal health services;
- Shortages of supplies and drugs influence the quality of care provided and likely affects utilization of maternal health services by pregnant women;
- The late application and failure to respect the reduced fee schedule likely affects utilization of maternal health services;
- According to respondents, a limited number of maternities were constructed or renovated, with several construction projects started but never completed.

Recommendations

It was recommended that future trainings be provided at a less rigorous speed, thereby allowing instructors to evaluate the retention capacity of trainees and make adjustments as needed. Other recommendations included that the project trains and engages community health workers to work specifically on maternal health care, thus enabling maternal health approaches to function at full capacity. Respondents indicated that in order for community health workers to function well, they need to be motivated or remunerated in some way. It was also noted that, especially for maternal health, there should be more female community health workers than males. Respondents from all sites voiced frustrations regarding the repeated shortages of medicines. Respondents suggested that decisions regarding construction and renovation be based on real needs, also proposing an increase in beds in certain maternity clinics, which will save women from traveling long distances in search of a maternity clinic.

<u>Mother Respondents</u>

Participation in ASSP Maternal Health Activities

Of the eighteen mothers interviewed, eleven had given birth in a health center and seven had delivered at home. Of the women who had delivered at home, one was living in the high-performance zone in N. Ubangi and the others were all in low-performance zones. In the high performing zone in Maniema, we were unable to identify women who had delivered at home within the past 6 months. It should be noted that, while many women in the N. Ubangi high-performance zone had delivered at home, only one woman was available to participate at the time of the study. Of the seven women who gave birth at home, all had planned on delivering in the health center, with six women reporting that the sudden onset of severe labor contractions prevented them from reaching the maternity clinic. Two of these women gave birth on the way to the health center, and four gave birth in the homes of trained midwives and were therefore assisted by skilled attendants of their respective health centers during childbirth. Only one woman gave birth in her own home; this woman claimed that she did not have transportation to get to the health center, and therefore decided to give birth at home. Notably, in both of the Maniema study zones, the research team learned that, when a woman gives birth at home, the police may threaten to arrest her and institute a fine.

Among women who delivered in the health facility, only two of eleven women paid the 1000 Cf official rate fixed by the project. In one of these cases, the family had a relationship with the head nurse, and in the second instance, the woman who gave birth was related to the head of a secondary school who paid the health center free for the woman. All of the other women interviewed paid more than 1000 Cf, with fees paid ranging from 3,600 to 30,000 Cf. Some women admitted that they did not know the official fee for childbirth in a health facility. The data suggest that the women delivering at home paid the midwives assisting the birth with a chicken. Women reported paying from 500 Cf to 1000 Cf for ANC, which was officially 500 Cf.

Although all respondents reported attending prenatal consultations, only 3 started consultations during the first trimester as is officially recommended. Most (10 of 18) started prenatal consultations during the second trimester, with fewer (5 of 18) beginning in the third trimester. When asked why they do not start the prenatal consultations during the first trimester, most respondents stated that they avoid making many trips between their houses and the health center due to the time and energy involved. Respondents also suggested that, since the service providers do not start prenatal consultations until there is a large number of women waiting to be seen for consultations, they avoid arriving in the health center early in the morning. Some women reported that it was not possible to plan other activities on the day of the prenatal consultation, with many women complaining that the service providers take a lot of time during consultations. In three of the four sites studied, the respondents indicated that the setting was good and there was adequate seating. In all sites, the women maintained that the personnel were welcoming, friendly, and courteous.

Of note, none of the eighteen women interviewed reported having participated in postnatal consultations.

Perception of the Approach

All women interviewed appreciated the interpersonal approach used by the health providers during childbirth, once again stating that they are respectful and friendly. However, no information was presented regarding the services provided. One woman reported the following about the midwife's services:

> *With this midwife, I have never had any problems giving birth. I have four children; I have given birth here since the second. The first one was born in the general hospital, but ever since I found out about this woman, I have never gone elsewhere. She knows what she is doing, she does not insult the women giving birth, and she talks to them with respect. She is really a good woman.*

In N. Ubangi a commonly cited limitation to delivering in a health facility related to the fact that many birth attendants are male, with women showing a strong preference for female birth attendants. In their view, men were often rough and did not treat women with respect. Treatment of the placenta constitutes another barrier to delivering in health centers. Specifically, 6 of 8 women from N. Ubangi interviewed described cultural norms related to burial of the placenta, specifying that cultural norms dictate that the placenta be buried either under a tree or at the crossroads of two paths. The belief is that if buried under a tree, the child will flourish and grow like a tree. If buried where two paths cross, the child will have many work opportunities. However, health center protocol mandate that the placenta be discarded in a hole or even in an incinerator, which according to local beliefs, can disrupt the future of the child. For this reason, even women who attended CPN refused to deliver in the health center so that they could deal with the placenta according to local customs. Women in N. Ubangi also indicated that some women chose not to deliver in the facilities because they lack appropriate clothing for themselves and the newborn to wear when leaving the health center. Women delivering in the health centers also frequently complained that the delivery environment was dirty.

iv. Limitations

Timing of baseline survey: The baseline survey was conducted in April 2014, well after ASSP maternal health activities had begun in April 2013. Thus, 2014 baseline estimates may not reflect the situation prior to ASSP intervention but may provide a slightly improved representation of the in-country situation, and potentially underestimate true program impact.

Service interruptions: Since community education and home visits were not reliant on ASSP funding following completion of training, it is not expected that the project's service interruptions impacted rates of outreach activities to sensitize mothers to the importance of early initiation of ANC consultation, facility deliveries or post-natal care. However, the provision of medicines and supplies to health facilities may have been impacted, affecting health worker motivation and capacity to provide (quality) care; medication stock-outs are discussed in Chapter 8.

Power to detect differences in outcomes: As described in Chapter 2, the analysis was powered to detect overall differences between intervention and control groups. It was not powered to detect differences between sub-groups. Nevertheless, some differences in the sub-analyses were found.

v. Discussion

Overall, the results from the DID models suggest that the ASSP program positively impacted facility deliveries, equipment availability and health facility cleanliness but negatively affected receipt of the recommended 4 or more ANC visits as well as receipt of a postnatal care visit for the baby within two days of delivery. No statistically significant program impacts were detected for other maternal health indicators.

The quantitative analyses indicate limited program impact on antenatal care. While the DID estimate from the model on receipt of the four recommended ANC visits suggested a negative impact, there was no statistically significant program impact on timing of the first ANC visit or the mean expenditure per ANC visit. Qualitative data help shed light on these findings with reports that efforts to improve access to and uptake of maternal health services was constrained by drug and supply shortages as well as an insufficient number of trained and female community health workers assigned to maternal health. At the same time, limited outreach activities of community health workers, particularly to women living in remote locations, likely restricted health service utilization. Mother-respondents included in the qualitative study also complained about the time involved in traveling to the health centers and participating in ANC, with some claiming that there is often a long waiting period and that participation in ANC consultations generally consumes an entire day. Furthermore, with regard to the timing of the first ANC visit, in particular, reports from health care workers, key informants and mothers consistently noted that women do not tell others (especially men) of their pregnancy during the first three months while it is not visible. These cultural traditions thus likely affected uptake of ANC services as well as the ability of community health workers to effectively promote early initiation of ANC consultations.

Still, the reason why a negative program impact on receipt of at least 4 ANC visits was found is unclear. Results on the timing of the first ANC visit, however, may offer some insight. As noted above, qualitative results informed of challenges with motivating women to attend ANC consultations early in their pregnancy, noting both cultural taboos and reluctance of women to share a new pregnancy (especially within the first three months) with male health workers. Indeed, during qualitative interviews with mothers, less than 1/5 of women reported starting ANC consultations during the first trimester as is officially recommended. Further, while descriptive data suggest no change in the number of women in ASSP areas who received their first ANC visit within the 1st trimester of pregnancy (absolute change=-2.0; p=0.537), results from non-ASSP areas show a significant increase in the proportion of women who initiate their first ANC consultation early (absolute change=6.9; p=0.013). This may be indicative of another initiative at work in non-ASSP areas (e.g. the World Bank program, or another program that we are not aware of) which was able to encourage women to attend all 4 recommended ANC visits, including the early visit within the first trimester of pregnancy. Alternatively, gains made prior to the baseline study could potentially explain the result seen here, such that the timing of the baseline study (subsequent to implementation of ASSP activities in 2013) may have biased results. It is also acknowledged that the result may simply be a false negative.

Findings from quantitative analyses were also compared with DHIS2 data. DHIS2 data from 2014 (baseline) were not available for comparison but there was little consistency with 2017/2018 (endline) data. For example, according to DHIS2 data, a large proportion of pregnant women (>60 percent) throughout Maniema, Nord Ubangi & Tshopo, attended at least 4 ANC visits in early 2017, with general improvements across all sampling domains, with each successive quarter. Similarly, when looking at women who received at least 3 ANC visits, DHIS2 data indicate that a large proportion of pregnant women (>70 percent), throughout Maniema, Nord Ubangi & Tshopo, attended at least 3 ANC visits in early 2017, with general improvements across all sampling domains, with each successive quarter. Further, although DHIS2 data similarly suggested modest declines across quarterly periods in the proportion of women initiating their first ANC visit within the first trimester throughout Maniema, Nord Ubangi & Tshopo, the absolute proportion of women initiating ANC consultations in their first trimester (>30 percent) was still larger than estimates from endline survey analyses. Despite these observed discrepancies, however, it is useful to note that all baseline survey point estimates align with 2013/14 Demographic and Health Survey (DHS) estimates (i.e. among women who had a live birth in the last five years prior to the survey, 48 percent at least completed the four recommended visits; 17 percent of women made their first visit before the fourth month of pregnancy) (Ministère du Plan et Suivi de la Mise en œuvre de la Révolution de la Modernité (MPSMRM), 2014).

Limited project performance was also observed for the use of ITNs and postnatal care services. With regard to ITNs, results from the DID model show that the ASSP program had no statistically significant impact on pregnant women's use of ITNs or household ownership of at least one ITN. The program scope is important to note here, however, as data from quarterly reports suggest that ASSP was not responsible for purchasing mosquito nets in either mass or routine campaigns. ASSP's quarterly reports also mention that throughout years 1 through 4 of the ASSP project, program support for malaria interventions targeted 19 health zones – the majority of which were in Kasai and thus excluded from analyses – with organizational challenges also potentially disrupting the availability of malaria commodities. Indeed, during qualitative interviewers with caregivers of malnourished children, participants in Maniema claimed to have not received mosquito nets since the time that Merlin was the implementing NGO in the health zone. No effective comparisons with DHIS2 data were possible since log frame data were only available for Kasai Central, Kasai and Maniema, with the indicator focused on the number/percentage of pregnant women *and* children under-one year provided with ITNs. However, baseline point estimates were noted to align with 2013/14 DHS estimates (i.e. 60 percent of pregnant women slept under an ITN in 2013; 70 percent of households own at least one ITN) (Ministère du Plan et Suivi de la Mise en œuvre de la Révolution de la Modernité (MPSMRM), 2014).

Results on receipt of post-natal care for babies were less than favorable, with DID estimates suggesting that the program had a negative impact on the likelihood of the newborn receiving a post-natal care visit within two days of delivery. Findings from the qualitative analysis echoed these findings with health worker and key informant interviewees noting that the post-natal consultations often did not take place. Respondents acknowledged that service providers often refused to offer the post-natal consultation because they did not have the necessary materials (e.g. vitamin A, folic acid, iron) with which to care for women who might attend. Respondents also informed of cultural practices that challenged uptake of these services, including *Buakelé* in Nord Ubangi, where a woman stays home for a year after birth to first protect and then celebrate the preservation of her life and that of her baby. Mothers who were interviewed similarly affirmed that they had not attended any post-natal consultations.

Notably, among ASSP's program goals was to increase the length of time a woman stayed in the facility (to at least 3 days) to allow for post-partum and post-natal visits to take place. Considering the limitation of the post-partum care and post-natal care indicators in reflecting this goal, we conducted additional analyses, exploring the proportion of women who spent at least 3 days in the facility after delivery. This indicator included women who were discharged early but reported receiving a health visit from a doctor or nurse, within 3 days of delivery. Results suggested no statistically significant program impact on the likelihood of a woman staying in a facility for at least 3 days.

On the other hand, the ASSP program was shown to have significant and positive impacts on delivery outcomes, including increased probability of facility deliveries as well as improved perceptions of quality of care during delivery. Quarterly reports note a six-month pilot distribution of birth delivery kits, containing items for mother and baby, to encourage maternal service use and ensure that women and their newborn could be seen leaving the facility well-dressed. While there is no survey data available to evaluate the impact of this initiative, it is possible that this program strategy, combined with other ASSP investments including reduced delivery user fees, contributed to the positive effect observed here. Quantitative results were consistent with DHIS2 reports of increases in facility-based deliveries; although survey point estimates are lower. (Survey point estimates are also lower than 2013/14 DHS estimates.) On another note, although many mother-respondents expressed reservations about cleanliness, results from the DID model indicated that the program was also associated with increased perceptions of the adequacy of equipment availability and facility cleanliness.

All in all, results suggest that future endeavors would benefit from a mid-point evaluation to better monitor and assess study progress, and direct changes in the project's approach and implementation as needed. Future interventions would further benefit from formative research to better understand how cultural traditions and provincial practices affect attitudes and service use so that BCC messages and outreach activities can be more effectively tailored and implemented.

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Table 4.1. Full model results of determinants of four or more ANC visits among women with a birth in the last two years (DID model) (n=2,938)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-10.817	0.044	**0.015**
Year	8.014	0.035	**0.022**
ASSP vs. non-ASSP	5.463	0.066	0.409
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-6.645	0.022	**0.002**
Setting			
Peri-urban	[ref]		
Rural	2.692	0.033	0.418
Wealth quintile			
Low	[ref]		
Low middle	5.407	0.031	0.082
Middle	8.348	0.031	**0.008**
High middle	6.660	0.032	**0.040**
High	7.975	0.034	**0.020**
Age at birth of youngest child (years)			
<20	[ref]		
20-34	-3.447	0.030	0.244
35-49	-1.141	0.040	0.773
Education level			
No education	[ref]		
Some primary	14.467	0.023	**<0.001**
Completed primary	15.115	0.025	**<0.001**
Completed secondary	34.139	0.083	**<0.001**
Birth order			
1	[ref]		
2-3	-4.855	0.029	0.093
4-5	-4.620	0.032	0.151
6+	-0.953	0.036	0.791

Table 4.1. Full model results of determinants of four or more ANC visits among women with a birth in the last two years (DID model) (n=2,938)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	-0.698	0.046	0.879
Currently working	4.017	0.024	0.090
World Bank program			
No support	[ref]		
Cash only	-10.229	0.041	**0.012**
PBF	-18.197	0.035	**<0.001**

ANC = antenatal care; DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.2. Sub-analysis for receipt of four or more ANC visits, by wealth (Bottom 40 percent wealth quintile: n=1,028)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.025	0.078	0.608
Year	-9.163	0.064	0.154
ASSP vs. non-ASSP	-4.024	0.113	0.723

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
ANC = antenatal care; SE = standard error

Table 4.3. Sub-analysis for receipt of four or more ANC visits, by wealth (Top 60 percent wealth quintile: n=1,910)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-12.065	0.054	**0.025**
Year	15.005	0.042	**<0.001**
ASSP vs. non-ASSP	7.627	0.081	0.348

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
ANC = antenatal care; SE = standard error

Table 4.4. Sub-analysis for receipt of four or more ANC visits, by domain (Nord/Sud Ubangi: n=1,544)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	7.709	0.058	0.183
Year	-4.559	0.044	0.302
ASSP vs. non-ASSP	-16.585	0.090	0.066

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
ANC = antenatal care; SE = standard error

Table 4.5. Sub-analysis for receipt of four or more ANC visits, by domain (Maniema/Tshopo: n=1,381)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-12.727	0.054	**0.019**
Year	4.332	0.039	0.266
ASSP vs. non-ASSP	7.581	0.088	0.388

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
ANC = antenatal care; SE = standard error

Table 4.6. Percentage of women with a birth in the last two years, who reported four or more ANC visits, by selected characteristics (n=3,009)								
	ASSP				**Non-ASSP**			
	2014 (*n=556*)	**2017 (*n=925*)**	**Absolute change**	***p-value***	**2014 (*n=542)***	**2017 (*n=986*)**	**Absolute change**	***p-value***
At least 4 ANC visits	36.8	30.8	-6.0	0.128	48.6	42.6	-6.0	0.163
Sampling domain								
Nord/ Sud Ubangi	34.8	34.7	-0.1	0.980	48.9	44.9	-4.0	0.403
Maniema/ Tshopo	37.9	27.1	-10.8	0.056	47.7	36.3	-11.4	0.175
Setting								
Peri-urban	27.5	40.9	13.4	0.098	50.6	47.3	-3.3	0.749
Rural	37.9	29.4	-8.5	**0.052**	48.6	42.4	-6.2	0.165
Wealth quintile								
Low	33.4	23.0	-10.4	0.244	58.1	42.2	-15.9	0.190
Low middle	42.5	24.4	-18.0	**0.043**	57.4	41.3	-16.0	0.144
Middle	33.8	38.1	4.4	0.747	52.6	46.6	-6.0	0.377
High middle	45.1	33.8	-11.3	0.267	41.2	47.6	6.5	0.516
High	28.9	37.6	8.7	0.073	41.7	36.6	-5.0	0.288
Total number of women reporting four or more ANC visits	220	330			253	429		

Note: Percentages are weighted

ANC = antenatal care

Table 4.7. Full model results of determinants of three or more ANC visits among women with a birth in the last two years (DID model) (n=2,938)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-5.611	0.041	0.172
Year	2.076	0.033	0.528
ASSP vs. non-ASSP	0.990	0.062	0.873
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-17.967	0.020	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	0.010	0.031	0.997
Wealth quintile			
Low	[ref]		
Low middle	11.262	0.031	**<0.001**
Middle	14.843	0.031	**<0.001**
High middle	15.584	0.032	**<0.001**
High	17.308	0.033	**<0.001**
Age at birth of youngest child (years)			
<20	[ref]		
20-34	-2.576	0.027	0.338
35-49	-0.752	0.036	0.833
Education level			
No education	[ref]		
Some primary	12.230	0.023	**<0.001**
Completed primary	12.138	0.024	**<0.001**
Completed secondary	17.119	0.072	**0.017**
Birth order			
1	[ref]		
2-3	-1.722	0.027	0.517
4-5	-4.373	0.030	0.142
6+	0.961	0.032	0.766

Table 4.7. Full model results of determinants of three or more ANC visits among women with a birth in the last two years (DID model) (n=2,938)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	6.434	0.043	0.130
Currently working	8.244	0.023	**<0.001**
World Bank program			
No support	[ref]		
Cash only	-8.614	0.043	**0.044**
PBF	-12.507	0.040	**0.002**

ANC = antenatal care; DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.8. Sub-analysis for receipt of three or more ANC visits, by wealth (Bottom 40 percent wealth quintile: n=1,028)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-8.183	0.078	0.293
Year	-8.041	0.064	0.211
ASSP vs. non-ASSP	6.822	0.116	0.555

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
ANC = antenatal care; SE = standard error

Table 4.9. Sub-analysis for receipt of three or more ANC visits, by wealth (Top 60 percent wealth quintile: n=1,910)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-2.579	0.048	0.592
Year	5.093	0.038	0.178
ASSP vs. non-ASSP	-3.318	0.073	0.650

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
ANC = antenatal care; SE = standard error

Table 4.10. Sub-analysis for receipt of three or more ANC visits, by domain (Nord/Sud Ubangi: n=1,544)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.273	0.051	0.400
Year	3.317	0.040	0.403
ASSP vs. non-ASSP	3.444	0.080	0.665

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
ANC = antenatal care; SE = standard error

Table 4.11. Sub-analysis for receipt of three or more ANC visits, by domain (Maniema/Tshopo: n=1,394)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-1.778	0.054	0.741
Year	-4.834	0.040	0.223
ASSP vs. non-ASSP	-8.034	0.088	0.360

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
ANC = antenatal care; SE = standard error

Table 4.12. Percentage of women with a birth in the last two years, who reported three or more ANC visits, by selected characteristics (n=3,009)

	ASSP				Non-ASSP			
	2014 (*n=556*)	**2017 (*n=925*)**	**Absolute change**	***p-value***	**2014 (*n=542)***	**2017 (*n=986*)**	**Absolute change**	***p-value***
At least 3 ANC visits	63.4	57.7	-5.7	0.353	79.3	69.2	-10.1	**0.035**
Sampling domain								
Nord/ Sud Ubangi	74.3	61.6	-12.7	0.065	79.1	74.2	-4.9	0.257
Maniema/ Tshopo	57.6	53.8	-3.8	0.642	79.8	55.5	-24.4	**0.032**
Setting								
Peri-urban	62.5	63.4	0.8	0.928	86.9	75.5	-11.3	**0.012**
Rural	63.5	56.8	-6.7	0.334	79.0	68.9	-10.2	**0.040**
Wealth quintile								
Low	56.4	47.1	-9.3	0.499	64.9	61.9	-3.0	0.788
Low middle	75.3	50.9	-24.5	**0.001**	78.1	67.1	-11.0	0.195
Middle	48.9	62.7	13.8	0.384	81.0	76.2	-4.8	0.302
High middle	67.2	61.6	-5.6	0.608	75.9	79.3	3.4	0.639
High	65.4	68.8	3.3	0.516	84.2	60.8	-23.4	**0.004**
Total number of women reporting three or more ANC visits	390	591			409	679		

Note: Percentages are weighted.

ANC = antenatal care.

Table 4.13. Full model results of determinants of receipt of first ANC visit within the 1st trimester of pregnancy for the most recent birth, among women with a birth in the last two years (DID model) (n=2,443)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.260	0.034	0.940
Year	2.689	0.027	0.325
ASSP vs. non-ASSP	3.829	0.052	0.461
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	5.985	0.018	**0.001**
Setting			
Peri-urban	[ref]		
Rural	-3.780	0.027	0.168
Wealth quintile			
Low	[ref]		
Low middle	-1.912	0.026	0.459
Middle	-2.272	0.026	0.379
High middle	-3.128	0.026	0.234
High	-1.083	0.028	0.701
Age at birth of youngest child (years)			
<20	[ref]		
20-34	3.593	0.019	0.064
35-49	3.494	0.028	0.209
Education level			
No education	[ref]		
Some primary	1.387	0.019	0.467
Completed primary	-1.092	0.020	0.581
Completed secondary	6.113	0.073	0.400
Birth order			
1	[ref]		
2-3	-5.851	0.025	**0.018**
4-5	-6.580	0.027	**0.015**
6+	-7.249	0.029	**0.013**

Table 4.13. Full model results of determinants of receipt of first ANC visit within the 1st trimester of pregnancy for the most recent birth, among women with a birth in the last two years (DID model) (n=2,443)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	-0.974	0.034	0.774
Currently working	-1.027	0.019	0.584
World Bank program			
No support	[ref]		
Cash only	1.499	0.035	0.665
PBF	6.085	0.038	0.106

ANC = antenatal care; DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.14. Sub-analysis for receipt of first ANC visit within the 1st trimester of pregnancy, by wealth (Bottom 40 percent wealth quintile: n=838)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	6.220	0.063	0.321
Year	-1.349	0.052	0.794
ASSP vs. non-ASSP	-3.895	0.091	0.670

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
ANC = antenatal care; SE = standard error

Table 4.15. Sub-analysis for receipt of first ANC visit within the 1st trimester of pregnancy, by wealth (Top 60 percent wealth quintile: n=1,605)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-2.638	0.041	0.521
Year	3.866	0.032	0.232
ASSP vs. non-ASSP	7.236	0.063	0.253

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
ANC = antenatal care; SE = standard error

Table 4.16. Sub-analysis for receipt of first ANC visit within the 1st trimester of pregnancy, by domain (Nord/Sud Ubangi: n=1,360)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	4.436	0.041	0.284
Year	6.589	0.031	**0.032**
ASSP vs. non-ASSP	-6.507	0.069	0.345

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
ANC = antenatal care; SE = standard error

Table 4.17. Sub-analysis for receipt of first ANC visit within the 1st trimester of pregnancy, by domain (Maniema/Tshopo: n=1,075)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-9.622	0.047	**0.042**
Year	1.001	0.035	0.776
ASSP vs. non-ASSP	17.962	0.075	**0.017**

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
ANC = antenatal care; SE = standard error

Table 4.18. Percentage of women with a birth in the last two years, who received their first ANC visit within the 1st trimester of pregnancy for their most recent live birth, by selected characteristics (n=2,374)								
	ASSP				**Non-ASSP**			
	2014 (*n=459*)	**2017 (*n=705*)**	**Absolute change**	***p-value***	**2014 (*n=465)***	**2017 (*n=745*)**	**Absolute change**	***p-value***
First ANC visit within the 1st trimester of pregnancy	17.6	15.6	-2.0	0.537	9.9	16.8	6.9	**0.013**
Sampling domain								
Nord/ Sud Ubangi	5.7	16.6	10.9	**0.016**	7.4	13.4	6.0	0.096
Maniema/ Tshopo	25.3	14.4	-10.9	**0.003**	18.2	30.1	11.9	0.126
Setting								
Peri-urban	22.4	16.3	-6.2	0.361	17.1	22.5	5.4	0.596
Rural	17.0	15.5	-1.5	0.661	9.7	16.5	6.9	**0.015**
Wealth quintile								
Low	10.1*	18.1	8.0	0.248	27.7	8.8	-18.9	0.128
Low middle	23.7	13.3	-10.5	0.295	8.3	11.6	3.3	0.532
Middle	11.5	20.3	8.8	0.199	15.0	13.0	-2.1	0.726
High middle	17.0	15.8	-1.2	0.839	2.4*	13.4	11.0	**0.009**
High	19.3	11.6	-7.6	0.076	9.3	31.5	22.1	**<0.001**
Total number of women with first ANC visit within the 1st trimester of pregnancy	62	110			42	102		

Note: Percentages are weighted.

ANC = antenatal care

* Indicates a cell size less than 5

Table 4.19. Full model results of determinants of mean expenditure (USD) on ANC during pregnancy for most recent live birth (DID model) (n=3,365)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	0.008	0.173	0.962
Year	0.161	0.147	0.275
ASSP vs. non-ASSP	-0.299	0.257	0.245
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	0.409	0.084	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-0.754	0.224	**0.001**
Wealth quintile			
Low	[ref]		
Low middle	0.093	0.107	0.382
Middle	0.172	0.112	0.124
High middle	0.123	0.113	0.277
High	0.278	0.126	**0.028**
Age at birth of youngest child (years)			
<20	[ref]		
20-34	0.060	0.098	0.537
35-49	0.038	0.119	0.747
World Bank program			
No support	[ref]		
Cash only	-0.042	0.167	0.800
PBF	0.018	0.173	0.915

ANC = antenatal care; DID = difference-in-differences; SE = standard error; PBF = performance-based financing; USD = US dollars

Table 4.20. Sub-analysis for mean expenditure (USD) on ANC during pregnancy, by wealth (Bottom 40 percent wealth quintile: n=1,111)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.099	0.194	0.610
Year	0.295	0.174	0.091
ASSP vs. non-ASSP	-0.057	0.276	0.836

Note: Model controls for sampling domain, setting, age at birth of youngest child, and the World Bank program.

ANC = antenatal care; USD = US dollars; SE = standard error

Table 4.21. Sub-analysis for mean expenditure (USD) on ANC during pregnancy, by wealth (Top 60 percent wealth quintile: n=2,254)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	0.022	0.248	0.929
Year	0.066	0.204	0.748
ASSP vs. non-ASSP	-0.376	0.375	0.316

Note: Model controls for sampling domain, setting, age at birth of youngest child, and the World Bank program.

ANC = antenatal care; USD = US dollars; SE = standard error

Table 4.22. Sub-analysis for mean expenditure (USD) on ANC during pregnancy, by domain (Nord/Sud Ubangi: n=1,818)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	0.042	0.134	0.752
Year	-0.149	0.104	0.154
ASSP vs. non-ASSP	-0.241	0.209	0.249

Note: Model controls for setting, wealth quintile, age at birth of youngest child, and the World Bank program.

ANC = antenatal care; USD = US dollars; SE = standard error

Table 4.23. Sub-analysis for mean expenditure (USD) on ANC during pregnancy, by domain (Maniema/Tshopo: n=1,547)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	0.118	0.353	0.739
Year	0.600	0.268	**0.025**
ASSP vs. non-ASSP	-0.336	0.575	0.559

Note: Model controls for setting, wealth quintile, age at birth of youngest child, and the World Bank program.

ANC = antenatal care; USD = US dollars; SE = standard error

Table 4.24. Incurred any expenses per ANC visit during pregnancy for most recent live birth, by selected characteristics (n=3,266)								
	ASSP				Non-ASSP			
	2014 (*n=671*)	2017 (*n=969*)	Absolute change	*p-value*	2014 (*n=650)*	2017 (*n=976*)	Absolute change	*p-value*
Incurred any expenses per ANC visit (USD)	66.5	86.1	19.7	**<0.001**	83.5	94.4	11.0	**0.050**
Sampling domain								
Nord/ Sud Ubangi	91.2	94.9	3.6	0.276	93.7	95.1	1.4	0.546
Maniema/ Tshopo	52.2	77.0	24.8	**0.003**	50.2	91.9	41.7	**0.002**
Setting								
Peri-urban	65.7	85.3	19.6	**0.029**	90.2	96.7	6.4	0.305
Rural	66.6	86.3	19.7	**0.001**	83.2	94.3	11.1	0.056
Wealth quintile								
Low	87.8	91.9	4.2	0.418	99.4	94.6	-4.8	**0.028**
Low middle	73.9	91.7	17.8	**0.001**	90.9	93.6	2.6	0.662
Middle	74.6	88.3	13.7	**0.032**	93.3	95.2	1.9	0.487
High middle	56.5	82.0	25.5	**0.017**	79.4	91.8	12.5	0.247
High	54.9	78.8	23.9	**0.041**	67.1	96.4	29.3	**0.001**
Total number of women incurring any ANC expenses	498	856			579	921		

Note: Percentages are weighted.

ANC = antenatal care; USD = US dollars

Table 4.25. Mean cash expenditure per ANC visit during pregnancy for most recent live birth, by selected characteristics (n=3,266)								
	ASSP				**Non-ASSP**			
	2014 (*n=671*)	**2017 (*n=969*)**	**Absolute change**	***p-value***	**2014 (*n=650)***	**2017 (*n=976*)**	**Absolute change**	***p-value***
Mean expenditure per ANC visit (USD)	0.6	0.7	0.1	0.422	0.7	1.0	0.3	0.261
Sampling domain								
Nord/ Sud Ubangi	0.5	0.4	-0.1	0.595	0.7	0.8	0.1	0.676
Maniema/ Tshopo	0.6	1.0	0.3	0.154	0.5	1.4	0.9	**0.003**
Setting								
Peri-urban	0.7	1.3	0.6	**0.053**	2.3	6.9	4.6	**0.034**
Rural	0.5	0.6	0.0	0.806	0.6	0.6	0.0	0.739
Wealth quintile								
Low	0.4	0.4	0.0	0.830	0.5	0.5	0.0	0.861
Low middle	0.3	0.8	0.5	**0.014**	0.5	0.6	0.1	0.344
Middle	0.9	0.6	-0.3	0.506	0.8	0.6	-0.2	0.220
High middle	0.6	0.5	-0.1	0.735	0.5	0.6	0.0	0.786
High	0.6	1.0	0.5	**0.047**	0.8	2.2	1.4	0.088

Note: Percentages are weighted.

ANC = antenatal care; USD = US dollars

Table 4.26 Full model results of determinants of pregnant women's use of an ITN the previous night (DID model) (n=845)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-8.878	0.077	0.247
Year	2.450	0.061	0.688
ASSP vs. non-ASSP	13.417	0.111	0.229
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-30.456	0.036	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-27.678	0.049	**<0.001**
Wealth quintile			
Low	[ref]		
Low middle	5.286	0.059	0.367
Middle	11.536	0.057	**0.042**
High middle	5.587	0.060	0.354
High	14.167	0.064	**0.027**
Woman's age (years)			
<20	[ref]		
20-34	9.056	0.043	**0.037**
35-49	12.312	0.058	**0.035**
Education level			
No education	[ref]		
Some primary	8.208	0.043	0.054
Completed primary	9.390	0.044	**0.033**
Completed secondary	19.982	0.130	0.126
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	1.939	0.083	0.815
Currently working	-5.971	0.042	0.158

Table 4.26 Full model results of determinants of pregnant women's use of an ITN the previous night (DID model) (n=845)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
World Bank program			
No support	[ref]		
Cash only	0.275	0.078	0.972
PBF	1.372	0.075	0.855

ITN = insecticide-treated net; DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.27. Sub-analysis for pregnant women's use of an ITN the previous night, by wealth (Bottom 40 percent wealth quintile: n=289)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-21.494	0.144	0.137
Year	13.878	0.118	0.240
ASSP vs. non-ASSP	27.071	0.202	0.179

Note: Model controls for sampling domain, setting, mother's age, mother's education level, employment status, and the World Bank program.
ITN = insecticide-treated net; SE = standard error

Table 4.28. Sub-analysis for pregnant women's use of an ITN the previous night, by wealth (Top 60 percent wealth quintile: n=554)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-3.423	0.091	0.708
Year	-4.355	0.071	0.539
ASSP vs. non-ASSP	6.113	0.134	0.648

Note: Model controls for sampling domain, setting, mother's age, mother's education level, employment status, and the World Bank program.
ITN = insecticide-treated net; SE = standard error

Table 4.29. Sub-analysis for pregnant women's use of an ITN the previous night, by domain (Nord/Sud Ubangi: n=414)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-13.661	0.107	0.200
Year	6.741	0.087	0.437
ASSP vs. non-ASSP	15.217	0.155	0.325

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, employment status, and the World Bank program.
ITN = insecticide-treated net; SE = standard error

Table 4.30. Sub-analysis for pregnant women's use of an ITN the previous night, by domain (Maniema/Tshopo: n=418)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-10.067	0.098	0.304
Year	5.554	0.071	0.437
ASSP vs. non-ASSP	17.126	0.153	0.262

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, employment status, and the World Bank program.
ITN = insecticide-treated net; SE = standard error

Table 4.31. Percentage of pregnant women who used an ITN last night, by selected characteristics (n=824)								
	ASSP				Non-ASSP			
	2014 (*n=217*)	**2017 (*n=197*)**	**Absolute change**	***p-value***	**2014 (*n=178)***	**2017 (*n=232*)**	**Absolute change**	***p-value***
Pregnant women who used an ITN last night	54.2	54.7	0.6	0.931	74.0	66.1	-8.0	0.167
Sampling domain								
Nord/ Sud Ubangi	75.8	60.5	-15.2	0.085	79.1	75.1	-4.0	0.512
Maniema/ Tshopo	43.5	49.6	6.1	0.461	51.3	45.7	-5.6	0.634
Setting								
Peri-urban	100.0	78.8	-21.2	**0.025**	93.3	57.9	-35.4	0.150
Rural	48.7	53.1	4.4	0.522	73.6	66.2	-7.5	0.205
Wealth quintile								
Low	80.3	49.2	-31.2	**0.052**	89.6	69.6	-20.0	0.225
Low middle	51.8	73.2	21.4	0.079	76.8	56.4	-20.4	0.154
Middle	43.8	54.5	10.7	0.372	61.5	90.8	29.4	**0.001**
High middle	46.8	34.8	-12.0	0.436	73.6	51.3	-22.3	0.182
High	78.3	65.1	-13.3	0.438	81.5	67.0	-14.5	0.510
Total number of pregnant women reporting use of an ITN the previous night	137	114			109	140		

Note: Percentages are weighted.

ITN = insecticide-treated net

Table 4.32. Full model results of determinants of household ownership of at least one ITN (DID model) (n=6,881)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.130	0.023	0.068
Year	5.146	0.018	**0.004**
ASSP vs. non-ASSP	5.628	0.035	0.103
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-29.652	0.011	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-18.717	0.013	**<0.001**
Wealth quintile			
Low	[ref]		
Low middle	3.131	0.016	0.056
Middle	6.329	0.017	**<0.001**
High middle	8.071	0.017	**<0.001**
High	12.034	0.017	**<0.001**
Education level of head of household			
No education	[ref]		
Some primary	6.158	0.018	**<0.001**
Completed primary	9.323	0.016	**<0.001**
Completed secondary	12.455	0.022	**<0.001**
Household size			
1-2	[ref]		
3-4	4.246	0.018	**0.018**
5-6	6.332	0.018	**<0.001**
7+	5.862	0.018	**0.001**
World Bank program			
No support	[ref]		
Cash only	10.136	0.023	**<0.001**
PBF	7.433	0.022	**0.001**

ITN = insecticide-treated net; DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.33. Sub-analysis for household ownership of at least one ITN, by wealth (Bottom 40 percent wealth quintile: n=2,809)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-1.399	0.038	0.711
Year	-1.754	0.031	0.571
ASSP vs. non-ASSP	1.769	0.055	0.747

Note: Model controls for sampling domain, setting, education level of head of household, household size, and the World Bank program.
ITN = insecticide-treated net; SE = standard error

Table 4.34. Sub-analysis for household ownership of at least one ITN, by wealth (Top 60 percent wealth quintile: n=4,072)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.549	0.028	0.109
Year	8.845	0.022	**<0.001**
ASSP vs. non-ASSP	6.478	0.045	0.146

Note: Model controls for sampling domain, setting, education level of head of household, household size, and the World Bank program.
ITN = insecticide-treated net; SE = standard error

Table 4.35. Sub-analysis for household ownership of at least one ITN, by domain (Nord/Sud Ubangi: n=3,470)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-16.332	0.031	**<0.001**
Year	14.176	0.028	**<0.001**
ASSP vs. non-ASSP	15.936	0.044	**<0.001**

Note: Model controls for setting, wealth quintile, education level of head of household, household size, and the World Bank program.
ITN = insecticide-treated net; SE = standard error

Table 4.36. Sub-analysis for household ownership of at least one ITN, by domain (Maniema/Tshopo: n=3,411)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-3.327	0.034	0.322
Year	8.831	0.025	**<0.001**
ASSP vs. non-ASSP	7.518	0.055	0.171

Note: Model controls for setting, wealth quintile, education level of head of household, household size, and the World Bank program.
ITN = insecticide-treated net; SE = standard error

Table 4.37. Percentage of households with at least one ITN, by selected characteristics (n=6,967)								
	ASSP				Non-ASSP			
	2014 (*n=1,394*)	**2017 (*n=2,149*)**	**Absolute change**	***p-value***	**2014 (*n=1,379)***	**2017 (*n=2,045*)**	**Absolute change**	***p-value***
Households with at least one ITN	60.8	67.2	6.4	0.134	73.5	88.5	14.9	**0.001**
Sampling domain								
Nord/ Sud Ubangi	81.6	77.8	-3.8	0.319	84.8	94.5	9.7	**<0.001**
Maniema/ Tshopo	49.0	58.6	9.5	0.107	45.1	69.6	24.5	**0.034**
Setting								
Peri-urban	93.7	89.7	-4.0	0.392	71.4	95.8	24.4	**0.014**
Rural	56.9	64.7	7.8	0.092	73.6	88.0	14.5	**0.001**
Wealth quintile								
Low	67.5	68.6	1.1	0.865	70.5	89.2	18.7	**<0.001**
Low middle	44.7	56.4	11.6	0.179	79.5	84.5	5.0	0.263
Middle	52.9	65.5	12.6	**0.029**	86.5	88.6	2.1	0.595
High middle	58.9	66.0	7.1	0.234	76.5	88.5	12.1	**0.023**
High	74.9	78.8	3.9	0.640	64.0	90.6	26.6	**<0.001**
Total number of households with at least one ITN	992	1545			938	1600		

Note: Percentages are weighted.

ITN = insecticide-treated net

Table 4.38. Full model results of determinants of having a delivery within a health facility, among women with a birth in the last two years (DID model) (n=2,995)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	14.128	0.038	**<0.001**
Year	-2.152	0.031	0.481
ASSP vs. non-ASSP	-20.793	0.055	**<0.001**
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	11.179	0.019	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-0.289	0.031	0.926
Wealth quintile			
Low	[ref]		
Low middle	10.010	0.028	**<0.001**
Middle	10.977	0.029	**<0.001**
High middle	11.198	0.030	**<0.001**
High	17.759	0.031	**<0.001**
Age at birth of youngest child (years)			
<20	[ref]		
20-34	3.136	0.026	0.222
35-49	-1.662	0.035	0.631
Education level			
No education	[ref]		
Some primary	6.093	0.021	**0.003**
Completed primary	9.591	0.022	**<0.001**
Completed secondary	11.407	0.071	0.110
Birth order			
1	[ref]		
2-3	-5.913	0.023	**0.011**
4-5	-6.774	0.026	**0.009**
6+	-2.643	0.028	0.349

Table 4.38. Full model results of determinants of having a delivery within a health facility, among women with a birth in the last two years (DID model) (n=2,995)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	2.225	0.040	0.583
Currently working	1.980	0.021	0.345
World Bank program			
No support	[ref]		
Cash only	10.661	0.031	**0.001**
PBF	14.840	0.027	**<0.001**

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.39. Sub-analysis for having a delivery within a health facility, by wealth (Bottom 40 percent wealth quintile: n=1,056)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	32.587	0.072	**<0.001**
Year	-12.348	0.061	**0.044**
ASSP vs. non-ASSP	-48.409	0.103	**<0.001**

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.40. Sub-analysis for having a delivery within a health facility, by wealth (Top 60 percent wealth quintile: n=1,939)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	6.418	0.043	0.138
Year	0.516	0.034	0.880
ASSP vs. non-ASSP	-9.139	0.064	0.150

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.41. Sub-analysis for having a delivery within a health facility, by domain (Nord/Sud Ubangi: n=1,578)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	2.884	0.054	0.592
Year	20.652	0.043	**<0.001**
ASSP vs. non-ASSP	-24.355	0.079	**0.002**

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.42. Sub-analysis for having a delivery within a health facility, by domain (Maniema/Tshopo: n=1,417)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-3.456	0.042	0.407
Year	1.938	0.028	0.495
ASSP vs. non-ASSP	12.307	0.067	0.068

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.43. Percentage of live births delivered in past two years within a health facility, by selected characteristics (n=3,460)								
	ASSP				Non-ASSP			
	2014 (*n=605*)	**2017 (*n=1,065*)**	**Absolute change**	***p-value***	**2014 (*n=622)***	**2017 (*n=1,168*)**	**Absolute change**	***p-value***
Delivery in a health facility	64.2	76.0	11.9	0.079	74.6	81.7	7.1	**0.021**
Sampling domain								
Nord/ Sud Ubangi	44.1	61.6	17.6	**0.011**	73.3	80.4	7.1	0.068
Maniema/ Tshopo	75.3	90.2	15.0	0.057	79.0	85.7	6.8	0.066
Setting								
Peri-urban	88.6	82.0	-6.6	0.369	93.1	83.8	-9.3	0.322
Rural	61.5	75.2	13.7	0.065	74.0	81.6	7.6	**0.017**
Wealth quintile								
Low	35.5	53.2	17.7	0.143	42.3	73.6	31.3	0.117
Low middle	51.3	78.4	27.1	**<0.001**	75.9	76.1	0.2	0.977
Middle	56.3	82.2	25.9	**0.025**	73.3	83.8	10.5	**0.048**
High middle	71.7	84.1	12.3	0.114	70.8	83.4	12.5	**0.014**
High	88.5	89.7	1.2	0.784	85.6	86.1	0.5	0.909
Total number of women with a facility delivery	397	821			452	950		

Note: Percentages are weighted.

Table 4.44. Full model results of determinants of health facility delivery in the presence of a skilled birth attendantǂ, among women with a birth in the last two years (DID model) (n=2,269)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.285	0.041	0.299
Year	13.201	0.031	**<0.001**
ASSP vs. non-ASSP	0.478	0.063	0.940
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-29.228	0.021	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	4.221	0.031	0.177
Wealth quintile			
Low	[ref]		
Low middle	7.425	0.034	**0.031**
Middle	-0.617	0.035	0.861
High middle	2.014	0.036	0.571
High	0.888	0.036	0.808
Age at birth of youngest child (years)			
<20	[ref]		
20-34	-4.942	0.026	0.061
35-49	-1.852	0.036	0.606
Education level			
No education	[ref]		
Some primary	3.188	0.025	0.194
Completed primary	-0.335	0.026	0.896
Completed secondary	9.712	0.059	0.098
Birth order			
1	[ref]		
2-3	2.620	0.028	0.349
4-5	3.168	0.031	0.311
6+	2.513	0.034	0.466

Table 4.44. Full model results of determinants of health facility delivery in the presence of a skilled birth attendantƗ, among women with a birth in the last two years (DID model) (n=2,269)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	-1.449	0.042	0.728
Currently working	-1.638	0.022	0.452
World Bank program			
No support	[ref]		
Cash only	-10.946	0.046	**0.017**
PBF	-17.259	0.040	**<0.001**

Ɨ Skilled birth attendants include doctors and nurses only

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.45. Sub-analysis for health facility delivery in the presence of a skilled birth attendant, by wealth (Bottom 40 percent wealth quintile: n=717)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.187	0.070	0.547
Year	3.353	0.050	0.505
ASSP vs. non-ASSP	7.155	0.109	0.510

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.46. Sub-analysis for health facility delivery in the presence of a skilled birth attendant, by wealth (Top 60 percent wealth quintile: n=1,552)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.450	0.052	0.388
Year	16.201	0.039	**<0.001**
ASSP vs. non-ASSP	-1.175	0.079	0.882

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.47. Sub-analysis for health facility delivery in the presence of a skilled birth attendant, by domain (Nord/Sud Ubangi: n=1,090)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-7.057	0.046	0.129
Year	7.573	0.031	**0.015**
ASSP vs. non-ASSP	15.238	0.076	**0.044**

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.48. Sub-analysis for health facility delivery in the presence of a skilled birth attendant, by domain (Maniema/Tshopo: n=1,179)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	6.698	0.060	0.264
Year	8.363	0.045	0.062
ASSP vs. non-ASSP	-22.593	0.096	**0.018**

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.49. Percentage of live births delivered within a health facility in the past two years in the presence of a skilled birth attendantǂ, by selected characteristics (n=2,620)								
	ASSP				**Non-ASSP**			
	2014 (*n=397*)	**2017 (*n=821*)**	**Absolute change**	***p-value***	**2014 (*n=452)***	**2017 (*n=950*)**	**Absolute change**	***p-value***
Delivery by a skilled birth attendant	55.6	71.0	15.4	**0.006**	65.8	79.9	14.1	**0.014**
Sampling domain								
Nord/ Sud Ubangi	85.9	87.4	1.5	0.693	72.9	88.4	15.6	**0.008**
Maniema/ Tshopo	45.8	60.0	14.1	**0.042**	44.0	55.7	11.7	0.162
Setting								
Peri-urban	47.5	59.3	11.9	0.289	74.5	84.1	9.6	0.318
Rural	56.9	72.8	15.9	**0.010**	65.5	79.7	14.3	**0.017**
Wealth quintile								
Low	84.2	81.1	-3.0	0.739	82.1	76.0	-6.1	0.724
Low middle	65.7	77.4	11.6	0.312	72.7	91.4	18.7	0.088
Middle	56.0	69.3	13.3	0.176	74.4	84.5	10.1	0.112
High middle	51.6	69.3	17.7	0.064	86.9	79.3	-7.6	0.380
High	46.8	62.0	15.3	0.063	31.4	71.6	40.2	**<0.001**
Total number of women with skilled birth attendant at delivery	248	626			339	740		

Note: Percentages are weighted.

ǂSkilled birth attendants include doctors and nurses only

Table 4.50. Full model results of determinants of receipt of at least one postpartum care visitǂ, among women with a birth in the last two years (DID model) (n=2,658)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	3.056	0.040	0.445
Year	7.253	0.031	**0.018**
ASSP vs. non-ASSP	-2.019	0.062	0.745
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	14.342	0.021	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-4.632	0.032	0.152
Wealth quintile			
Low	[ref]		
Low middle	-1.757	0.029	0.540
Middle	-0.533	0.029	0.853
High middle	-1.291	0.030	0.663
High	6.344	0.033	**0.053**
Age at birth of youngest child (years)			
<20	[ref]		
20-34	4.061	0.026	0.116
35-49	2.735	0.035	0.431
Education level			
No education	[ref]		
Some primary	3.343	0.022	0.123
Completed primary	3.381	0.023	0.146
Completed secondary	11.857	0.084	0.157
Birth order			
1	[ref]		
2-3	-4.097	0.027	0.135
4-5	-5.841	0.030	**0.052**
6+	1.210	0.034	0.725

Table 4.50. Full model results of determinants of receipt of at least one postpartum care visitƚ, among women with a birth in the last two years (DID model) (n=2,658)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	-5.166	0.040	0.195
Currently working	-0.202	0.021	0.925
World Bank program			
No support	[ref]		
Cash only	-2.319	0.039	0.549
PBF	-4.558	0.035	0.189

ƚA postpartum care visit is defined here as an examination of the state of health of the mother, by a health professional (i.e. doctor or nurse), in the two days following childbirth

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.51. Sub-analysis for receipt of at least one postpartum care visit, by wealth (Bottom 40 percent wealth quintile: n=960)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	7.570	0.067	0.257
Year	6.334	0.052	0.227
ASSP vs. non-ASSP	-6.538	0.104	0.529

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.52. Sub-analysis for receipt of at least one postpartum care visit, by wealth (Top 60 percent wealth quintile: n=1,698)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	0.850	0.050	0.866
Year	6.684	0.038	0.078
ASSP vs. non-ASSP	0.576	0.078	0.941

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.53. Sub-analysis for receipt of at least one postpartum care visit, by domain (Nord/Sud Ubangi: n=1,447)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	7.457	0.049	0.125
Year	8.757	0.037	**0.019**
ASSP vs. non-ASSP	-4.748	0.079	0.550

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.54. Sub-analysis for receipt of at least one postpartum care visit, by domain (Maniema/Tshopo: n=1,211)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.447	0.058	0.938
Year	1.967	0.041	0.631
ASSP vs. non-ASSP	-1.520	0.095	0.872

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.55. Percentage of women who delivered in the past two years that received at least one postpartum care visitǂ, by selected characteristics (n=2,717)								
	ASSP				**Non-ASSP**			
	2014 (*n=492*)	**2017 (*n=818*)**	**Absolute change**	***p-value***	**2014 (*n=501)***	**2017 (*n=906*)**	**Absolute change**	***p-value***
Mothers receiving at least 1 postpartum visit (within 2 days of childbirth)	25.7	30.2	4.5	0.362	16.8	22.8	6.0	0.402
Sampling domain								
Nord/ Sud Ubangi	10.4	26.3	16.0	**<0.001**	6.9	19.5	12.6	**<0.001**
Maniema/ Tshopo	34.4	34.2	-0.3	0.967	55.1	34.3	-20.8	0.073
Setting								
Peri-urban	39.3	40.6	1.3	0.885	33.7	38.2	4.5	0.816
Rural	24.1	28.9	4.8	0.377	16.4	22.1	5.6	0.442
Wealth quintile								
Low	8.0*	23.3	15.4	0.093	6.7*	17.6	10.8	0.215
Low middle	15.6	30.6	15.0	0.093	8.3	16.7	8.4	**0.027**
Middle	23.5	30.8	7.3	0.271	11.0	18.1	7.1	0.293
High middle	25.0	27.3	2.3	0.842	15.2	24.5	9.3	0.232
High	47.3	40.1	-7.2	0.490	41.2	33.0	-8.3	0.579
Total number of women who received at least one postpartum visit	111	259			99	236		

Note: Percentages are weighted.

ǂA postpartum care visit is defined here as an examination of the state of health of the mother, by a health professional (i.e. doctor or nurse), in the two days following childbirth

* Indicates a cell size less than 5

Table 4.56. Full model results of determinants of receipt of at least one postnatal visitǂ, among live births in the last two years (DID model) (n=2,968)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.571	0.017	**0.008**
Year	6.343	0.014	**<0.001**
ASSP vs. non-ASSP	6.335	0.029	**0.026**
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Orientale	-1.102	0.009	0.214
Setting			
Peri-urban	[ref]		
Rural	-1.184	0.014	0.397
Wealth quintile			
Low	[ref]		
Low middle	0.755	0.010	0.456
Middle	1.167	0.011	0.274
High middle	0.681	0.011	0.530
High	1.264	0.012	0.290
Age at birth of youngest child (years)			
<20	[ref]		
20-34	0.422	0.009	0.653
35-49	2.138	0.015	0.156
Education level			
No education	[ref]		
Some primary	-2.469	0.010	**0.012**
Completed primary or more	-2.168	0.011	**0.042**
Birth order			
1	[ref]		
2-3	2.332	0.011	**0.035**
4-5	-0.907	0.010	0.379
6+	0.221	0.012	0.855

Table 4.56. Full model results of determinants of receipt of at least one postnatal visitǂ, among live births in the last two years (DID model) (n=2,968)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Employment status	[ref]		
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	-0.496	0.019	0.793
Currently working	-1.899	0.010	**0.049**
World Bank program			
No support	[ref]		
Cash only	-2.583	0.012	**0.027**
PBF	-3.979	0.008	**<0.001**

ǂA postnatal care visit is defined here as an examination of the state of health of the baby, by a health professional (i.e. doctor or nurse), in the two days following delivery

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.57. Sub-analysis for receipt of at least one postnatal visit, by wealth (Bottom 40 percent wealth quintile: n=1,043)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-5.228	0.035	0.136
Year	7.877	0.031	**0.011**
ASSP vs. non-ASSP	5.392	0.055	0.323

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.58. Sub-analysis for receipt of at least one postnatal visit, by wealth (Top 60 percent wealth quintile: n=1,925)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.862	0.020	**0.016**
Year	6.330	0.016	**<0.001**
ASSP vs. non-ASSP	7.081	0.034	**0.036**

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.59. Sub-analysis for receipt of at least one postnatal visit, by domain (Nord/Sud Ubangi: n=1,565)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	0.292	0.025	0.907
Year	0.474	0.021	0.825
ASSP vs. non-ASSP	2.856	0.039	0.469

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.60. Sub-analysis for receipt of at least one postnatal visit, by domain (Maniema/Tshopo: n=1,390)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-2.252	0.023	0.330
Year	5.576	0.017	**0.001**
ASSP vs. non-ASSP	2.001	0.041	0.629

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 4.61. Percentage of live births delivered in the past two years that received at least one postnatal care visitǂ, by selected characteristics (n=3,039)								
	ASSP				**Non-ASSP**			
	2014 (*n=555*)	**2017 (*n=929*)**	**Absolute change**	***p-value***	**2014 (*n=554*)**	**2017 (*n=1001*)**	**Absolute change**	***p-value***
Newborns receiving at least 1 postnatal care visit (within 2 days of childbirth)	2.6	3.9	1.3	0.279	0.6	2.9	2.3	**0.004**
Sampling domain								
Nord/ Sud Ubangi	3.8	3.9	0.1	0.961	0.5*	2.8	2.3	**0.021**
Maniema/ Tshopo	1.9*	3.9	2.0	0.248	1.1*	3.4	2.4	0.117
Setting								
Peri-urban	2.6*	6.5	3.9	0.169	1.3*	12.4	11.0	0.056
Rural	2.5	3.5	1.0	0.464	0.6*	2.5	1.8	**0.014**
Wealth quintile								
Low	0.0*	4.4	4.4	0.326	0.0*	3.4	3.4	0.523
Low middle	2.3*	3.3	1.0	0.578	0.1*	3.0	2.9	**<0.001**
Middle	3.4	3.6	0.1	0.958	0.0*	3.7	3.7	0.073
High middle	2.7*	2.0	-0.7	0.798	1.4*	1.4	-0.1	0.973
High	2.8*	5.4	2.5	0.284	1.3*	3.2	1.8	0.247
Total number of newborns who received at least one postnatal care visit	13	42			6	46		

Note: Percentages are weighted.

ǂA postnatal care visit is defined here as an examination of the state of health of the baby, by a health professional (i.e. doctor or nurse), in the two days following delivery

* Indicates a cell size less than 5

Table 4.62. Full model results of determinants of mean cash expenditure (USD) on delivery for most recent live birth (DID model) (n=3,177)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	0.366	1.674	0.827
Year	-2.233	1.331	0.093
ASSP vs. non-ASSP	-2.508	2.571	0.329
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	8.103	0.813	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-4.003	1.474	**0.007**
Wealth quintile			
Low	[ref]		
Low middle	-0.683	1.235	0.580
Middle	-0.519	1.227	0.672
High middle	-0.476	1.251	0.704
High	0.935	1.352	0.489
Age at birth of youngest child (years)			
<20	[ref]		
20-34	-0.608	0.957	0.525
35-49	0.743	1.241	0.549
Facility type			
Public hospital	[ref]		
Public health center/post	-11.813	2.211	**<0.001**
All other (including private)	-4.376	3.676	0.234
World Bank program			
No support	[ref]		
Cash only	2.299	2.038	0.259
PBF	-1.946	1.238	0.116

USD = US dollars; DID = difference-in-differences; SE = standard error; PBF = performance-based financing;

Table 4.63. Sub-analysis for mean cash expenditure (USD) on delivery, by wealth (Bottom 40 percent wealth quintile: n=974)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.092	3.238	0.977
Year	-1.291	2.546	0.612
ASSP vs. non-ASSP	-1.693	4.917	0.731

Note: Model controls for sampling domain, setting, age at birth of youngest child, facility type, and the World Bank program.
USD = US dollars; SE = standard error

Table 4.64. Sub-analysis for mean cash expenditure (USD) on delivery, by wealth (Top 60 percent wealth quintile: n=2,203)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	0.584	1.667	0.726
Year	-2.352	1.341	0.079
ASSP vs. non-ASSP	-2.658	2.586	0.304

Note: Model controls for sampling domain, setting, age at birth of youngest child, facility type, and the World Bank program.
USD = US dollars; SE = standard error

Table 4.65. Sub-analysis for mean cash expenditure (USD) on delivery, by domain (Nord/Sud Ubangi: n=1,475)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	0.678	1.597	0.671
Year	-2.256	1.151	**0.050**
ASSP vs. non-ASSP	-3.133	2.625	0.233

Note: Model controls for setting, wealth quintile, age at birth of youngest child, facility type, and the World Bank program.
USD = US dollars; SE = standard error

Table 4.66. Sub-analysis for mean cash expenditure (USD) on delivery, by domain (Maniema/Tshopo: n=1,702)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-1.012	2.034	0.619
Year	-0.488	1.513	0.747
ASSP vs. non-ASSP	1.708	3.310	0.606

Note: Model controls for setting, wealth quintile, age at birth of youngest child, facility type, and the World Bank program.
USD = US dollars; SE = standard error

Table 4.67. Mean cash expenditure on delivery for most recent live birth, by selected characteristics (n=3,088)								
	ASSP				**Non-ASSP**			
	2014 (*n=554*)	**2017 (*n=954*)**	**Absolute change**	***p-value***	**2014 (*n=578)***	**2017 (*n=1,002*)**	**Absolute change**	***p-value***
Mean expenditure on delivery (USD)	11.5	8.2	-3.3	0.070	7.5	6.9	-0.6	0.593
Sampling domain								
Nord/ Sud Ubangi	4.2	2.9	-1.3	0.060	6.9	5.1	-1.8	0.099
Maniema/ Tshopo	13.6	12.0	-1.6	0.513	9.4	11.5	2.1	0.395
Setting								
Peri-urban	13.4	13.3	-0.1	0.977	22.6	28.1	5.5	0.427
Rural	11.2	7.3	-3.9	0.059	7.0	5.8	-1.1	0.249
Wealth quintile								
Low	3.7	4.2	0.5	0.804	8.2	3.4	-4.8	**0.028**
Low middle	7.6	5.0	-2.5	**0.029**	5.4	5.2	-0.1	0.847
Middle	10.8	6.5	-4.3	0.153	6.8	5.0	-1.9	0.059
High middle	12.1	8.4	-3.7	0.259	7.6	5.3	-2.3	0.093
High	14.5	14.2	-0.4	0.910	10.0	12.0	2.0	0.592

Note: Percentages are weighted.

USD = US dollars

Table 4.68. Full model results of determinants of reporting adequate competence of birth assistant for the most recent live birth (DID model) (n=2,901)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.810	0.047	0.863
Year	-30.495	0.030	**<0.001**
ASSP vs. non-ASSP	4.869	0.086	0.573
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-3.774	0.017	**0.026**
Setting			
Peri-urban	[ref]		
Rural	-2.811	0.023	0.218
Wealth quintile			
Low	[ref]		
Low middle	-3.195	0.023	0.165
Middle	-4.079	0.023	0.076
High middle	-4.941	0.024	**0.039**
High	-1.987	0.024	0.410
Age at birth of youngest child (years)			
<20	[ref]		
20-34	3.363	0.020	0.089
35-49	6.267	0.024	**0.008**
Education level			
No education	[ref]		
Some primary	-0.427	0.018	0.817
Completed primary	-0.979	0.019	0.610
Completed secondary	3.029	0.068	0.655
Facility type			
Public hospital	[ref]		
Public health center/post	-3.075	0.022	0.169
All other (including private)	-18.103	0.048	**<0.001**

Table 4.68. Full model results of determinants of reporting adequate competence of birth assistant for the most recent live birth (DID model) (n=2,901)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Borrowed money to assist with expenses			
No	[ref]		
Yes	11.963	0.017	**<0.001**
Listens to the radio at least once a week			
No	[ref]		
Yes	1.999	0.023	0.383
World Bank program			
No support	[ref]		
Cash only	1.214	0.027	0.654
PBF	-3.961	0.027	0.143

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.69. Sub-analysis for reporting adequate competence of birth assistant, by wealth (Bottom 40 percent wealth quintile: n=893)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.394	0.080	0.583
Year	-18.809	0.057	**0.001**
ASSP vs. non-ASSP	2.737	0.141	0.846

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.70. Sub-analysis for reporting adequate competence of birth assistant, by wealth (Top 60 percent wealth quintile: n=2,008)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-1.406	0.061	0.817
Year	-33.901	0.035	**<0.001**
ASSP vs. non-ASSP	8.291	0.114	0.468

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.71. Sub-analysis for reporting adequate competence of birth assistant, by domain (Nord/Sud Ubangi: n=1,363)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	4.031	0.070	0.562
Year	-29.842	0.035	**<0.001**
ASSP vs. non-ASSP	2.073	0.132	0.876

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.72. Sub-analysis for reporting adequate competence of birth assistant, by domain (Maniema/Tshopo: n=1,538)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	3.214	0.063	0.611
Year	-38.272	0.044	**<0.001**
ASSP vs. non-ASSP	-4.293	0.121	0.722

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.73. Perceptions of adequate competence of birth assistant for the most recent live birth, by selected characteristics (n=3,051)								
	ASSP				**Non-ASSP**			
	2014 (*n=548*)	**2017 (*n=932*)**	**Absolute change**	***p-value***	**2014 (*n=572)***	**2017 (*n=999*)**	**Absolute change**	***p-value***
Adequate competence of person assisting delivery	98.6	78.8	-19.8	**<0.001**	97.3	74.2	-23.1	**<0.001**
Sampling domain								
Nord/ Sud Ubangi	98.3	83.9	-14.4	**<0.001**	96.7	75.9	-20.8	**<0.001**
Maniema/ Tshopo	98.6	75.2	-23.4	**<0.001**	99.4	70.1	-29.3	**<0.001**
Setting								
Peri-urban	98.6	81.0	-17.6	**0.002**	95.9	93.2	-2.7	0.609
Rural	98.5	78.4	-20.2	**<0.001**	97.4	73.2	-24.2	**<0.001**
Wealth quintile								
Low	100.0	80.4	-19.6	0.158	88.2	79.4	-8.9	0.558
Low middle	97.3	78.9	-18.4	**<0.001**	95.2	80.1	-15.2	**0.002**
Middle	97.9	76.8	-21.1	**<0.001**	99.3	70.2	-29.1	**<0.001**
High middle	98.7	81.4	-17.3	**<0.001**	97.3	67.2	-30.1	**<0.001**
High	100.0	77.3	-22.7	**<0.001**	97.9	77.0	-20.9	**<0.001**
Total number of women reporting adequate competence of person assisting birth	538	724			559	707		

Note: Percentages are weighted.

Table 4.74. Full model results of determinants of reporting adequate availability of equipment during the most recent live birth (DID model) (n=2,840)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	8.580	0.028	**0.002**
Year	-7.830	0.020	**<0.001**
ASSP vs. non-ASSP	-8.608	0.045	0.057
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-8.061	0.014	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-5.375	0.016	**0.001**
Wealth quintile			
Low	[ref]		
Low middle	2.415	0.024	0.324
Middle	1.232	0.025	0.616
High middle	2.377	0.025	0.335
High	4.016	0.025	0.107
Age at birth of youngest child (years)			
<20	[ref]		
20-34	-2.627	0.015	0.082
35-49	-1.736	0.019	0.367
Education level			
No education	[ref]		
Some primary	-0.775	0.015	0.611
Completed primary	-3.367	0.016	**0.038**
Completed secondary	-3.954	0.052	0.451
Facility type			
Public hospital	[ref]		
Public health center/post	-5.776	0.016	**<0.001**
All other (including private)	-5.652	0.036	0.118

Table 4.74. Full model results of determinants of reporting adequate availability of equipment during the most recent live birth (DID model) (n=2,840)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Borrowed money to assist with expenses			
No	[ref]		
Yes	-2.148	0.019	0.259
Listens to the radio at least once a week			
No	[ref]		
Yes	2.165	0.018	0.236
World Bank program			
No support	[ref]		
Cash only	3.988	0.022	0.073
PBF	4.870	0.019	**0.010**

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.75. Sub-analysis for reporting adequate availability of equipment, by wealth (Bottom 40 percent wealth quintile: n=855)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	3.925	0.054	0.465
Year	-8.784	0.036	**0.015**
ASSP vs. non-ASSP	1.631	0.088	0.854

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.76. Sub-analysis for reporting adequate availability of equipment, by wealth (Top 60 percent wealth quintile: n=1,973)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	10.406	0.033	**0.002**
Year	-7.913	0.025	**0.001**
ASSP vs. non-ASSP	-12.417	0.054	**0.021**

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.77. Sub-analysis for reporting adequate availability of equipment, by domain (Nord/Sud Ubangi: n=1,342)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-6.290	0.038	0.095
Year	1.403	0.023	0.550
ASSP vs. non-ASSP	11.109	0.064	0.084

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.78. Sub-analysis for reporting adequate availability of equipment, by domain (Maniema/Tshopo: n=1,498)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	16.797	0.040	**<0.001**
Year	-12.753	0.029	**<0.001**
ASSP vs. non-ASSP	-21.848	0.067	**0.001**

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.79. Perceptions of adequate availability of equipment for the most recent live birth, by selected characteristics (n=2,991)								
	ASSP				Non-ASSP			
	2014 (*n=543*)	**2017 (*n=908*)**	**Absolute change**	***p-value***	**2014 (*n=563)***	**2017 (*n=977*)**	**Absolute change**	***p-value***
Adequate availability of equipment	86.6	91.5	4.9	0.181	90.7	88.9	-1.8	0.482
Sampling domain								
Nord/ Sud Ubangi	96.8	92.9	-3.9	0.268	90.6	92.2	1.6	0.492
Maniema/ Tshopo	83.8	90.4	6.7	0.144	91.1	80.6	-10.5	0.064
Setting								
Peri-urban	95.1	93.4	-1.7	0.720	96.9	94.0	-2.9	0.656
Rural	85.2	91.1	5.9	0.154	90.5	88.7	-1.8	0.480
Wealth quintile								
Low	95.3	85.4	-9.8	0.254	78.7	94.9	16.2	**0.030**
Low middle	94.8	93.3	-1.5	0.663	90.2	86.1	-4.1	0.560
Middle	84.1	92.3	8.2	0.089	88.2	85.3	-2.9	0.659
High middle	86.4	91.6	5.2	0.419	92.3	88.1	-4.2	0.362
High	82.9	93.0	10.1	0.138	93.6	91.2	-2.4	0.677
Total number of women reporting adequate availability of equipment	491	834			514	823		

Note: Percentages are weighted.

Table 4.80. Full model results of determinants of reporting adequate availability of drug supplies during the most recent live birth (DID model) (n=2,783)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	0.208	0.040	0.959
Year	-0.191	0.030	0.950
ASSP vs. non-ASSP	-5.948	0.063	0.348
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-34.790	0.019	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-15.316	0.024	**<0.001**
Wealth quintile			
Low	[ref]		
Low middle	1.942	0.033	0.552
Middle	-2.764	0.032	0.394
High middle	2.032	0.033	0.534
High	0.197	0.034	0.954
Age at birth of youngest child (years)			
<20	[ref]		
20-34	-3.544	0.022	0.115
35-49	-5.979	0.029	**0.037**
Education level			
No education	[ref]		
Some primary	-1.460	0.023	0.530
Completed primary	-5.317	0.024	**0.026**
Completed secondary	-2.138	0.063	0.736
Facility type			
Public hospital	[ref]		
Public health center/post	-12.659	0.025	**<0.001**
All other (including private)	0.638	0.046	0.890

Table 4.80. Full model results of determinants of reporting adequate availability of drug supplies during the most recent live birth (DID model) (n=2,783)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Borrowed money to assist with expenses			
No	[ref]		
Yes	-12.749	0.026	**<0.001**
Listens to the radio at least once a week			
No	[ref]		
Yes	0.888	0.027	0.745
World Bank program			
No support	[ref]		
Cash only	-11.157	0.040	**0.006**
PBF	2.478	0.035	0.474

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.81. Sub-analysis for reporting adequate availability of drug supplies, by wealth (Bottom 40 percent wealth quintile: n=834)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	3.149	0.076	0.677
Year	-2.896	0.055	0.599
ASSP vs. non-ASSP	-5.861	0.119	0.624

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.82. Sub-analysis for reporting adequate availability of drug supplies, by wealth (Top 60 percent wealth quintile: n=1,949)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.644	0.048	0.893
Year	0.322	0.037	0.930
ASSP vs. non-ASSP	-6.123	0.075	0.417

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.83. Sub-analysis for reporting adequate availability of drug supplies, by domain (Nord/Sud Ubangi: n=1,304)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-7.376	0.052	0.153
Year	13.335	0.037	**<0.001**
ASSP vs. non-ASSP	8.039	0.082	0.327

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.84. Sub-analysis for reporting adequate availability of drug supplies, by domain (Maniema/Tshopo: n=1,479)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	5.160	0.054	0.340
Year	-8.582	0.040	**0.030**
ASSP vs. non-ASSP	-19.429	0.089	**0.029**

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.85. Perceptions of adequate availability of health facility's drug supplies for the most recent live birth, by selected characteristics (n=2,930)								
	ASSP				**Non-ASSP**			
	2014 (*n=514*)	**2017 (*n=888*)**	**Absolute change**	***p-value***	**2014 (*n=557)***	**2017 (*n=971*)**	**Absolute change**	***p-value***
Adequate availability of drug supplies	57.0	61.9	4.9	0.257	66.2	74.9	8.7	0.439
Sampling domain								
Nord/ Sud Ubangi	82.5	87.2	4.6	0.292	79.7	81.0	1.3	0.809
Maniema/ Tshopo	50.5	44.3	-6.2	0.191	25.2	59.3	34.1	0.235
Setting								
Peri-urban	73.4	72.1	-1.2	0.904	89.0	81.1	-7.8	0.103
Rural	54.3	59.9	5.6	0.233	65.5	74.6	9.1	0.430
Wealth quintile								
Low	79.4	76.7	-2.7	0.844	63.6	76.4	12.8	0.436
Low middle	60.5	67.0	6.5	0.422	78.6	73.0	-5.6	0.423
Middle	53.7	57.8	4.0	0.631	72.5	71.1	-1.5	0.812
High middle	51.9	59.0	7.1	0.365	63.7	72.6	8.9	0.394
High	59.2	54.9	-4.3	0.667	51.6	79.9	28.4	0.207
Total number of women reporting adequate availability of drug supplies	316	586			396	654		

Note: Percentages are weighted.

Table 4.86. Full model results of determinants of reporting adequate manner in which the health care provider(s) explained the situation for the most recent live birth (DID model) (n=2,886)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	2.454	0.013	0.055
Year	-0.585	0.010	0.558
ASSP vs. non-ASSP	-4.078	0.019	**0.034**
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-0.466	0.006	0.470
Setting			
Peri-urban	[ref]		
Rural	-1.888	0.005	**0.001**
Wealth quintile			
Low	[ref]		
Low middle	0.738	0.012	0.535
Middle	1.085	0.012	0.353
High middle	0.995	0.012	0.402
High	-0.430	0.013	0.749
Age at birth of youngest child (years)			
<20	[ref]		
20-34	-0.154	0.008	0.844
35-49	0.707	0.009	0.433
Education level			
No education	[ref]		
Some primary	-0.095	0.008	0.905
Completed primary	0.033	0.008	0.967
Completed secondary	-0.137	0.019	0.941
Facility type			
Public hospital	[ref]		
Public health center/post	-0.165	0.008	0.844
All other (including private)	-3.800	0.027	0.153

Table 4.86. Full model results of determinants of reporting adequate manner in which the health care provider(s) explained the situation for the most recent live birth (DID model) (n=2,886)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Borrowed money to assist with expenses			
No	[ref]		
Yes	-3.226	0.011	**0.005**
Listens to the radio at least once a week			
No	[ref]		
Yes	-2.984	0.014	**0.028**
World Bank program			
No support	[ref]		
Cash only	2.110	0.008	**0.005**
PBF	2.480	0.005	**<0.001**

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.87. Sub-analysis for reporting adequate manner in which the health care provider(s) explained the situation, by wealth (Bottom 40 percent wealth quintile: n=881)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	2.557	0.023	0.268
Year	0.346	0.018	0.849
ASSP vs. non-ASSP	-5.006	0.034	0.140

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.88. Sub-analysis for reporting adequate manner in which the health care provider(s) explained the situation, by wealth (Top 60 percent wealth quintile: n=1,993)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	2.131	0.015	0.164
Year	-1.058	0.012	0.379
ASSP vs. non-ASSP	-3.516	0.024	0.136

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.89. Sub-analysis for reporting adequate manner in which the health care provider(s) explained the situation, by domain (Nord/Sud Ubangi: n=1,277)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.578	0.016	0.719
Year	3.077	0.013	**0.015**
ASSP vs. non-ASSP	-0.545	0.024	0.818

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.90. Sub-analysis for reporting adequate manner in which the health care provider(s) explained the situation, by domain (Maniema/Tshopo: n=1,535)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	4.194	0.019	**0.026**
Year	-2.598	0.015	0.086
ASSP vs. non-ASSP	-7.792	0.032	**0.015**

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.91 Perceptions of the manner in which the health care provider(s) explained the situation for the most recent live birth, by selected characteristics (n=3,034)								
	ASSP				**Non-ASSP**			
	2014 (*n=550*)	**2017 (*n=945*)**	**Absolute change**	***p-value***	**2014 (*n=545)***	**2017 (*n=994*)**	**Absolute change**	***p-value***
Adequate manner in explaining the situation	96.4	98.1	1.7	0.184	96.0	99.0	3.0	**0.018**
Sampling domain								
Nord/ Sud Ubangi	94.5	98.3	3.8	0.192	94.7	99.5	4.7	**0.002**
Maniema/ Tshopo	97.0	98.0	1.0	0.450	99.4	97.7	-1.7	0.095
Setting								
Peri-urban	98.6	98.3	-0.4	0.874	98.6	98.4	-0.2	0.946
Rural	96.1	98.1	2.1	0.154	95.9	99.0	3.1	**0.017**
Wealth quintile								
Low	97.2	95.8	-1.4	0.748	100.0	99.6	-0.4	0.743
Low middle	93.6	100.0	6.4	**0.025**	98.8	99.0	0.2	0.884
Middle	97.1	99.7	2.6	**0.023**	93.8	100.0	6.2	**<0.001**
High middle	94.6	98.9	4.3	**0.028**	96.6	99.2	2.7	0.152
High	98.8	96.7	-2.1	0.211	95.1	97.6	2.6	0.326
Total number of women reporting that health care provider(s) explained the situation adequately	526	927			530	981		

Note: Percentages are weighted.

Table 4.92. Full model results of determinants of reporting adequate cleanliness of the health facility during the most recent live birth (DID model) (n=2,921)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	14.263	0.030	**<0.001**
Year	1.316	0.023	0.571
ASSP vs. non-ASSP	-22.034	0.044	**<0.001**
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-0.095	0.015	0.949
Setting			
Peri-urban	[ref]		
Rural	-4.416	0.019	**0.019**
Wealth quintile			
Low	[ref]		
Low middle	1.060	0.025	0.676
Middle	2.621	0.025	0.293
High middle	0.634	0.026	0.806
High	3.621	0.026	0.168
Age at birth of youngest child (years)			
<20	[ref]		
20-34	1.899	0.018	0.289
35-49	-0.525	0.023	0.818
Education level			
No education	[ref]		
Some primary	-3.091	0.016	0.057
Completed primary	-3.156	0.017	0.061
Completed secondary	-0.276	0.044	0.950
Facility type			
Public hospital	[ref]		
Public health center/post	0.024	0.021	0.991
All other (including private)	0.399	0.040	0.921

Table 4.92. Full model results of determinants of reporting adequate cleanliness of the health facility during the most recent live birth (DID model) (n=2,921)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Borrowed money to assist with expenses			
No	[ref]		
Yes	-8.781	0.021	**<0.001**
Listens to the radio at least once a week			
No	[ref]		
Yes	-0.145	0.021	0.945
World Bank program			
No support	[ref]		
Cash only	3.098	0.028	0.265
PBF	8.136	0.020	**<0.001**

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 4.93. Sub-analysis for reporting adequate cleanliness of the health facility, by wealth (Bottom 40 percent wealth quintile: n=834)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	3.149	0.076	0.677
Year	-2.896	0.055	0.599
ASSP vs. non-ASSP	-5.861	0.119	0.624

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.94. Sub-analysis for reporting adequate cleanliness of the health facility, by wealth (Top 60 percent wealth quintile: n=1,949)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.644	0.048	0.893
Year	0.322	0.037	0.930
ASSP vs. non-ASSP	-6.123	0.075	0.417

Note: Model controls for sampling domain, setting, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.95. Sub-analysis for reporting adequate cleanliness of the health facility, by domain (Nord/Sud Ubangi: n=1,304)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-7.376	0.052	0.153
Year	13.335	0.037	**<0.001**
ASSP vs. non-ASSP	8.039	0.082	0.327

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.96. Sub-analysis for reporting adequate cleanliness of the health facility, by domain (Maniema/Tshopo: n=1,479)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	5.160	0.054	0.340
Year	-8.582	0.040	**0.030**
ASSP vs. non-ASSP	-19.429	0.089	**0.029**

Note: Model controls for setting, wealth quintile, age at birth of youngest child, mother's education level, facility type, borrowed money to assist with expenses, listens to the radio at least once a week, and the World Bank program.
SE = standard error

Table 4.97 Perceptions of adequate cleanliness of the health facility for the most recent live birth, by selected characteristics (n=3,071)								
	ASSP				**Non-ASSP**			
	2014 (*n=548*)	**2017 (*n=947*)**	**Absolute change**	***p-value***	**2014 (*n=574)***	**2017 (*n=1,002*)**	**Absolute change**	***p-value***
Adequate cleanliness of health facility	74.8	92.7	17.9	**<0.001**	79.3	89.2	10.0	**0.001**
Sampling domain								
Nord/ Sud Ubangi	74.8	94.0	19.3	**<0.001**	75.6	90.1	14.5	**<0.001**
Maniema/ Tshopo	74.8	91.8	17.0	**<0.001**	89.9	87.0	-3.0	0.316
Setting								
Peri-urban	86.0	91.9	5.9	0.387	89.2	86.1	-3.1	0.571
Rural	73.0	92.8	19.9	**<0.001**	78.9	89.4	10.5	**0.001**
Wealth quintile								
Low	85.8	93.4	7.5	0.257	51.7	87.5	35.9	**0.011**
Low middle	69.3	94.9	25.5	**<0.001**	75.6	84.7	9.1	0.220
Middle	77.4	96.9	19.5	**<0.001**	68.6	93.7	25.2	**<0.001**
High middle	69.8	88.3	18.6	**0.021**	84.0	87.0	3.0	0.618
High	78.4	90.8	12.4	**0.020**	92.3	90.3	-2.0	0.663
Total number of women reporting adequate cleanliness of health facility	406	872			478	893		

Note: Percentages are weighted.

Chapter 5

Child Health

Acronyms

ACT	Artemisinin-based Combination Therapies (ACTs)
AMF	Against Malaria Foundation
ARI	Acute Respiratory Infection
ASSP	Access to Primary Health Care (Project)
BCC	Behavior Change Communication
BCG	Bacillus Calmette–Guérin vaccine
BCP	*Bulletin de Performance Communautaire* (Community Scorecard)
CCS	Community Care Site
CDR	Regional Distribution Center
CODESA	*Comité de développement de l'aire de santé* (Health Area Development Committee)
CPS	*Services de Santé de l'Enfant* (Child Health Services)
DFID	Department for International Development
DHIS2	District Health Information System (Software)
DHS	Demographic and Health Survey
DID	Difference-in-Differences
DPT/HepB/Hib	Diphtheria-Tetanus-Pertussis/Hepatitis B/Haemophilus influenzae type b Vaccine
DRC	Democratic Republic of Congo
DPS	District Provincial Health Office
ECZS	Health Zone Executive Team
EPI	Expanded Program of Immunizations
IMA	Interchurch Medical Assistance (dba IMA World Health)
IMCI	Integrated Management of Childhood Illness
ITN	Insecticide-treated net
IP	Implementing partner
LLIN	Long-lasting insecticidal net
MOH	Ministry of Health
ORS	Oral Rehydration Salts
PBF	Performance-based financing
PMI	President's Malaria Initiative
RDT	Rapid Diagnostic Test
RECO	Community Health Volunteer
RHF	Recommended Home Fluids
RUTF	Ready to Use Therapeutic Foods
SE	Standard Error
SNIS	National Health Information System
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation, and Hygiene
WHO	World Health Organization

i. Overview of the ASSP approach

The official Access to Primary Health Care (ASSP) approach included efforts to strengthen the health system in the Democratic Republic of Congo (DRC), and had two global goals with respect to children's health: 1) improving the quality of and access to health services targeting children less than five years of age, and 2) improving the demand for health services. These two goals were specifically implemented through the following measures:

- Strengthening the capacity of health center personnel and community health workers (RECOs) via trainings and supportive supervision;
- Improving the infrastructure and equipment in the health stations, enhancing software and providing regular supervision to the Regional Distribution Centers (CDRs) and Health Zone Executive Teams (ECZSs) to address management capacity weaknesses;
- Providing medicine and essential commodities;
- Increasing behavioral change communication (BCC) with respect to detection and early care of ill children in households, the community, and local health facilities;
- Implementing a negotiated and reasonable fee system for the treatment of children under five years of age.

All things considered, child health interventions involved basic curative services, preventive care, and training, with immunization and the fight against malaria being specific focus areas for the child health approach.

Basic curative care had the goal of improving access to and usage of the health centers, through training and retention of staff, provision of adequate equipment for diagnosis and treatment, implementation of a system of continuous supply of essential medicine, and availability of services at reasonable rates. In accordance with the policies of the Ministry of Health (MOH), other important focal areas included creating functional centers of medicine distribution, rehabilitating and furnishing the health structures, construction of new buildings with lasting materials, and providing essential equipment. In particular, the project provided microscopes and spectrophotometers to the General Reference Hospital, as well as resuscitation kits for children, scales, sterilizers, and solar refrigerators to the health centers. Integrated Management of Childhood Illness (IMCI) guidelines were supposed to be followed during treatment, with the program committed to providing artemisinin-based combination therapies (ACTs) and other malaria drugs for malaria treatment, zinc combined with oral rehydration salts (ORS) for the treatment of diarrhea, and amoxicillin for the treatment of pneumonia.

Preventive services involved growth-monitoring consultations with services including weighing children, vitamin A distribution, deworming with mebendazole, distribution of insecticide-treated nets (ITNs), and Mother and Child weeks, as well as immunizations and health communication sessions. Prevention also involved several community-based approaches, led by RECOs who were responsible for implementing BCC strategies through household visits, group meetings, and mass awareness-raising activities, with a focus on prompt care-seeking. The community-based IMCI approach aimed to address geographical barriers and extend access to care in ASSP-assisted health zones, via outreach activities in hard-to-reach communities. Further, via the establishment and reinvigoration of community care sites (CCSs), trained relays were supported in the provision of basic treatment for the three most common childhood diseases, namely malaria, diarrhea, and acute respiratory infection (ARI).

Training had the goal of capacity building for the service providers working in health centers and the community health sites, to ensure quality diagnosis and care. Such training was provided by the implementing partners (IPs), with content including resuscitation of newborns, use of rapid diagnostic tests (RDTs) for malaria, and treatment of malaria, diarrhea, and pneumonia. Other training themes included utilization of IMCI guidelines at the health center level, as well as managing cases on a community basis, extension of the immunization program, integrated training of laboratory technicians about blood security, malaria, and tuberculosis diagnostics and topics related to health service delivery (e.g. hospital hygiene, integrated supervision of endemic diseases, nutrition, and clean villages and schools).

Strategies designed for immunization and malaria, central interventions to the ASSP child health approach, included:

The immunization strategy. In the DRC, immunization campaigns are predominantly supported by MOH partner organizations such as the GAVI Alliance (formerly the Global Alliance for Vaccines and Immunisation), the United Nations Children's Fund (UNICEF), and the World Health Organization (WHO). To support the national immunization program, ASSP committed to improving cold chain efficiency via a shift in reliance on expensive petrol refrigerators and freezers to sustainable and cost-effective solar equipment. Accordingly, until all solar units were in place, ASSP provided diesel fuel to the Expanded Program on Immunization (EPI) antenna (clusters of health zones) and/or local provincial vaccines storage antennas, distributed kerosene to health facilities for existing vaccine refrigerators, and provided parts to repair kerosene refrigerators, in order to maintain the cold chain as needed. To avoid shortages of vaccines and syringes, a system of rapid alerts was implemented. The project aimed to ensure the quality of data, in collaboration with provincial institutions such as the Provincial Department of Health, to guarantee that vaccines were provided as reported.

To support the solar investment and improve overall reach and efficiency, bicycles and motorbikes were purchased and distributed to health facilities to improve transportation of vaccines and drugs from the health zones. Solar equipment (i.e. solar refrigerators, freezers, and lighting kits) was used to support vaccine storage at both the health zone and health facility level, in addition to blood and drug conservation at hospitals and drug depots. Solar refrigerators were procured and installed in ASSP-assisted health zones, along with tool kits for refrigerator repair and maintenance, replacement parts, and, per WHO requirements, fridge-tags for continuous temperature monitoring in refrigerators. To encourage long-term use of these solar fridges, Sundazer was recruited to organize a three-day training focused on good practices for solar system and cold chain equipment installation as well as basic preventive maintenance and compressor replacement. Training in refrigerator installation, maintenance, and design of essential tools was then facilitated by a cold chain engineer with over 20 years' experience at UNICEF and involved MOH staff and Interchurch Medical Assistance (dba IMA World Health) consultant technicians. By ensuring local capacity to conduct routine maintenance and system monitoring, this training served to further strengthen the immunization program at the national and local levels. Monitoring and formative supervision by IPs were also provided as needed.

Ultimately, several vaccination campaigns (e.g. polio vaccination campaigns, the “reach every zone” vaccination strategy; African Vaccination Week (i.e. *Semaine Africaine de la Vaccination*), polio vaccination campaigns) were organized and/or facilitated by ASSP, through participation in coordination meetings, support for supervision activities, and provision of technical and logistical assistance. During *Semaine Africaine de la Vaccination*, activities organized by ASSP-supported clusters included the administration of the injectable polio vaccination as well as the introduction of “Penta 3” as routine vaccination, coupled with vitamin A supplementation and deworming campaigns using mebendazole. A three-month catch-up program was also organized, using the Mother and Child week strategy and involving RECOs making visits to villages to identify children who missed immunization appointments. Campaigns targeting maternal and neonatal tetanus were also launched – although this activity was mainly funded by UNICEF with the ASSP program providing logistical support – while other immunization-related activities included support for an urgent yellow fever vaccination campaign.

Combatting malaria. ASSP set a goal to reduce malaria fatalities by half. To achieve this, the project aimed to offer preventive and curative treatments with an emphasis on increasing prevention and quality diagnosis. Increased prevention and improved care were to be achieved via training and supervision of service providers, at the health center level and the community health sites; provision of RDTs and antimalarials in health centers and community health sites; utilization of BCC strategies to increase treatment compliance; distribution of long-lasting insecticidal nets (LLINs) to children under five who completed the vaccination series; deployment of RECOs to help community members attach mosquito nets correctly and advise them about usage; and implementation of a community-based IMCI program with an emphasis on detection, early case management, the recognition of danger signs, and the promotion of presumptive intermittent treatment and LLINs.

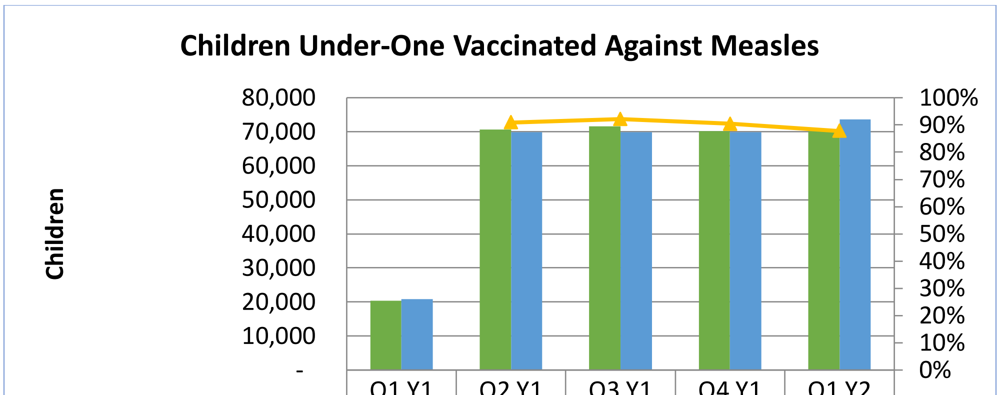
ASSP investments were consolidated via partnership with the Global Fund and the President’s Malaria Initiative (PMI), which supported the provision of antimalarial drugs to functional CCSs, and also reinforced the supply of malaria commodities, including availability of ITNs for distribution in PMI-supported health zones. In addition to routine distribution of ITNs, IMA World Health launched a mass distribution campaign for LLINs, using a “hang-up” strategy which aimed to provide more certainty that LLINs were being properly used. Funded through a partnership with IMA, the Department for International Development (DFID) and the Against Malaria Foundation (AMF), this “hang-up” initiative was complemented by post-distribution check-up modules to monitor bed net distribution, condition, and utilization, following reports of poor conditions and limited net usage. Notably, in years one through four of the ASSP project, program support for malaria interventions targeted 19 health zones (eight in Maniema, one in Kasai Central, and ten in Kasai). As noted previously, Kasai and Kasai Central were excluded from all analyses due to civil unrest which precluded endline data collection.

Summary of ASSP activities prior to the baseline survey

According to ASSP's quarterly reports, by the end of Year 1, ASSP provided substantial support to the vaccination program by supplying kerosene for existing refrigerators, dispatching 144 eco-friendly solar refrigerators (36 of which were installed), and distributing 1,186 bicycles to improve the reach and efficiency of vaccination campaigns. Children under 1 year of age were vaccinated against measles and other infectious diseases, and campaigns targeting maternal and neonatal tetanus were launched in 4 health zones in Nord Ubangi. This latter activity was mainly funded by UNICEF, with the ASSP program providing logistical support.

Data on immunizations received (i.e. measles) are reported through the National Health Information System (SNIS) and later keyed into the District Health Information System (Software) (DHIS2). While all data are now extracted from the DHIS2, IPs would previously collect data from local EPI antennas with a parallel data collection system (before the DHIS2 was fully functional in all ASSP-assisted health zones) and report these to IMA when confronted with low reporting rates and /or completeness. Figure 5.1 below depicts quarterly progress on vaccination of children under 1 against measles. The chart (taken from April – June 2014 quarterly report) depicts results by quarter, up until the baseline survey in Quarter 1 Year 2.

Figure 5.1. Quarterly progress on measles vaccination among children under-1.



	Q1 Y1	Q2 Y1	Q3 Y1	Q4 Y1	Q1 Y2
Quarterly Results	20,305	70,648	71,578	70,250	70,197
Quarterly Target	20,756	69,907	69,907	69,907	73,604
Population Coverage	88%	91%	92%	90%	88%

Routine distribution of LLINs to children under one was also supported during immunization visits. Of note, the ASSP program reduced its malaria programming to 8 HZs in Maniema with other ASSP HZs receiving support from two major in-country malaria donors (i.e. the Global Fund and the PMI). In Kalehe and Kabare health zones, RECOs were trained on the correct utilization of RDTs for malaria diagnosis as per ministry protocol. Community-based health care services were offered throughout community care sites operational in Sud Kivu, Maniema and Orientale, treating 1,896 cases of malaria, diarrhea and respiratory infections in children under five years of age. In addition, over the course of Year 1, performance primes, running costs and supervision expenses were paid, and changes in user fees were initiated.

ii. Quantitative findings

This chapter presents findings on several important child health indicators including the prevalence of diarrhea, symptoms of ARI and fever, among children under five, as well as the treatment of these common illnesses. The prevalence of anemia, as well as the results of an RDT test for malaria, among children 6-59 months of age, are also discussed. The chapter concludes with findings on vaccination coverage among children 12-23 months of age.

Probit models were fit for each child health indicator, using a difference-in-differences (DID) estimation strategy. The results of these DID models allowed for an ASSP project impact assessment on relevant child health outcomes, with the DID estimator being represented by a multiplicative interaction term between the time (i.e. module wave) and group assignment (i.e. ASSP vs. non-ASSP) variables. All DID models are controlled for potentially relevant confounding factors, including sampling domain, setting, wealth quintile, and maternal education. DID models for sub-groups of the population (based on sex, wealth, and sampling domain) are also presented. Of note, the study was powered to detect overall differences between intervention and control groups; however, the study was not powered to detect differences according to sub-groups which may have required a larger sample size. In addition, the World Bank introduced a performance-based financing (PBF) project in some non-ASSP areas with an aim to improve service utilization, quality of care, and health behaviors. Given the potential of this World Bank program to influence results of the ASSP impact evaluation, all DID models include a categorical indicator to control for the two modes of World Bank support (i.e. cash support only or the full PBF intervention). In addition to results from DID models, descriptive tables are also presented for each child health indicator, illustrating changes in the relevant outcome, at endline compared to baseline, in both ASSP and non-ASSP areas.

Child illness

<u>Diarrhea, symptoms of ARI and fever</u>

Diarrhea and ARI, including pneumonia, are among the leading causes of morbidity and mortality for children under five in the DRC (Ministère du Plan et Suivi de la Mise en œuvre de la Révolution de la Modernité (MPSMRM), 2014). Moreover, fever is a major presenting symptom in many childhood illnesses including ARI, malaria, and measles, among others (Ministère du Plan et Suivi de la Mise en œuvre de la Révolution de la Modernité (MPSMRM), 2014).

Prevalence of each of these three childhood illnesses (i.e. diarrhea, symptoms of ARI, and fever) was assessed via mother's self-report. Respondents were asked whether the child had been ill with diarrhea in the two weeks preceding the module and also whether the child had suffered from a fever in the two weeks prior. To assess the prevalence of symptoms of ARI, mothers were asked if the child had been ill with a cough in the two weeks prior to the module and, if so, whether the cough was accompanied by short, rapid, or difficult breathing. For the purpose of this analysis, children who had a cough accompanied by short, rapid, or difficult breathing were considered to have symptoms of ARI. It should be noted that these measures were subjective (i.e. based on the mothers' perception of the symptoms/illness) and not validated by any medical examination.

Findings from the fully-adjusted DID models indicated that the ASSP program had no impact on diarrhea prevalence, but resulted in improvements in both symptoms of ARI and fever prevalence among children under five (Figure 5.2).

Figure 5.2. Direction of ASSP impact overall and on child illness by sex, wealth, and domain.

	Diarrhea	Symptoms of ARI	Fever
Overall DID results	No impact	Improved	Improved
Sex			
Female	No impact	No impact	No impact
Male	No impact	Improved	No impact
Wealth			
Low & Low middle wealth quintiles	No impact	No impact	No impact
Middle, High-middle, and High wealth quintiles	No impact	Improved	Improved
Domain			
Nord/Sud Ubangi	No impact	No impact	No impact
Maniema/Tshopo	No impact	Improved	No impact

*Impact is determined by statistical significance ($p<0.05$).

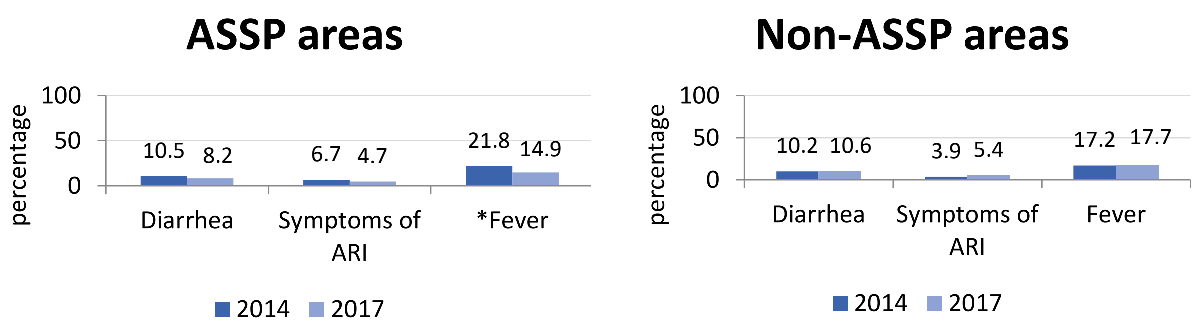
With regard to diarrhea prevalence, the fully adjusted DID model indicated no statistically significant program effects (Table 5.1). Further, sub-analyses revealed no statistically significant differences in diarrhea prevalence by sex (Tables 5.2 and 5.3), wealth (Tables 5.4 and 5.5), or domain (Tables 5.6 and 5.7). The DID model did, however, indicate a significant inverse association of diarrhea prevalence with increasing age of the child (Table 5.1, $p<0.01$), consistent with evidence of increased burden of diarrhea in younger age-groups (Fischer Walker et al., 2013; Fischer Walker, Perin, Aryee, Boschi-Pinto, & Black, 2012).

With regard to symptoms of ARI, the fully adjusted DID model indicated that the ASSP program had a significant positive impact on the prevalence of symptoms of ARI, decreasing the probability of illness by 5.4 percentage points in ASSP areas compared to non-ASSP areas (Table 5.9, $p<0.001$). Sub-analyses also revealed significant program impacts, with a decreased probability of ARI symptoms among male children under five (Table 5.11, marginal effect: -8.6, $p<0.001$), those in the top 60 percent wealth quintile (Table 5.13, marginal effect: -7.1, $p<0.001$) and those living in Maniema/Tshopo (Table 5.15, marginal effect: -4.7, $p<0.01$).

For fever, the fully adjusted DID model indicated a positive and significant program impact, with the probability of fever in children under five decreasing by 4.6 percentage points in ASSP compared to non-ASSP areas (Table 5.17, $p=0.043$). Notably, sub-analyses revealed statistically significant differences in fever prevalence according to wealth, with a decreased probability of fever among those in the top 60 percent wealth quintile (Table 5.21, marginal effect: -5.4, $p=0.049$). There were no statistically significant differences in fever prevalence by sex (Tables 5.18 and 5.19) or domain (Tables 5.22 and 5.23).

Finally, as further support to findings from the DID models, descriptive data indicated that, in ASSP areas, the prevalence of several childhood illnesses declined at endline compared to baseline (Figure 5.3).

Figure 5.3. Prevalence of diarrhea, symptoms of ARI, and fever in ASSP and non-ASSP areas, by year



*Difference between 2014 and 2017 levels statistically significant at $p<0.05$

Specifically, a smaller proportion of children aged 0-59 months in ASSP areas experienced diarrhea in the past two weeks, at endline compared to baseline. However, this difference was not statistically significant (Table 5.8, 2014: 10.5 percent vs. 2017: 8.2 percent; $p=0.242$). Similar to diarrhea, a smaller proportion of children aged 0-59 months in ASSP areas experienced symptoms of ARI at endline compared to baseline; this difference was not statistically significant (Table 5.16, 2014: 6.7 percent vs. 2017: 4.7 percent; $p=0.200$). There was, however, a statistically significant decline in the prevalence of fever in ASSP areas, at endline compared to baseline (Table 5.24, 2014: 21.8 percent vs. 2017: 14.9 percent; $p=0.020$). There were no significant differences in prevalence of these three childhood illnesses, in non-ASSP areas, between baseline and endline.

Key Points

- There was no statistically significant program impact on diarrhea prevalence.
- The ASSP program had a positive and significant effect on the prevalence of symptoms of ARI among children under five years (marginal effect: -5.434; $p<0.001$).
- The ASSP program had a positive and significant effect on the prevalence of fever among children under five years (marginal effect: -4.590; $p<0.05$).

Malaria and anemia

Malaria is an endemic disease among the DRC populace, with year-round transmission, and one of the top contributors to under-five morbidity and mortality in the country (United States Agency for International Development (USAID), 2015). To assess malaria parasite prevalence, an RDT for malaria was administered to children under five years — SD Bioline Malaria Ag P.f/Pan (Standard Diagnostics Inc., Suwon City, South Korea), a screening test for *P. falciparum* and other *Plasmodium* species— with the permission of their parent or guardian.

Anemia prevalence in children 6-59 months of age was also assessed via a blood test following consent from the parent or guardian. Anemia is a known complication of malaria (Oladeinde et al., 2012; World Health Organization & UNICEF, 2004). It is estimated to affect half of all pre-school children in developing countries, and its effects on cognitive and physical development in children as well as child mortality are well documented (World Health Organization & UNICEF, 2004).

Findings from the fully-adjusted DID models indicated that the ASSP program had no statistically significant impact on malaria parasite prevalence or anemia prevalence among children 6-59 months of age (Figure 5.4).

Figure 5.4. Direction of impact of ASSP overall and on malaria and anemia by wealth, and domain.

	Malaria	Anemia
Overall DID results	No impact	No impact
Wealth		
Low & Low middle wealth quintiles	No impact	No impact
Middle, High-middle, and High wealth quintiles	No impact	No impact
Domain		
Nord/Sud Ubangi	Improved	Improved
Maniema/Tshopo	No impact	Worsened

*Impact is determined by statistical significance ($p<0.05$).

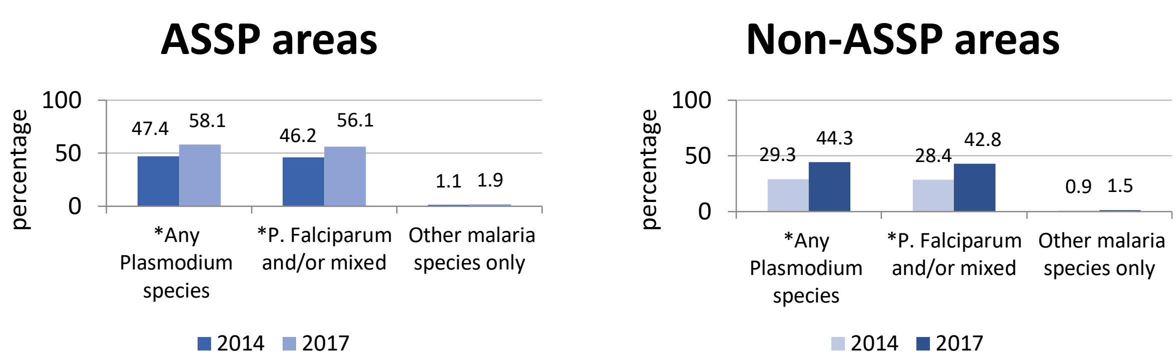
Results of the fully adjusted DID model indicated no statistically significant program impact on malaria parasite prevalence among children aged 6-59 months (Table 5.25, $p=0.063$). The DID model did indicate, however, that malaria parasite prevalence among children 6-59 months was positively associated with advancing age ($p<0.001$) and inversely associated with household ownership of at least one bed net ($p<0.001$) and cash only support from the World Bank initiative ($p<0.001$). Sub-analyses indicated that in Nord/Sud Ubangi, malaria parasite prevalence declined by 30.3 percentage points in ASSP areas compared to non-ASSP areas (Table 5.28, *p*=0.009).

Descriptive data suggested similar trends in malaria parasite prevalence, across ASSP and non-ASSP areas, with a significantly larger proportion of children aged 6-59 months testing positive for the antigen for at least one species of malaria at endline compared to baseline (Figure 5.5). Of these, the majority tested positive for *P. falciparum* and/or other species infections (i.e. Plasmodium and/or mixed) in comparison to very few who tested positive for other malaria species only. The proportion of children who tested positive for Plasmodium and/or mixed species of malaria significantly increased at endline compared to baseline, in both ASSP and non-ASSP areas (*p*<0.05).

Key Points

- There was no statistically significant program impact on malaria parasite prevalence among children under 6-59 months of age.
- There was no statistically significant program impact on anemia prevalence among children under 6-59 months of age.

Figure 5.5. Malaria parasite prevalence among children aged 6-59 months in ASSP and non-ASSP areas, by year



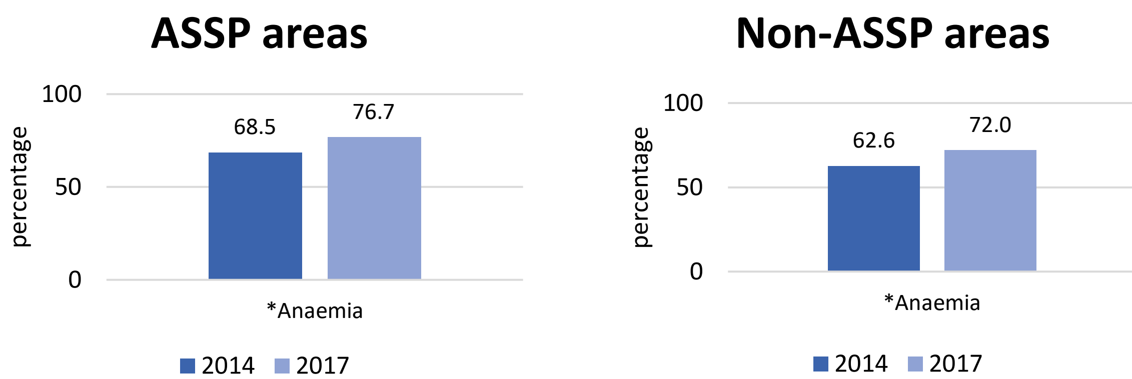
*Difference between 2014 and 2017 levels statistically significant at *p*<0.05

Notably, the magnitude of the absolute change in malaria parasite prevalence was larger in non-ASSP areas than that in ASSP areas (Table 5.30). Comparison of these absolute changes between ASSP and non-ASSP areas, at endline compared to baseline, suggest that the ASSP program may have positively influenced the prevalence of malaria among children 6-59 months.

With regard to anemia, the fully-adjusted DID model indicated no statistically significant program impact on illness among children aged 6-59 months (Table 5.31, *p*=0.053). The DID model did indicate, however, that anemia prevalence was significantly and inversely associated with advancing age (*p*<0.01) and increasing wealth (*p*<0.05). Sub-analyses revealed differences in anemia prevalence according to domain. Specifically, in Nord/Sud Ubangi, anemia prevalence declined by 28.6 percentage points in ASSP areas compared to non-ASSP areas (Table 5.34, *p*=0.049) while, in Maniema/Tshopo regions, anemia prevalence increased by 10.9 percentage points in ASSP areas compared to non-ASSP areas (Table 5.35, *p*=0.001).

Similar to the findings on malaria parasite prevalence, descriptive data indicated that the proportion of children aged 6-59 months with anemia significantly increased at endline compared to baseline in both ASSP and non-ASSP areas (Figure 5.6), with a greater absolute change in anemia prevalence from 2014 to 2017 in non-ASSP areas compared to ASSP areas (Table 5.36).

Figure 5.6. Anemia prevalence among children aged 6-59 months in ASSP and non-ASSP areas, by year



*Difference between 2014 and 2017 levels statistically significant at $p<0.05$

<u>Robustness checks</u>

The baseline and endline surveys were conducted in different months and the potential impact of seasonal variation on childhood illness burden must be considered. Crossed by the Equator line, there are three main "season zones" in the DRC, corresponding to areas North of Equator line, along the Equator line, and South of Equator line. North of the Equator line, the rainy season spans from April to November while the dry season runs from December through March. South of the Equator line, however, the rainy season is observed from October through May while the dry season spans June to September. Accordingly, at the time of baseline collection (April-May 2014) there were rains everywhere while, for endline data collection (July - September 2017), Nord Ubangi and Tshopo were experiencing rains while Maniema had rains near the Equator line and was drier in the southern part. In response to concerns regarding survey timing and seasonal variation in Maniema, the endline prevalence of diarrhea, symptoms of ARI, fever, malaria, and anemia were compared between ASSP areas of northern and southern Maniema. There were no statistically significant differences in prevalence of any of the five childhood illnesses between the rainy northern region and the dry southern region of Maniema (results not shown).

Treatment of childhood illnesses

Mothers who self-reported experiences of common illnesses among their children, were additionally asked about treatment-seeking behaviors for those illnesses. Specifically, mothers of children with diarrhea were additionally asked whether they sought advice or treatment for the diarrhea and whether the child was given any treatments or supplements for diarrhea. Mothers of children with symptoms of ARI and/or fever were additionally asked whether they had sought treatment for the child from a health facility or health provider and whether the child took antibiotics and/or anti-malarial drugs, regardless of seeking treatment from a facility or provider of care.

Findings from the fully-adjusted DID models indicated that the ASSP program had no statistically significant impact on either treatment of diarrhea, or symptoms of ARI or fever (Figure 5.7). With regard to treatment-seeking behavior for children with symptoms of ARI and/or fever, however, the program was shown to have a negative impact, reducing the likelihood of seeking care at a health facility or from a health care provider (Figure 5.7).

Figure 5.7. Direction of ASSP impact overall and on child illness by sex, wealth, and domain.

	Received either ORS or RHF	Received either ORS or RHF or increased fluids	Received antibiotics for symptoms of ARI	Received antimalarials for fever	Treatment for ARI and/or fever sought
Overall DID results	No impact	No impact	No impact	No impact	Worsened
Sex					
Female	Improved	No impact	No impact	No impact	No impact
Male	No impact	No impact	No impact	No impact	No impact
Wealth					
Low & Low middle wealth quintiles	No impact	No impact	No impact	Worsened	No impact
Middle, High-middle, and High wealth quintiles	Improved	No impact	No impact	Improved	No impact
Domain					
Nord/Sud Ubangi	No impact	Worsened	No impact	No impact	No impact
Maniema/Tshopo	No impact	No impact	No impact	Improved	No impact

*Impact is determined by statistical significance (p<0.05).

There were no statistically significant program effects on the treatment of diarrhea in children under five years of age with either ORS or recommended home fluids (RHF) (Table 5.37). Notably, however, sub-analyses revealed significant program impacts among female children under five (Table 5.38, marginal effect: 34.6, *p*=0.014) and those in the top 60 percent wealth quintile (Table 5.41, marginal effect: 31.1, *p*=0.008), suggesting an increased probability of those subgroups receiving either ORS or RHF in ASSP areas compared to non-ASSP areas.

When expanding the diarrhea treatment portfolio to include supplementation with increased fluids, the fully adjusted DID model similarly suggested no statistically significant program effect on the treatment of diarrhea with ORS, RHF and/or increased fluids (Table 5.45). There were no statistically significant differences in the treatment of diarrhea in children under five years of age with either ORS, RHF or increased fluids by sex (Tables 5.46 and 5.47) or wealth (Tables 5.48 and 5.49). However, sub-analyses indicated that, in Nord/Sud Ubangi, children under five years in ASSP areas were less likely to receive either ORS, RHF, and/or increased fluids for treatment of diarrhea, compared to under-five children in non-ASSP areas (Table 5.50, marginal effect: -31.9, *p*=0.006).

Key Points

- There was no statistically significant ASSP program impact on treatment of the three common childhood illnesses (i.e. diarrhea, symptoms of ARI, or fever).
- The ASSP program had a negative and significant effect on treatment-seeking behavior, reducing the likelihood of seeking care at a health facility or from a health care provider for children with symptoms of ARI and/or fever (marginal effect: -11.517; *p*=0.030).

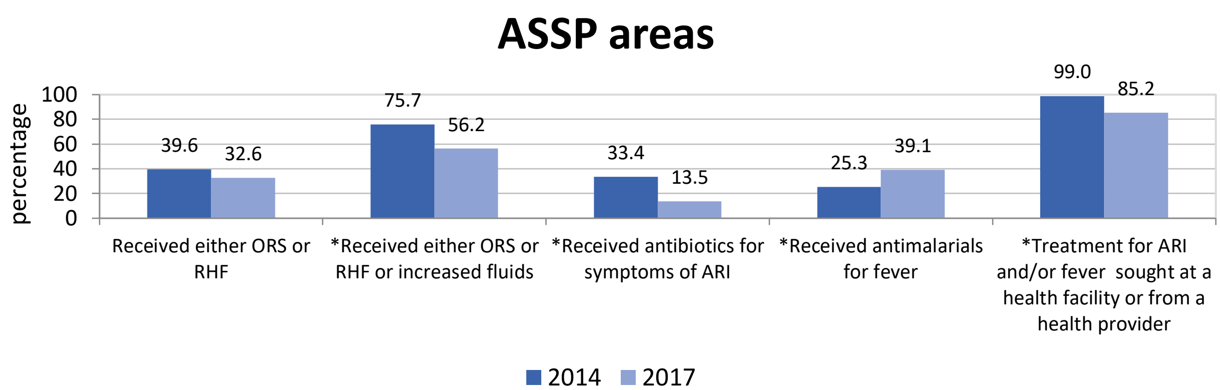
There were no statistically significant program effects for the treatment of symptoms of ARI with antibiotics (Table 5.53). Furthermore, sub-analyses revealed no statistically significant differences in treatment of symptoms of ARI with antibiotics by sex (Tables 5.54 and 5.55), wealth (Tables 5.56 and 5.57), or domain (Tables 5.58 and 5.59).

Notably, while no statistically significant program effect was detected for the treatment of fever in children under five (Table 5.61), sub-analyses revealed significant differences according to wealth and domain. Specifically, the probability of children under five receiving treatment with antimalarials for fever significantly declined in ASSP areas compared to non-ASSP areas among those in the bottom 40 percent wealth quintile (Table 5.64, marginal effect: -25.6, *p*=0.022), but significantly increased in ASSP areas compared to non-ASSP for those in the top 60 percent wealth quintile (Table 5.65, marginal effect: -18.1, *p*=0.018). In Maniema/Tshopo, children under five years in ASSP areas were more likely to receive antimalarials for treatment of fever compared to under-five children in non-ASSP areas (Table 5.67, marginal effect: 18.5, *p*=0.016).

With regard to treatment-seeking behaviors, the fully adjusted DID model indicated that the probability of seeking treatment for symptoms of ARI and/or fever declined by 11.5 percentage points in ASSP compared to non-ASSP areas (Table 5.69, *p*=0.030). However, sub-analyses revealed no statistically significant differences in treatment-seeking behavior by sex (Tables 5.70 and 5.71), wealth (Tables 5.72 and 5.73), or domain (Tables 5.74 and 5.75).

Overall, descriptive data indicated somewhat dissimilar trends in treatment of diarrhea, symptoms of ARI and fever, between baseline and endline, in ASSP compared to non-ASSP areas. In ASSP areas, significantly fewer children received treatment for diarrhea or symptoms of ARI, while a significantly greater proportion of children in ASSP areas received antimalarials for fever, at endline compared to baseline (Figure 5.8).

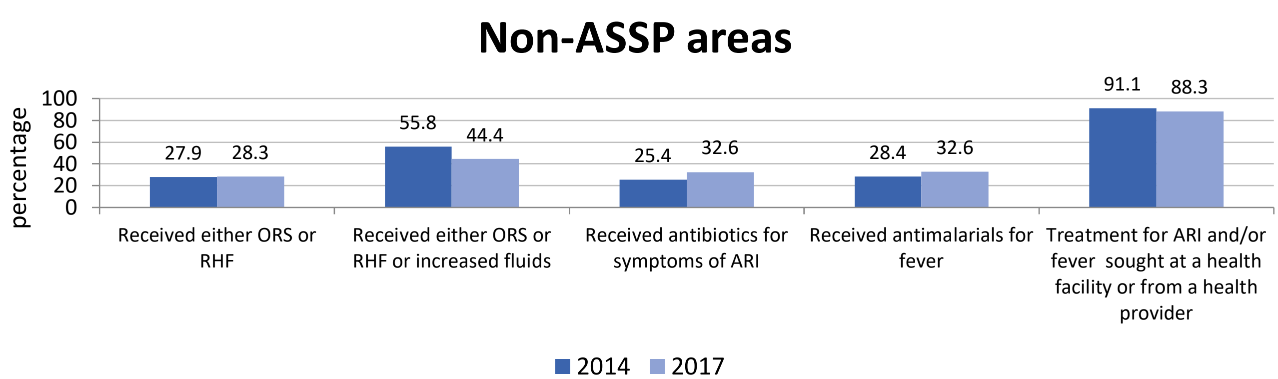
Figure 5.8. Changes in treatment of childhood illness in ASSP areas, by year



*Difference between 2014 and 2017 levels statistically significant at *p*<0.05

In non-ASSP areas, there were no statistically significant changes in receipt of treatment for any of the childhood illnesses (Figure 5.9).

Figure 5.9. Changes in treatment of childhood illness in non-ASSP areas, by year



*Difference between 2014 and 2017 levels statistically significant at *p*<0.05

Of note, treatment-seeking behaviors were very high and favorable at the start of the program, with 99 percent and 91.1 percent of mothers, in ASSP and non-ASSP areas, respectively, reporting that they sought treatment at a health facility or from a health provider for their children with symptoms of ARI and/or fever (Figure 5.8 and 5.9). Significantly fewer children in ASSP areas experienced symptoms of

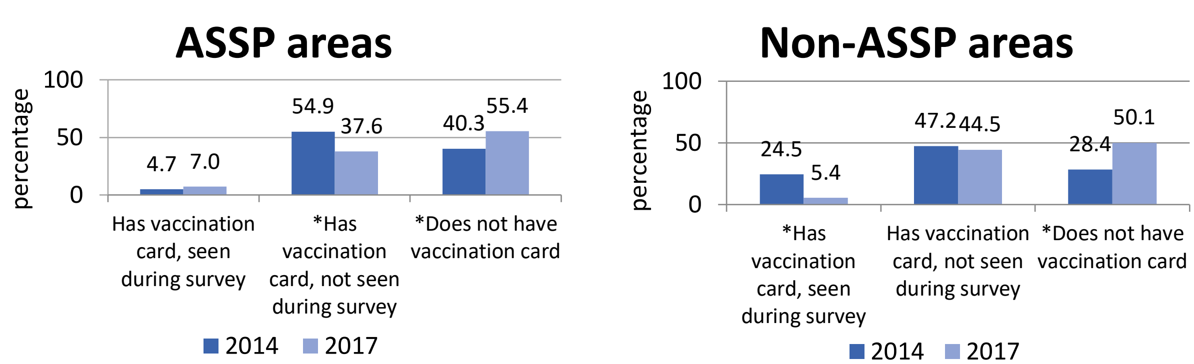
ARI and/or fever at endline compared to baseline (2014: 24.8 percent vs. 2017: 17.5 percent; *p*=0.018), however, and the proportion for whom treatment was sought, at a facility or from a health provider, also significantly declined at endline compared to baseline (Table 5.76, 2014: 99 percent vs. 2017: 85.2 percent; *p*<0.001). Overall, the proportion of mothers reporting that they sought treatment at a health facility or from a health provider for their children with symptoms of ARI and/or fever remained high at endline in both ASSP and non-ASSP areas (85.2 percent vs. 88.3 percent).

Immunizations

Having effective coverage of child immunizations for vaccine-preventable diseases is one of the most important preventive measures for child morbidity and mortality, especially in developing countries (Bloom, Canning, & Weston, 2005; Bryce et al., 2003; Fotso, Ezeh, Madise, & Ciera, 2007; Liu et al., 2012). Basic vaccinations included in the definition of full vaccination coverage are Bacillus Calmette–Guérin (BCG), three doses of Diphtheria, Pertussis, and Tetanus (DPT), three doses of Polio (excluding the dose given immediately after birth, Polio 0), and measles. Following the *Guide to DHS Statistics* (Rutstein & Rojas, 2006), the DPT 1, 2, and 3 doses were assumed to have been given at the same time as the Polio 1, 2, and 3 doses.

Vaccination coverage was assessed via this module in two ways. The first, and the preferred method, was to copy each child's vaccination card. Where vaccination cards were not available or if the vaccine had not been recorded on the card as being given, the mother gave an oral history of vaccinations received. In ASSP areas, the proportion of mothers who reported not having a vaccination card significantly increased at endline compared to baseline (Figure 5.10, 2014: 40.3 percent vs. 2017: 55.4 percent). Similar changes were observed in non-ASSP areas with a significant increase in the proportion of mothers reporting that they did not have a vaccination card (Figure 5.10, 2014: 28.4 percent vs. 2017: 50.1 percent). At baseline, only 4.7 percent of children 12-23 months of age in ASSP areas had vaccination cards that mothers were able to produce for the interviewers; this increased to 7 percent of children 12-23 months of age by endline, although the change was not statistically significant. Conversely, in non-ASSP areas the proportion of children 12-23 months of age whose mothers were able to produce vaccination cards, significantly declined from 24.5 percent to 5.4 percent (Figure 5.10).

Figure 5.10. Observation of vaccination cards in ASSP and non-ASSP areas, by year



*Difference between 2014 and 2017 levels statistically significant at *p*<0.05

There were no statistically significant program effects for vaccination coverage among children 12-23 months (Figure 5.11).

Figure 5.11. Direction of ASSP impact overall and on immunizations by sex, wealth, and domain.

	Immunizations
Overall DID results	No impact
Sex	
Female	No impact
Male	No impact
Wealth	
Low & Low middle wealth quintiles	No impact
Middle, High-middle, and High wealth quintiles	Improved
Domain	
Nord/Sud Ubangi	No impact
Maniema/Tshopo	Improved

*Impact is determined by statistical significance ($p<0.05$).

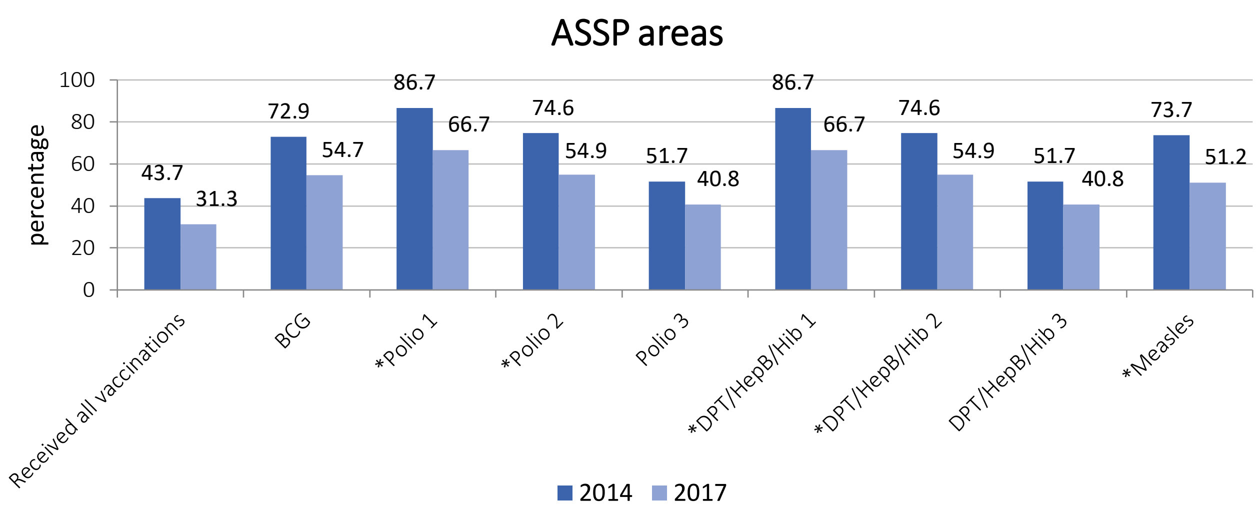
Notably, the fully adjusted DID model suggested that higher levels of education among mothers (Table 5.77, $p<0.05$) were significantly associated with receipt of all basic vaccinations among children 12-23 months of age. Sub-analyses suggested no differences in receipt of all specified vaccinations by sex (Tables 5.78 and 5.79) but revealed significant differences according to wealth and domain. Specifically, the probability of children 12-23 months of age receiving all basic vaccinations significantly increased in ASSP areas compared to non-ASSP areas among those in the top 60 percent wealth quintile (Table 5.81, marginal effect: 16.398, $p=0.044$) as well as those in Maniema/Tshopo (Table 5.83, marginal effect: 15.801, $p=0.044$). There were no statistically significant differences in receipt of all basic vaccinations among those children 12-23 months of age for whom mothers were able to produce a vaccination card (Table 5.84).

All in all, descriptive data suggested that, in both ASSP (Figure 5.12) and non-ASSP areas (Figure 5.13), vaccination coverage decreased at endline compared to baseline. However, this change was only statistically significant in non-ASSP areas (Table 5.85, 2014: 52.5 percent vs. 2017: 38.7 percent; p=0.035).

Key Points

- There were no ASSP program effects on the vaccination coverage.

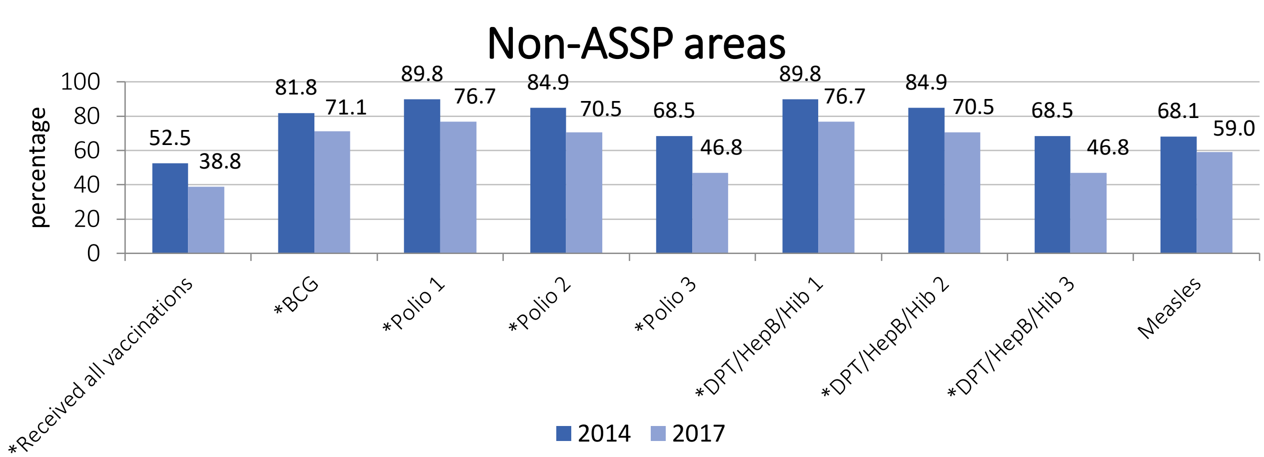
Figure 5.12. Changes in immunization coverage in ASSP areas, by year



BCG = Bacillus Calmette–Guérin vaccine; DPT/HepB/Hib = Diphtheria-Tetanus-Pertussis/Hepatitis B/Haemophilus influenzae type b

*Difference between 2014 and 2017 levels statistically significant at p<0.05

Figure 5.13. Changes in immunization coverage in non-ASSP areas, by year

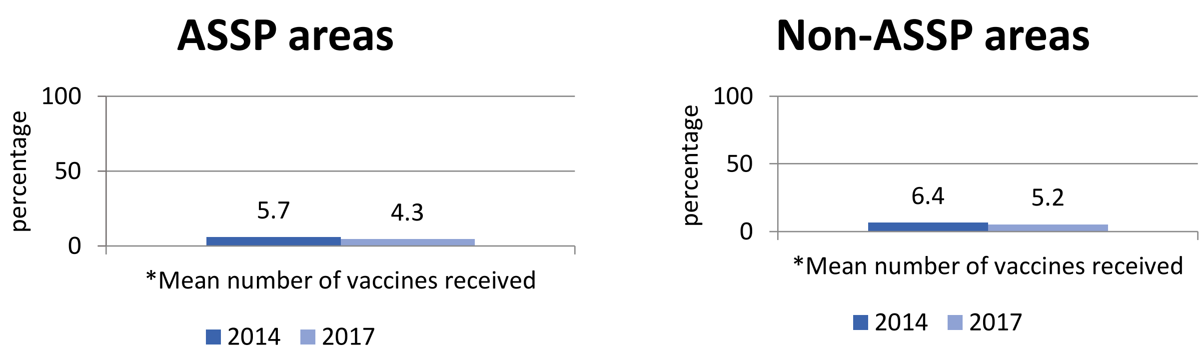


BCG = Bacillus Calmette–Guérin vaccine; DPT/HepB/Hib = Diphtheria-Tetanus-Pertussis/Hepatitis B/Haemophilus influenzae type b

*Difference between 2014 and 2017 levels statistically significant at p<0.05

Of the eight specified vaccinations, children aged 12-23 months in ASSP areas received an average of 5.7 vaccines at baseline while those in non-ASSP areas received an average of 6.4 vaccines (Figure 5.14). At endline, the average number of vaccinations received significantly declined in both ASSP and non-ASSP areas to 4.3 and 5.2 vaccinations, respectively.

Figure 5.14. Changes in immunization coverage in non-ASSP areas, by year



*Difference between 2014 and 2017 levels statistically significant at *p*<0.05

Robustness checks

As a robustness check, the DID models for treatment of childhood illnesses and receipt of immunizations were estimated with the inclusion of a variable indicating the straight-line distance between the child's household and the nearest governmental health facility. The distance variable was not a significant predictor in any of the models, and the significance and direction of the DID estimate were not affected. In addition, there were no statistically significant differences in distance to the health facility, between baseline and endline, in either ASSP or non-ASSP areas (results not shown).

iii. Qualitative findings

Research methods

Methods included in-depth interviews with facility-based service providers including nurses (N=5) and midwives (N=1), RECOs involved in implementing child health activities (N=8), and *Comité de développement de l'aire de santé* (CODESA) members (N=4). Focus group discussions were also conducted in each of the study health areas with caregivers of children under five years of age (N=8), with one group discussion carried out near the health facility area and a second focus group discussion conducted far from the health center. Focus groups included 8-10 participants and were comprised of mothers or other caregivers of young children under five years of age who had visited a health facility within the past six months. The majority of participants were housewives and farmers.

Health Worker In-depth Interview Respondents

Implementation across the research sites

Respondents generally agreed that ASSP activities began in 2013. Child health activities were comprised of curative and preventive care, with curative care entailing treatment of common childhood illnesses such as pneumonia, malaria, and diarrhea using medications available through the program. In several instances, health providers in Maniema mentioned that the medications offered by the previous IP (Merlin) were more abundant and free while, with ASSP, essential drugs needed to treat childhood illnesses were not always available. If health providers determined that the illness was too complicated to treat in the health center, children were transferred to a general hospital. In these cases, patients were responsible for arranging and paying for transport, which often involved transporting the sick child over difficult roadways and long distances (participants mentioned from 15 to 22 km) by bicycle, motorcycle or foot. Respondents reported that children often die on the way to the hospital. They maintained that families face difficulties providing food for the child and caregivers while in the hospital.

Participants reported that main preventive activities include growth monitoring sessions, vaccinations, behavioral change and communication approaches, and community-based activities involving the RECOs. Growth monitoring sessions were held once a week and involved weighing the child and providing vitamin A supplements, mebendazole, and vaccinations as needed. During growth monitoring visits, educational sessions were given by the RECOs focusing on such topics as the vaccination calendar, vitamin A supplementation, child feeding and nutrition, and the importance of rapid care-seeking to the health facility during fever or other childhood illnesses. Distribution of mosquito nets to children under five years of age was also part of the approach.

Behavioral change strategies were devised locally by the health providers and included dissemination of messages during community meetings (one site mentioned monthly meetings) and home visits by the RECOs. However, at least one health center admitted to not yet having developed a strategy. While health providers contended that communication efforts are important to increase community mobilization related to both curative and preventive health services, implementation of behavioral change interventions appeared to be limited and did not follow a set schedule. The research suggested that there was no systemized approach to home visits and that these visits were infrequent. In one zone in Maniema and one zone in North Ubangi, RECOs reported giving messages by megaphone on the importance of *Services de Santé de l'Enfant* (CPS).

With regard to specific responsibilities, the health care providers were noted to have been responsible for treating children with illnesses, coordinating and implementing growth monitoring sessions, and providing training and overseeing the work of the RECOs, with two nurses mentioning that they also participated in community-based child nutrition activities. The RECOs were responsible for community sensitization related to issues around child health such as hygiene and handwashing, caring for newborns, vaccinations, treatment of sick children, and the importance of attending CPS. Their work included carrying out home visits to raise awareness about child health, particularly during disease outbreaks, and to identify sick children and refer them to the health center. When sick children were identified, RECOs were supposed to conduct follow up household visits to monitor the child's health. RECOs were also responsible for monitoring vaccination coverage in communities, and children not up-to-date on vaccinations were reported to the health nurse. While household visits were designed to be an important component of the community-based approach, respondents indicated that only when there were reductions in the utilization of health center services or during mass campaigns did RECOs actively carry out household visits. The CODESAs coordinated RECO activities, particularly related to home visits, monitored monthly meetings when health center data were compiled, and acted as a link between community members and the health center. They also participated in activities such as the *Bulletin de Performance Communautaire* (BCP) and vaccination campaigns.

Most facility-based workers had participated in multiple training sessions since the start of ASSP. The exception were workers who had recently been transferred to the health area. Trainings focused on revitalization of CPS, water, sanitation and hygiene (WASH), vitamin A supplementation, IMCI, vaccinations/EPI, revitalization of CODESAs, and management of malaria. CODESAs reported participating in training related to CODESA revitalization and child nutrition, and RECO trainings included sessions focusing on malaria prevention and the malaria RDT, diarrhea management, WASH, child nutrition, and community outreach and support. Trainers were from the national level (respondents mentioned IMA staff or representatives of government health programs), provincial capital (District Provincial Health Office (DPS) representatives and personnel representing different government programs like EPI or malaria) and the zonal offices, and sessions lasted three to seven days. Respondents generally felt that the length of the trainings was appropriate, the trainers were competent and the content helpful, thus improving their knowledge and ability to provide care. Respondents also appreciated the per diem received during the trainings.

In each health area, there had been a high turnover of RECOs ranging from three to five, and as a result many RECOs had not received all of the training. Reasons for leaving included lack of remuneration, the RECO had moved or died, or pursuit of studies.

Two of the four health centers had been renovated, one was newly constructed, and no renovations had occurred in the fourth. In this last site, the health workers claimed they had been promised that the building would be renovated. Three of the four centers had received solar kits, one of which reported that the solar panels did not function properly. A second site located in a more urban location relied on local electricity and did not use the solar panels they had received. Two sites had received a refrigerator to store vaccines; the other two sites had to obtain vaccines from nearby health centers where the refrigerator and solar panels functioned, with RECOs traveling to these health centers on days that CPS sessions were held to acquire the vaccines. Other equipment that respondents reported receiving included weighing scales for growth monitoring, communication aides, vaccination cards, and monitoring forms.

All of the health centers reported regular shortages of both essential supplies such as syringes and vaccines, as well as medications. When medicine stock-outs arose, health workers would prescribe medications which could be purchased in private pharmacies or patients were required to go to other health centers. Respondents reported receiving fewer supplies and drugs than ordered, and even sometimes receiving empty boxes. Respondents also reported that frequent stock-outs of medicines affect health staff morale.

Respondents reported that routine data were collected through a health center registry that tracks patient information and a register maintained by the RECOs which monitors vaccine coverage of children under five years collected during household visits. Respondents mentioned that they followed several performance indicators, including the number of curative consultations and CPS participation. During monthly monitoring meetings attended by facility-based health personnel, CODESA members, and RECOs, information from the patient and community registers was compiled and reports submitted to the zonal offices. These records were used to determine drugs and supplies needed for future child health activities. Medical provisions were supposed to be sent every trimester, but reports indicated that this schedule was determined by the availability of drugs stored in warehouses and the zonal distribution schedule, with medical supplies often received less frequently.

Reports on supervision were varied, with supervision in North Ubangi reported to have carried out by zonal staff, while in Maniema respondents reported being supervised by people stationed at the national, provincial, and zonal level. Zonal staff supervising activities in North Ubangi included the chief medical officer and nurse supervisor. While it was reported that supervision by zonal staff was supposed to be carried out twice monthly, respondents noted that these visits occurred once a month or less frequently. Supervisors were reported to review records related to treatment of childhood illness, CPS and EPI, with supervisors providing feedback aimed at improving child health activities, as well as monitoring records. Respondents in North Ubangi did not report being supervised by national or provincial level staff. In Maniema, respondents mentioned that they were monitored by supervisors from the national, provincial, and zonal level, with respondents reporting that supervisions focused on EPI records, the number of vaccines stored, the way vaccines were refrigerated, storage and distribution of mosquito nets, and CPS activities, as well as the patient registry and receipt and use of pharmaceutical supplies. Respondents maintained that supervisions by national-level staff (e.g. IMA, DFID, or national program personnel) were infrequent, while provincial staff (IP, DPS, and government program representatives) conduct unannounced visits approximately every trimester. While the zonal nurse supervisor attempted to visit each month, it was reported that the frequency of these visits depended on the availability of a motorcycle and fuel. Supervisors were reported to identify and correct errors and motivate health workers to improve the quality of the work. Some described supervision as a means to receive additional training and improve their knowledge, with many indicating that supervisory visits were informative.

Only in one of the high performing sites did health workers talk about holding community meetings designed to sensitize community members about child health issues such as common illnesses and care for sick children, as well as the importance of growth monitoring. In this same site, it was mentioned that a breastfeeding support group was convened. In three sites, the hotline was available, and in two of these sites the hotline number was displayed. In one of these sites, phone networks were not functioning, and the hotline could only be accessed in a neighboring health station. In the final site, respondents were not aware of a hotline. No-one reported ever using the hotline, with some suggesting that they feared that there would be consequences if they used it.

Perceptions of the project

Respondents were generally positive about the child health activities, stating that they were able to provide curative and preventive care as designed by the ASSP program. In the site in North Ubangi where a new facility had been constructed, respondents suggested that morale and work ethic had improved. Several respondents contended that the program led to increased health care access and reductions in child mortality, morbidity, and malnutrition, although they did not make reference to actual data. In the high performing site in Maniema, respondents were more critical, suggesting that the previous IP provided higher salaries/primes, transport, and an endowment fund to the health center, and medications were abundant. While some respondents praised the community-based initiatives, they only referenced activities related to child nutrition. A general lack of formal behavioral change strategies appeared to limit the effectiveness of community outreach and communication, with respondents particularly in North Ubangi indicating that they faced a lot of resistance from community members to adhere to ASSP program child health strategies such as immunizations or accessing facility-based care, with residents often opting for traditional or religious healers. In addition, regular shortages of medications and essential supplies, including vaccinations, were reported to pose a problem, with respondents mentioning that stock-outs affect willingness to access facility-based services. RECOs indicated that they have not been provided with essential materials, such as a bag to carry their documents or bicycles to allow them to cover the long distances they had to travel to obtain vaccinations or carry out community outreach. Low salaries or lack of compensation were uniformly cited as problems across the health areas. Commonly reported challenges included:

- Regular shortages of medications or supplies (e.g. vaccinations, syringes, bed nets)
- Insufficient payment of facility-based health workers
- Lack of compensation/limited motivation for RECOs and CODESA members
- Promised materials such as bags have not been provided
- No solar power or refrigerator; reliance on another center for vaccines (high performing, North Ubangi)
- Lack of involvement of fathers in childcare
- Local beliefs aligned with traditional beliefs and practices, rather than modern care (North Ubangi)
- Lack of transport of complicated cases to referral facilities

Recommendations/solutions to guide future activities

Commonly made recommendations across the sites included providing appropriate compensation for facility workers and motivation for community-based workers, as well as regular and adequate provision of medicines and critical supplies. Other recommendations included providing a bicycle for use by the RECOs and children who need to be transferred to a reference hospital, ensuring continuous training of health workers, and reestablishing provision of Ready to Use Foods/Therapeutic Foods (RUTFs) in health centers. Specific recommendations made by respondents working in one health center included building a separate room for medical treatment of sick children, posting a medical doctor to the health center, and providing a refrigerator and solar panel (high-performing Nord Ubangi).

Caregivers of Malnourished Children

Health care-seeking and treatment

In three of four sites, most participants claimed that they first go to the health center for treatment when their children fall sick, with caregivers claiming that the facility-based health providers are well-qualified and trained to assess the child's condition and determine appropriate care to treat the illness. In the low performing facility in North Ubangi, where a new facility had been built, participants were also persuaded by the cleanliness of the facility. In the final site, the majority of participants stated that they first resort to self-medication using drugs at home or purchased in a pharmacy, and subsequently obtain traditional medications, and only if the condition becomes critical will they go to the health facility. A minority of participants in the other three health areas mentioned using religious healers or traditional medicines, particularly if biomedical treatment was not effective and spiritually based illnesses are suspected, or buying medications in the local pharmacy, especially if money is limited. Barriers to care-seeking in health facilities included distance (most travel by foot) and road conditions, lack of money (Maniema), concerns about insecurity or having to deal with police en route, and difficulties in carrying the child long distances. In the low performing site in Maniema, respondents also mentioned lack of medications or the fact that health personnel were often absent from the health center. Mothers were generally reported as the primary decision-makers related to care-seeking or providing medications at home. If the child required care at night or the condition was considered serious, fathers were more likely to be involved.

Perceptions of the health center treatment and quality of care varied across the sites. In the high performing site in North Ubangi, services were highly appreciated, with health providers reported to ask questions about the child's health, condition, and any medication s/he may be taking, be friendly, courteous and respectful, explain how to treat the illness at home, and provide effective treatment. A different scenario was described in the other sites, with caregivers indicating that some providers were friendly, while others were described as abrupt, disrespectful and rude. In the low performing site in Maniema, health providers were generally described as lacking politesse and compassion, and frequently berating patients. In this site, the head nurse was drunk during our interactions.

Respondents reported that patients were treated according to a queue with only caregivers in one area in North Ubangi complaining of a long waiting time. Caregivers indicated that an initial physical assessment involving checking the eyes, mouth, and abdomen was conducted and the child's temperature was taken, and lab tests may have been done to determine the illness. Most participants stated that they were given a prescription to purchase medications, with some complaining that treatment fees were supposed to cover drug costs. While health providers were generally perceived to be capable and well trained to treat child illnesses, workers in the low performing zone in North Ubangi were sometimes described as poorly qualified and frequently ineffective in treating illnesses, with some speculating that because they did not do lab tests they were perhaps less able to identify the illness. Except in the site where a new building had been constructed, the space where children were treated was described as narrow and crowded, unclean, and very public. Children were examined on the same bed used for adults, with several indicating that these beds are frequently dirty.

Participants reported that fees were posted, with care for young children at 1,500 Cf. However, in the remote health area in Maniema, participants admitted to being illiterate and thus unable to understand the fee schedule. In North Ubangi, caregivers indicated that they were permitted to receive care on credit or pay in installments and that they sold crops to obtain cash or other family members may have contributed to costs. In contrast, in Maniema, payment was required before treatment; in these sites, participants complained that the displayed fees were not necessarily followed, with costs reaching as much as 15,000 Cf.

While most participants expressed satisfaction that the health workers effectively treated childhood illnesses, dissatisfaction was reported in relation to the failure to follow listed health care fees, the fact that medications had to be purchased, the frequent rude demeanor of the health workers, and, in Maniema, that the health workers would only treat if payment was provided upfront. Some recommendations are as follows:

- Construct a health facility with adequate space and equipment (high-performing Nord Ubangi, low-performing Maniema)
- Ensure that all health centers have adequate laboratory facilities
- Provide adequate essential medications to centers; eliminate prescriptions
- Provide a bicycle to RECOs to transport medications and vaccines
- Provide separate examination beds for adult and child patients
- Ensure that health workers are compassionate and accountable
- Provide salaries to health worker, which will improve quality of care
- Equip facilities with supplies such as bed, mattresses, mosquito nets, etc.

Preschool consultations

Most participants claimed to have attended CPS on a monthly basis starting soon after the child's birth, with the majority stating that they participated to ensure that their children were vaccinated and thus protected against disease. Fewer caregivers mentioned attending CPS to monitor their children's growth and learn about child feeding. Many caregivers admitted to having stopped participating in CPS consultations after the child reached nine months and was fully vaccinated, noting that they returned to the health center when immunization boosters were available. In the high performing zones, caregivers reported that community RECOs promoted the importance of attending CPS, while in the low performing sites they stated that it was the health workers who encouraged participation. Caregivers reported that RECOs often led educational sessions during CPS consultations providing information on topics such as the importance of rapid care-seeking to the health center, exclusive breastfeeding, complementary child feeding, the importance of using bed nets, handwashing, and immunizations.

Caregivers indicated that they traveled to CPS on foot. Cited barriers to attending CPS included lack of money, lack of clothes for the mother and child (North Ubangi), distance, and bandits or police who might accost or harass them on the road. In one site in each province, a major barrier was related to the fact that vaccines were stored in another health center several kilometers away and, as a result, vaccines were not always available.

Caregivers were generally satisfied with the CPS visits, with many underlining the importance of immunizations which are provided for free as part of the initial 500 CPS fee. Some mentioned that during CPS, children can also be treated for illnesses. Other benefits included knowledge gained during health education sessions. Perceived problems included that vaccines were not available in the health center (high-performing Nord Ubangi, low-performing Maniema) and thus they had to wait a long time to receive the vaccine, the place where CPS is held was cramped, and benches for seating were inadequate.

Recommendations regarding CPS included:

- Renovate the area where CPS is held so that it is bigger and can accommodate more people
- Assure that adequate benches are available
- Equip the facility with a refrigerator where vaccines can be conserved (high-performing Nord Ubangi, low-performing Maniema)
- Provide RECOs with bicycles, which will make it easier to pick up medicines and vaccines
- Provide motivation to the RECOs

Other activities

Across sites, the majority of focus group participants maintained that they had not received a home visit from the RECOs related to child health. When asked about the RECOs community activities, many stated that their main role was to promote immunization of young children, with RECOs in the low performing site in North Ubangi reported to have used a megaphone to convey messages. In all sites, respondents indicated that RECOs sometimes hold meetings after Sunday church where different topics including those related to health such as handwashing, exclusive breastfeeding, child feeding, and malnutrition were discussed; however, many participants admitted to never participating in these meetings. Generally, participants gave the impression that RECOs had little visibility in communities, except for activities related to child nutrition.

In North Ubangi, the vast majority of participants received a mosquito net during prenatal or growth monitoring consultations or directly after childbirth. In contrast, in Maniema participants claimed to have not received mosquito nets since the time that Merlin was the implementing NGO in the health zone. Some stated that when they asked for bed nets, the health providers claimed that they did not have bed nets available.

In both sites in North Ubangi, caregivers reported that a mass campaign involving vaccinations, vitamin A distribution, rapid screening for malaria, and provision of deworming medication had been held in June 2017. However, in Maniema, only groups from the high performing zone reported that a mass campaign took place. Participants across all sites were not aware of community-based curative outreach sites (*site de soins communautaire*).

Some caregivers from the high performing zone in North Ubangi were aware of the hotline, which they believed was available to call authorities in Kinshasa when equipment was not working. Participants in other group discussions were unaware that a hotline existed. Caregivers uniformly stated that there was no assistance provided for vulnerable population members who had to pay the same health care fees required of other residents.

iv. Limitations

Timing of baseline survey: The baseline survey was conducted in April 2014, well after ASSP child health activities had begun in April 2013. Thus, 2014 baseline estimates may not reflect the situation prior to ASSP intervention but may provide a slightly improved representation of the in-country situation, and potentially underestimate true program impact.

Seasonality: With regard to childhood morbidity, available evidence suggests variation in disease prevalence according to season and pathogen (Armah et al., 1994; Findley, Medina, Sogoba, Guindo, & Doumbia, 2010; Mayindou et al., 2016; Nkwembe et al., 2016; Ouedraogo et al., 2017; Shah et al., 2016). In the DRC, one generally expects an increase in diarrhea incidence (due to water contamination) and an increase in malaria incidence (due to mosquito proliferation) during the rainy season, but an increased pneumonia frequency during the dry season (due to a relative drop of temperature and an increased incidence of respiratory tract infections). This pattern can be confounded by several factors, including disease outbreaks, however, and the impact of seasonality on childhood illness burden in the DRC is somewhat less clear, due to limited published evidence on the diverse pathogens responsible for infectious disease in-country. Although additional analyses of childhood illness burden in ASSP areas within southern and northern Maniema (result not shown here) indicated no statistically significant differences at the $p<0.05$ level, the potential bias resulting from seasonal variations is acknowledged.

Service interruptions: Since community education and home visits were not reliant on ASSP funding following completion of training, it is not expected that the project's service interruptions impacted rates of childhood morbidity. However, the provision of medicines, vaccines and malaria commodities (e.g. ITNs) may have been impacted; medication stock-outs are discussed in Chapter 8.

Power to detect differences in outcomes: As described in Chapter 2, the analysis was powered to detect differences among children under five overall. It was not powered to detect differences between sub-groups. Nevertheless, some differences in the sub-analyses were found.

v. Discussion

All in all, results from the fully-adjusted DID models suggest that the ASSP program was successful in reducing the likelihood of symptoms of ARI and fever among children under five. There were no statistically significant program impacts on morbidity from other childhood illnesses (i.e. diarrhea, malaria or anemia), treatment of childhood illness or immunization coverage.

In these analyses, symptoms of ARI were used as a proxy for pneumonia and considered present if a mother self-reported that her child had a cough accompanied by short, rapid, or difficult breathing. While the limitation of using subjective data (not validated by any medical examination) to determine disease prevalence is noted, several factors support the plausibility of findings and the likelihood that the observed decline was indeed attributable to the presence of the ASSP program. First of all, underlying determinants of morbidity from pneumonia include poverty, under-nutrition, poor hygiene and deprived home environments, with evidence-based preventive strategies often targeting scale-up of immunization coverage for measles and Haemophilus influenzae type B (Hib), nutritional interventions supporting breastfeeding promotion, and environmental innovations such as reduced household air pollution and adequate WASH infrastructure (Bhutta et al., 2013). ASSP investments included roll-out of vaccination campaigns to support full immunization coverage (i.e. BCG, DPT/HepB/Hib, Polio, and measles), implementation of WASH activities to improve hygiene and excreta disposal, introduction and adoption of clean cookstoves, initiation of home gardens to encourage dietary diversity and better nutrition, and BCC activities to promote healthier behaviors. Qualitative results suggest that BCC activities were informal and limited; that drugs were not readily available, with frequent shortages of essential medicines, supplies, and vaccines; and that home visits were seldom. However, it is plausible that while implementation of individual interventions was not as far-reaching or strong as hoped, the comprehensive nature of the ASSP program and the combined effect of various strategies targeting different risk factors (e.g. nutrition, immunization, sanitation) could have resulted in the observed decline. Indeed, results from WASH activities (Chapter 10) note significant program impacts related to improved sources of household drinking water and improved sanitation. In addition, while research suggests that vaccine effectiveness is dependent on proper vaccine storage, distribution, and maintenance of cold chain requirements (Doshi et al., 2015), qualitative results inform that supervisory visits that focus on EPI records, the number of vaccines stored and the way vaccines were refrigerated, allowing for motivation to improve quality of work, additional training and improved knowledge. Accordingly, ASSP's commitment to improving cold chain maintenance via supportive supervision in addition to provision of solar technology and refrigerators could have supported improved quality of vaccines, boosting vaccine effectiveness and thereby contributing to reduced disease prevalence, in spite of lower than anticipated vaccination coverage rates. Finally, given that fever is a common presenting symptom in respiratory illnesses such as pneumonia, the statistically significant decline in fever prevalence – of similar magnitude to the observed decline in prevalence of symptoms of ARI – suggests that the DID effect estimate is true.

Although a statistically significant program impact on diarrhea prevalence was not detected, descriptive data suggested a reduction in two-week point prevalence rates of diarrhea in ASSP areas, at endline compared to baseline – although this difference was also not statistically significant. Conversely, while trends suggested a significant increase in malaria parasite prevalence at endline, compared to baseline, in both ASSP areas and non-ASSP areas, the magnitude of the absolute change was larger in the latter, suggesting that the ASSP program may have positively influenced malaria morbidity among children aged 6-59 months. As a known complication of malaria, trends in anemia prevalence mirrored the results for malaria, as were expected. Specifically, descriptive data indicated a significantly greater prevalence of anemia at endline compared to baseline in both ASSP areas and non-ASSP areas, with a greater absolute change in disease burden in non-ASSP area. The fully-adjusted DID models indicated that there were no statistically significant ASSP program impacts on either malaria or anemia prevalence among children 6-59 months.

There was little consistency between results from quantitative analyses and DHIS2 data. In the case of diarrhea prevalence, DHIS2 data indicated a higher absolute burden of childhood diarrhea in 2017, with rates as high as 28 percent in Nord Ubangi. With regard to symptoms of ARI, DHIS2 data also indicated a higher absolute burden of suspected childhood pneumonia in 2017, ranging from 25 percent in Tshopo to 31 percent in Nord Ubangi and 32 percent in Maniema. Furthermore, DHIS2 data suggested modest fluctuations between Quarter 1 2016 and Quarter 4 2017, with a trend toward increasing prevalence of diarrhea and suspected pneumonia over time. DHIS2 data for 2014 were not available and there were no DHIS2 data on fever prevalence among children under-five. However, baseline survey point estimates of morbidity from childhood illnesses all aligned with 2013/14 Demographic and Health Survey (DHS) estimates (i.e. 17 percent prevalence of diarrhea in the 2 weeks prior to the survey, among children under 5 years of age; 7 percent prevalence of symptoms of ARI in the 2 weeks prior to the survey, among children under 5 years of age; 30 percent prevalence of fever in the 2 weeks prior to the survey, among children under 5 years of age) (Ministère du Plan et Suivi de la Mise en œuvre de la Révolution de la Modernité (MPSMRM), 2014).

For malaria prevalence, quantitative results were somewhat consistent with DHIS2 data, which indicated a high burden of malaria among children that generally increased between 2016 and 2017, ultimately ranging from 61 percent in Maniema to 74 percent in Tshopo to 120 percent in Nord Ubangi. DHIS2 data for 2014 were not available and there were no DHIS2 data on anemia prevalence among children aged 6-59 months. However, baseline survey point estimates for both malaria and anemia were somewhat comparable with 2013/14 DHS estimates (i.e. 31 percent children tested positive for the malaria rapid diagnostic test; 60 percent prevalence of anemia, among children aged 6-59 months) (Ministère du Plan et Suivi de la Mise en œuvre de la Révolution de la Modernité (MPSMRM), 2014).

While data suggest that the ASSP project may have had a significant and positive impact on reducing child morbidity due to symptoms of ARI and fever, however, there were no statistically significant impacts on the uptake of curative interventions for such illnesses. Indeed, trends between endline and baseline suggested a decline in use of ORS and/or RHF for diarrhea, a decline in the use of antibiotics for pneumonia, as well as a decline in treatment-seeking behavior, with significantly fewer mothers reporting seeking treatment from a health facility or health provider for their children with symptoms of ARI and/or fever. Qualitative findings from in-depth interviews and focus group discussions help shed light on results regarding treatment of childhood illnesses, with data indicating that lack of formal behavior change strategies limited the effectiveness of communication efforts to sensitize parents and caregivers about the importance of curative health service use for child illnesses. Qualitative data further suggest that willingness to access facility-based services was affected by drug stock-outs, perceived unavailability and cost of medications, failure of health centers to adhere to listed user fees, long distances to the hospital and challenges navigating hard-to-travel routes, as well as cultural practices which favored traditional remedies and/or religious healing. Another deterrent to health-care seeking, which emerged from the qualitative findings, was the quality of care received at some health centers, with facilities reported to be crowded, unclean, and lacking privacy while providers were often described as lacking politesse and compassion. Furthermore, participants across all sites reported not being aware of CCSs which plausibly limited their seeking care at these facilities. Finally, in assessing the lack of impact on the treatment of childhood illnesses, the World Bank PBF initiative being implemented in non-ASSP areas should be borne in mind, as results from fully-adjusted DID models indicate a significant association of this PBF project with increased use of therapeutic interventions (i.e. ORS and/or RHF for diarrhea; antibiotics for pneumonia) and the goals of this project were likely to have influenced changes in child health outcomes in non-ASSP areas.

Findings from quantitative analyses were again compared with DHIS2 data. Despite consistency between quantitative and qualitative findings, there little consistency with 2017/2018 (endline) DHIS2 data; DHIS2 data from 2014 (baseline) were not available. Specifically, DHIS2 data indicated that a higher absolute proportion of children received ORS or RHF for diarrhea (86 percent - 96 percent) and antibiotics for suspected pneumonia (90 percent - 99 percent), with modest declines between 2016-2017 in all sampling domains except Tshopo (where improvements were observed). Similarly, DHIS2 data indicated that a higher absolute proportion of children received antimalarials for fever (96 percent - 98 percent), with minimal changes between 2016-2017. Notably, baseline survey point estimates all align with 2013/14 DHS estimates (i.e. 42 percent of children who had diarrhea received ORS packets or recommended home solution; 29 percent of children who had fever treated with antimalarials; advice or treatment sought from an establishment or healthcare provider for 42 percent of children with symptoms of ARI and 40 percent for cases of fever) (Ministère du Plan et Suivi de la Mise en œuvre de la Révolution de la Modernité (MPSMRM), 2014).

With regard to child immunizations, the ASSP program appeared to have had no statistically significant impact on vaccination coverage, with trends suggesting that a smaller proportion of children received all specified vaccinations at endline compared to baseline, in both ASSP and non-ASSP areas. Again, qualitative evidence proves useful in understanding these findings, with data indicating that home visits to promote uptake of child health services were infrequent, while shortages of essential supplies such as vaccines and syringes were regular, and limited availability and/or sharing of solar power or refrigerators necessitated reliance on other centers for vaccines. Qualitative data also informed of challenges in Nord Ubangi, with respondents noting that lack of formal BBC strategies limited communication effectiveness and resulted in great resistance from community members to make use of health services in general.

Notably, however, immunization coverage results from these analyses are discrepant from DHIS2 data. DHIS2 data indicate that the percentage of 1-year-old children vaccinated against measles was high at baseline (>85 percent) and has been increasing up until endline, with over 90 percent of children under 1 (in Maniema, Nord Ubangi, and Tshopo) vaccinated against measles. Survey data, on the other hand, indicate that full immunization coverage was low at baseline (43.7 percent) and declined at endline (31.3 percent) – although this change was not statistically significant. Full immunization coverage includes BCG, three doses of DPT, three doses of Polio (excluding the dose given immediately after birth), and measles. When analyses were limited to measles only, to allow greater comparability with DHIS2 data, results indicated baseline measles vaccine coverage of 73.7 percent among kids 12-23 months of age, in ASSP areas, compared to 51.2 percent coverage at endline (p<0.001). Further, there was no statistically significant program impact on receipt of measles vaccination among children 12-23 months of age.

Of note, survey data and DHIS2 data used different denominators, with the latter based on children under 1 year of age. For the survey data, analyses focused on children 12–23 months who received all specified vaccines at any time before the survey, as recommended in the *Guide to DHS Statistics* (Rutstein & Rojas, 2006). Notably, additional analyses explored receipt of all basic immunizations among children 0-11 months of age and found similar results, with low coverage rates that did not show any statistically significant differences over time. Aside from the use of different denominators, however, it is generally accepted that, although neither facility nor survey data are perfect, a high-quality household survey with an adequate national sample provides the best estimate of immunization coverage (World Health Organization, 2011). For service statistics, key challenges include incomplete and inaccurate reporting of the number of vaccinations and uncertainty about the true size of the denominator (World Health Organization, 2011). On the other hand, household surveys collect information on the vaccination status of children by asking the mother to provide the child's health card and copying the vaccination dates from the card (World Health Organization, 2011). In this case, less than 10 percent of women were able to produce a vaccination card and data on child vaccinations received was largely dependent on mother's self-report, which is subject to recall bias that is also likely to increase with the length of the recall period. In considering possible explanations for the discrepancy between survey and DHIS2 data, it is also noted that service statistics regarding immunization-related activities may include persons from neighboring health areas who travel to participate in *Semaine Africaine de la Vaccination* or other mobile campaigns around which the immunization activities were organized. These persons would not have been captured during household surveys but could have potentially been included in the DHIS2 numerators (although the denominator would have stayed the same).

In assessing ASSP project performance related to goals of improving child health, lack of impact may be explained by differences in the strength of implementation in different regions and among different groups. For example, sub-analyses indicate that among the wealthier groups (i.e. the top 60 percent wealth quintile), improvements were observed in the prevalence of symptoms of ARI, prevalence of fever, receipt of ORS or RHF for treatment of diarrhea, receipt of antimalarials for fever, and receipt of all basic immunizations. In Maniema/Tshopo, sub-analyses revealed similar gains in areas related to symptoms of ARI, receipt of antimalarials for fever, and receipt of all basic immunizations. In keeping with evidence of differential impact among wealthier sub-groups, throughout qualitative interviews, caregivers uniformly mentioned that there was no assistance provided for vulnerable population members, for example, who had to pay the same health care fees required of other residents. These results support utility of a mid-point evaluation to assess study progress and direct changes in the project approach and implementation as needed. Finally, reports from qualitative interviews speak to the need for formative research to better understand cultural preferences which affect receptivity and uptake of program messages and services.

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Table 5.1. Full model results of determinants of diarrhea prevalence among children under five (DID model) (n= 6,672)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.941	0.019	0.615
Year	-1.421	0.015	0.352
ASSP vs. non-ASSP	1.688	0.027	0.530
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-4.190	0.009	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-3.653	0.017	**0.031**
Wealth quintile			
Low	[ref]		
Low middle	0.514	0.013	0.687
Middle	0.110	0.013	0.931
High middle	-0.526	0.013	0.692
High	-1.510	0.014	0.282
Education level			
No education	[ref]		
Some primary	1.159	0.009	0.210
Completed primary	0.313	0.010	0.752
Completed secondary	-4.948	0.024	**0.040**
Birth order			
1	[ref]		
2-3	0.069	0.010	0.948
4-5	0.289	0.011	0.795
6+	-0.264	0.012	0.822
Sex of child			
Female	[ref]		
Male	-0.128	0.007	0.858

Table 5.1. Full model results of determinants of diarrhea prevalence among children under five (DID model) (n= 6,672)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Age of child (months)			
<6	[ref]		
6-11	11.575	0.015	**<0.001**
12-23	12.160	0.012	**<0.001**
24-35	6.045	0.011	**<0.001**
36-47	2.993	0.010	**0.003**
48-59	2.257	0.010	**0.021**
Number of children under five years living in household			
1-2	[ref]		
3-4	-0.775	0.009	0.374
5+	1.007	0.023	0.662
Unknown	-0.595	0.023	0.795
Toilet facility			
Improved, not shared	[ref]		
Shared	4.974	0.019	**0.008**
Non-improved	2.543	0.013	0.053
Source of drinking water			
Not improved	[ref]		
Improved	-1.217	0.008	0.147
World Bank program			
No support	[ref]		
Cash only	-0.336	0.018	0.851
PBF	-1.389	0.017	0.407

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 5.2. Sub-analysis for diarrhea prevalence, by sex (Females: n=3,355)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-1.738	0.026	0.508
Year	-1.075	0.021	0.617
ASSP vs. non-ASSP	2.045	0.038	0.589

Note: Model controls for sampling domain, setting, wealth quintile, mother's education level, birth order, age of child, number of children under five years living in household, toilet facility, source of drinking water, and the World Bank program.
SE = standard error

Table 5.3. Sub-analysis for diarrhea prevalence, by sex (Males: n=3,317)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.035	0.027	0.990
Year	-1.758	0.022	0.420
ASSP vs. non-ASSP	1.419	0.038	0.711

Note: Model controls for sampling domain, setting, wealth quintile, mother's education level, birth order, age of child, number of children under five years living in household, toilet facility, source of drinking water, and the World Bank program.
SE = standard error

Table 5.4. Sub-analysis for diarrhea prevalence, by wealth (Bottom 40 percent wealth quintile: n=2,330)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	4.710	0.037	0.207
Year	-6.126	0.032	0.058
ASSP vs. non-ASSP	-4.888	0.052	0.344

Note: Model controls for sampling domain, setting, mother's education level, birth order, sex of the child, age of child, number of children under five years living in household, toilet facility, source of drinking water, and the World Bank program.
SE = standard error

Table 5.5. Sub-analysis for diarrhea prevalence, by wealth (Top 60 percent wealth quintile: n=4,342)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-3.426	0.022	0.113
Year	0.360	0.017	0.834
ASSP vs. non-ASSP	4.992	0.032	0.114

Note: Model controls for sampling domain, setting, mother's education level, birth order, sex of the child, age of child, number of children under five years living in household, toilet facility, source of

drinking water, and the World Bank program.
SE = standard error

Table 5.6. Sub-analysis for diarrhea prevalence, by domain (Nord/Sud Ubangi: n=3,462)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-2.844	0.026	0.272
Year	-0.517	0.021	0.801
ASSP vs. non-ASSP	7.501	0.039	0.057

Note: Model controls for setting, wealth quintile, mother's education level, birth order, sex of the child, age of child, number of children under five years living in household, toilet facility, source of drinking water, and the World Bank program.
SE = standard error

Table 5.7. Sub-analysis for diarrhea prevalence, by domain (Maniema/Tshopo: n=3,210)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	1.808	0.020	0.368
Year	-3.311	0.014	**0.021**
ASSP vs. non-ASSP	-4.453	0.032	0.164

Note: Model controls for controls for setting, wealth quintile, mother's education level, birth order, sex of the child, age of child, number of children under five years living in household, toilet facility, source of drinking water, and the World Bank program.
SE = standard error

Table 5.8. Percent of children under five with diarrhea in the past two weeks, by selected characteristics, study sample, and year (n=6,542)								
	ASSP				Non-ASSP			
	2014 (*n=1,283*)	**2017 (*n=1,920*)**	**Absolute change**	***p-value***	**2014 (*n=1,240*)**	**2017 (*n=2,099*)**	**Absolute change**	***p-value***
Diarrhea	10.5	8.2	-2.3	0.242	10.2	10.6	0.4	0.837
Sampling domain								
Nord/ Sud Ubangi	19.6	12.2	-7.4	0.069	10.9	11.7	0.8	0.732
Maniema/ Tshopo	5.7	4.4	-1.3	0.435	7.7	7.4	-0.3	0.920
Setting								
Peri-urban	5.8	12.5	6.7	0.211	11.6	27.0	15.4	0.068
Rural	11.1	7.5	-3.5	0.076	10.2	9.8	-0.4	0.827
Wealth quintile								
Low	6.7	11.9	5.2	0.184	4.1	10.3	6.2	0.127
Low middle	12.9	9.3	-3.6	0.300	15.2	9.1	-6.1	0.092
Middle	14.5	4.5	-10.0	**0.009**	11.6	8.6	-3.0	0.267
High middle	9.0	7.9	-1.1	0.723	8.7	11.2	2.5	0.453
High	5.8	6.5	0.7	0.782	6.2	13.1	6.8	**0.027**
Total number of children 0-59 months with diarrhea	145	173			132	184		

Note: Percentages are weighted

Table 5.9. Full model results of determinants of symptoms of ARI among children under five (DID model) (n=6,672)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-5.434	0.014	**<0.001**
Year	1.579	0.011	0.165
ASSP vs. non-ASSP	9.188	0.021	**<0.001**
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-1.628	0.007	**0.018**
Setting			
Peri-urban	[ref]		
Rural	-0.253	0.011	0.825
Wealth quintile			
Low	[ref]		
Low middle	-1.038	0.011	0.329
Middle	-1.888	0.010	0.072
High middle	-1.337	0.011	0.229
High	-0.929	0.012	0.444
Education level			
No education	[ref]		
Some primary	-1.026	0.007	0.161
Completed primary	0.108	0.008	0.897
Completed secondary	-4.442	0.014	**0.001**
Birth order			
1	[ref]		
2-3	0.172	0.008	0.835
4-5	0.568	0.009	0.521
6+	-0.681	0.009	0.452
Sex of child			
Female	[ref]		
Male	0.649	0.006	0.250

Table 5.9. Full model results of determinants of symptoms of ARI among children under five (DID model) (n=6,672)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Age of child (months)			
<6	[ref]		
6-11	-0.745	0.012	0.536
12-23	1.705	0.012	0.142
24-35	-0.826	0.011	0.443
36-47	-1.594	0.011	0.135
48-59	-2.019	0.011	0.057
Number of children under five years living in household			
1-2	[ref]		
3-4	-0.474	0.007	0.484
5+	3.192	0.021	0.128
Unknown	2.254	0.022	0.295
Type of cooking fuel			
Coal/ Lignite or Charcoal	[ref]		
Wood	-2.298	0.016	0.156
World Bank program			
No support	[ref]		
Cash only	-2.220	0.011	**0.050**
PBF	-2.302	0.011	**0.034**

ARI = acute respiratory infection; DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 5.10. Sub-analysis for prevalence of symptoms of ARI, by sex (Females: n=3,357)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-2.822	0.019	0.140
Year	0.518	0.016	0.742
ASSP vs. non-ASSP	5.926	0.028	**0.035**

Note: Model controls for sampling domain, setting, wealth quintile, mother's education level, birth order, age of child, number of children under five years living in household, type of cooking fuel, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.11. Sub-analysis for prevalence of symptoms of ARI, by sex (Males: n=3,315)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-8.591	0.021	**<0.001**
Year	3.235	0.016	**0.048**
ASSP vs. non-ASSP	12.897	0.030	**<0.001**

Note: Model controls for sampling domain, setting, wealth quintile, mother's education level, birth order, age of child, number of children under five years living in household, type of cooking fuel, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.12. Sub-analysis for prevalence of symptoms of ARI, by wealth (Bottom 40 percent wealth quintile: n=2,332)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.673	0.029	0.815
Year	-2.168	0.026	0.400
ASSP vs. non-ASSP	5.360	0.040	0.176

Note: Model controls for sampling domain, setting, mother's education level, birth order, sex of child, age of child, number of children under five years living in household, type of cooking fuel, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.13. Sub-analysis for prevalence of symptoms of ARI, by wealth (Top 60 percent wealth quintile: n=4,347)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-7.107	0.016	**<0.001**
Year	2.597	0.013	**0.040**
ASSP vs. non-ASSP	10.514	0.024	**<0.001**

Note: Model controls for sampling domain, setting, mother's education level, birth order, sex of child, age of child, number of children under five years living in household, type of cooking fuel, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.14. Sub-analysis for prevalence of symptoms of ARI, by domain (Nord/Sud Ubangi: n=3,455)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-2.580	0.020	0.197
Year	-0.174	0.017	0.917
ASSP vs. non-ASSP	8.694	0.030	**0.004**

Note: Model controls for setting, wealth quintile, mother's education level, birth order, sex of child, age of child, number of children under five years living in household, type of cooking fuel, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.15. Sub-analysis for symptoms of ARI, by domain (Maniema/Tshopo: n= 3,186)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.731	0.017	**0.005**
Year	0.070	0.012	0.952
ASSP vs. non-ASSP	6.061	0.026	**0.019**

Note: Model controls for setting, wealth quintile, mother's education level, birth order, sex of child, age of child, number of children under five years living in household, type of cooking fuel, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.16. Percent of children under five with symptoms of ARI in the past two weeks, by selected characteristics, study sample, and year (n=6,531)								
	ASSP				Non-ASSP			
	2014 (*n=1,277*)	**2017 (*n=1,915*)**	**Absolute change**	***p-value***	**2014 (*n=1,241)***	**2017 (*n=2,098*)**	**Absolute change**	***p-value***
Symptoms of ARI	6.7	4.7	-1.9	0.200	3.9	5.4	1.5	0.153
Sampling domain								
Nord/ Sud Ubangi	10.0	7.4	-2.6	0.337	3.5	5.4	1.9	0.146
Maniema/ Tshopo	4.8	2.2	-2.6	**0.048**	5.4	5.4	0.0	0.995
Setting								
Peri-urban	9.0	3.3	-5.8	**0.045**	14.0	8.6	-5.3	0.123
Rural	6.4	5.0	-1.4	0.357	3.6	5.3	1.6	0.137
Wealth quintile								
Low	4.5	9.4	4.9	0.071	2.3*	5.3	3.0	0.343
Low middle	8.2	3.5	-4.7	**0.045**	3.5	6.2	2.7	0.307
Middle	2.6	2.3	-0.3	0.784	4.5	4.0	-0.4	0.832
High middle	10.9	1.6*	-9.2	**0.001**	2.2	4.2	2.0	0.205
High	5.8	5.1	-0.7	0.806	5.8	7.2	1.4	0.465
Total number of children 0-59 months with symptoms of ARI	116	98			49	101		

Note: Percentages are weighted

ARI = acute respiratory infection

* Indicates a cell size less than five

Table 5.17. Full model results of determinants of fever prevalence among children under five (DID model) (n=6,682)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.590	0.023	**0.043**
Year	0.433	0.018	0.811
ASSP vs. non-ASSP	8.215	0.034	**0.016**
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	3.885	0.012	**0.001**
Setting			
Peri-urban	[ref]		
Rural	-2.988	0.018	0.102
Wealth quintile			
Low	[ref]		
Low middle	-0.161	0.017	0.923
Middle	-1.170	0.016	0.477
High middle	0.654	0.017	0.707
High	1.535	0.018	0.406
Education level			
No education	[ref]		
Some primary	0.399	0.012	0.745
Completed primary	0.033	0.013	0.980
Completed secondary	0.901	0.040	0.821
Birth order			
1	[ref]		
2-3	-0.327	0.014	0.809
4-5	0.447	0.014	0.756
6+	-0.566	0.015	0.712
Sex of child			
Female	[ref]		
Male	2.434	0.009	**0.008**

Table 5.17. Full model results of determinants of fever prevalence among children under five (DID model) (n=6,682)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Age of child (months)			
<6	[ref]		
6-11	10.131	0.018	**<0.001**
12-23	12.627	0.016	**<0.001**
24-35	10.565	0.015	**<0.001**
36-47	7.521	0.015	**<0.001**
48-59	5.991	0.015	**<0.001**
Number of children under five years living in household			
1-2	[ref]		
3-4	-2.969	0.011	**0.007**
5+	2.276	0.029	0.434
Unknown	-4.875	0.027	0.068
Owns bed net			
No	[ref]		
Yes	0.523	0.012	0.660
World Bank program			
No support	[ref]		
Cash only	3.032	0.024	0.203
PBF	-0.592	0.021	0.775

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 5.18. Sub-analysis for fever prevalence, by sex (Females: n=3,362)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.779	0.031	0.122
Year	-0.393	0.025	0.874
ASSP vs. non-ASSP	8.742	0.046	0.059

Note: Model controls for sampling domain, setting, wealth quintile, mother's education level, birth order, age of child, number of children under five years living in household, bed net ownership, and the World Bank program.
SE = standard error

Table 5.19. Sub-analysis for fever prevalence, by sex (Males: n=3,320)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.274	0.033	0.198
Year	1.238	0.026	0.640
ASSP vs. non-ASSP	7.466	0.050	0.134

Note: Model controls for sampling domain, setting, wealth quintile, mother's education level, birth order, age of child, number of children under five years living in household, bed net ownership, and the World Bank program.
SE = standard error

Table 5.20. Sub-analysis for fever prevalence, by wealth (Bottom 40 percent wealth quintile: n=2,333)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-1.840	0.041	0.651
Year	-1.454	0.034	0.668
ASSP vs. non-ASSP	3.682	0.059	0.534

Note: Model controls for sampling domain, setting, mother's education level, birth order, sex of child, age of child, number of children under five years living in household, bed net ownership, and the World Bank program.
SE = standard error

Table 5.21. Sub-analysis for fever prevalence, by wealth (Top 60 percent wealth quintile: n=4,356)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-5.443	0.028	**0.049**
Year	1.011	0.022	0.642
ASSP vs. non-ASSP	9.321	0.042	**0.026**

Note: Model controls for sampling domain, setting, mother's education level, birth order, sex of child, age of child, number of children under five years living in household, bed net ownership, and the World Bank program.
SE = standard error

Table 5.22. Sub-analysis for fever prevalence, by domain (Nord/Sud Ubangi: n=3,464)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-3.820	0.029	0.191
Year	1.948	0.023	0.388
ASSP vs. non-ASSP	7.560	0.045	0.096

Note: Model controls for setting, wealth quintile, mother's education level, birth order, sex of child, age of child, number of children under five years living in household, bed net ownership, and the World Bank program.
SE = standard error

Table 5.23. Sub-analysis for fever prevalence, by domain (Maniema/Tshopo: n=3,225)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-5.190	0.029	0.077
Year	-1.154	0.022	0.592
ASSP vs. non-ASSP	7.721	0.047	0.103

Note: Model controls for setting, wealth quintile, mother's education level, birth order, sex of child, age of child, number of children under five years living in household, bed net ownership, and the World Bank program.
SE = standard error

Table 5.24. Percent of children under five with fever in the past two weeks, by selected characteristics, study sample, and year (n=6,539)								
	ASSP				**Non-ASSP**			
	2014 (*n=1,279*)	**2017 (*n=1,920*)**	**Absolute change**	***p-value***	**2014 (*n=1,242)***	**2017 (*n=2,098*)**	**Absolute change**	***p-value***
Fever	21.8	14.9	-6.9	**0.020**	17.2	17.7	0.5	0.881
Sampling domain								
Nord/ Sud Ubangi	18.4	14.4	-4.1	0.303	14.0	18.4	4.5	0.144
Maniema/ Tshopo	23.6	15.3	-8.3	**0.051**	28.6	15.4	-13.2	**0.043**
Setting								
Peri-urban	20.4	24.5	4.1	0.596	30.3	31.7	1.4	0.851
Rural	22.0	13.4	-8.6	**0.005**	16.8	17.0	0.2	0.961
Wealth quintile								
Low	16.2	14.3	-1.9	0.749	16.0	20.3	4.3	0.432
Low middle	19.9	14.7	-5.2	0.354	19.3	15.0	-4.3	0.355
Middle	17.9	10.2	-7.7	0.057	15.5	16.8	1.3	0.719
High middle	24.4	17.2	-7.2	0.111	17.4	16.8	-0.6	0.921
High	25.6	17.8	-7.8	0.140	17.0	19.7	2.7	0.737
Total number of children 0-59 months with fever	268	313			201	374		

Note: Percentages are weighted

Table 5.25. Full model results of determinants of malaria parasite prevalence among children aged 6-59 months (DID model) (n=5,086)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-6.006	0.032	0.063
Year	15.407	0.026	**<0.001**
ASSP vs. non-ASSP	18.853	0.046	**<0.001**
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	3.346	0.016	**0.042**
Setting			
Peri-urban	[ref]		
Rural	12.790	0.024	**<0.001**
Wealth quintile			
Low	[ref]		
Low middle	-0.504	0.025	0.840
Middle	-2.769	0.025	0.267
High middle	-2.086	0.026	0.417
High	-4.309	0.027	0.109
Age of child (months)			
6-11	[ref]		
12-23	11.571	0.024	**<0.001**
24-35	21.839	0.023	**<0.001**
36-47	27.749	0.023	**<0.001**
48-59	29.664	0.023	**<0.001**
Owns bed net			
No	[ref]		
Yes	-7.074	0.017	**<0.001**
World Bank program			
No support	[ref]		
Cash only	-15.085	0.034	**<0.001**
PBF	-4.762	0.033	0.143

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 5.26. Sub-analysis for malaria parasite prevalence, by wealth (Bottom 40 percent wealth quintile: n=1,684)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-9.562	0.058	0.101
Year	21.179	0.048	**<0.001**
ASSP vs. non-ASSP	27.278	0.082	**0.001**

Note: Model controls for domain, setting, age of child, bed net ownership, and the World Bank program.
SE = standard error

Table 5.27. Sub-analysis for malaria parasite prevalence, by wealth (Top 60 percent wealth quintile: n=3,402)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.851	0.039	0.208
Year	12.843	3.081	**<0.001**
ASSP vs. non-ASSP	15.536	0.055	**0.005**

Note: Model controls for domain, setting, age of child, bed net ownership, and the World Bank program.
SE = standard error

Table 5.28. Sub-analysis for malaria parasite prevalence, by domain (Nord/Sud Ubangi: n=2,531)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-30.346	0.115	**0.009**
Year	31.537	0.112	**0.005**
ASSP vs. non-ASSP	51.126	0.124	**<0.001**

Note: Model controls for setting, wealth quintile, age of child, bed net ownership, and the World Bank program.
SE = standard error

Table 5.29. Sub-analysis for malaria parasite prevalence, by domain (Maniema/Tshopo: n=2,555)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	5.604	0.039	0.153
Year	11.148	0.029	**<0.001**
ASSP vs. non-ASSP	-2.596	0.061	0.670

Note: Model controls for setting, wealth quintile, age of child, bed net ownership, and the World Bank program.
SE = standard error

Table 5.30. Percent of children under 6-59 months with malaria parasite in their blood, by selected characteristics, study sample, and year (n=5,086)								
	ASSP				**Non-ASSP**			
	2014 (*n=1,239*)	**2017 (*n=1,283*)**	**Absolute change**	***p-value***	**2014 (*n=1,288)***	**2017 (*n=1,276*)**	**Absolute change**	***p-value***
Malaria	47.4	58.1	10.7	**0.020**	29.3	44.3	15.0	**<0.001**
Sampling domain								
Nord/ Sud Ubangi	45.9	53.1	7.2	0.314	25.9	42.4	16.5	**0.002**
Maniema/ Tshopo	48.2	62.1	13.9	**0.017**	37.7	48.2	10.5	**0.048**
Setting								
Peri-urban	22.9	46.2	23.3	0.105	47.6	44.5	-3.1	0.664
Rural	50.4	59.6	9.2	**0.057**	28.7	44.3	15.6	**<0.001**
Wealth quintile								
Low	53.5	55.2	1.7	0.878	44.8	50.5	5.8	0.678
Low middle	50.0	65.5	15.5	**0.006**	31.5	50.3	18.8	**0.018**
Middle	53.2	55.7	2.5	0.783	26.5	43.1	16.6	**0.002**
High middle	42.7	66.4	23.7	**<0.001**	30.7	38.9	8.2	0.192
High	40.2	48.8	8.6	0.392	26.8	42.0	15.2	**0.004**
Total number of children 6-59 months with any malaria parasite in their blood	597	760			454	582		

Note: Percentages are weighted

Table 5.31. Full model results of determinants of anemia prevalence among children aged 6-59 months (DID model) (n=5,117)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	5.889	0.030	0.053
Year	2.547	0.025	0.309
ASSP vs. non-ASSP	-6.907	0.043	0.106
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	14.056	0.014	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	6.583	0.024	**0.006**
Wealth quintile			
Low	[ref]		
Low middle	-4.968	0.022	**0.022**
Middle	-3.768	0.022	0.080
High middle	-4.397	0.022	**0.049**
High	-6.811	0.024	**0.004**
Age of child (months)			
6-11	[ref]		
12-23	-6.893	0.020	**0.001**
24-35	-12.009	0.020	**<0.001**
36-47	-14.181	0.020	**<0.001**
48-59	-19.040	0.021	**<0.001**
World Bank program			
No support	[ref]		
Cash only	0.901	0.032	0.781
PBF	2.755	0.030	0.355

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 5.32. Sub-analysis for anemia prevalence, by wealth (Bottom 40 percent wealth quintile: n= 1,689)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	2.784	0.057	0.625
Year	10.312	0.049	**0.034**
ASSP vs. non-ASSP	-2.895	0.078	0.710

Note: Model controls for domain, setting, age of child, bed net ownership, and the World Bank program.
SE = standard error

Table 5.33. Sub-analysis for anemia prevalence, by wealth (Top 60 percent wealth quintile: n= 3,428)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	5.911	0.036	0.100
Year	0.098	0.029	0.973
ASSP vs. non-ASSP	-7.315	0.051	0.153

Note: Model controls for domain, setting, age of child, bed net ownership, and the World Bank program.
SE = standard error

Table 5.34. Sub-analysis for anemia prevalence, by domain (Nord/Sud Ubangi: n= 2,534)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-28.561	0.145	**0.049**
Year	37.067	0.142	**0.009**
ASSP vs. non-ASSP	32.846	0.152	**0.030**

Note: Model controls for setting, wealth quintile, age of child, bed net ownership, and the World Bank program.
SE = standard error

Table 5.35. Sub-analysis for anemia prevalence, by domain (Maniema/Tshopo: n= 2,583)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	10.914	0.033	**0.001**
Year	-2.702	0.025	0.281
ASSP vs. non-ASSP	-18.024	0.051	**<0.001**

Note: Model controls for setting, wealth quintile, age of child, bed net ownership, and the World Bank program.
SE = standard error

Table 5.36. Percent of children under 6-59 months with anemia, by selected characteristics, study sample, and year (n=5,116)								
	ASSP				Non-ASSP			
	2014 (*n=1,249*)	**2017 (*n=1,303*)**	**Absolute change**	***p-value***	**2014 (*n=1,273)***	**2017 (*n=1,291*)**	**Absolute change**	***p-value***
Anemiaǂ	68.5	76.7	8.2	**0.014**	62.6	72.0	9.4	**0.018**
Sampling domain								
Nord/ Sud Ubangi	60.2	74.6	14.4	**0.019**	57.6	67.8	10.2	**0.044**
Maniema/ Tshopo	73.4	78.5	5.1	0.169	74.1	80.8	6.7	0.332
Setting								
Peri-urban	65.5	68.2	2.7	0.798	83.3	52.8	-30.5	**0.032**
Rural	68.9	77.8	8.9	**0.010**	61.9	73.0	11.1	**0.006**
Wealth quintile								
Low	63.7	78.6	14.9	0.131	62.1	78.1	16.0	0.083
Low middle	60.5	79.3	18.8	**0.012**	62.4	72.4	10.0	0.114
Middle	79.7	72.2	-7.5	0.168	63.9	73.8	9.9	0.056
High middle	63.4	82.2	18.8	**0.001**	61.8	64.8	3.0	0.711
High	70.8	71.7	0.9	0.881	62.2	73.1	10.9	0.170
Total number of children 6-59 months with anemia	854	997			887	945		

Note: Percentages are weighted

ǂAnemia is defined as a hemoglobin level of less than 11 g/dL.

Table 5.37. Full model results of determinants of receipt of either ORS or RHF for treatment of diarrhea, among children under five (DID model) (n=654)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	17.551	0.099	0.075
Year	-23.102	0.084	**0.006**
ASSP vs. non-ASSP	-6.762	0.134	0.614
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	13.971	0.046	**0.003**
Setting			
Peri-urban	[ref]		
Rural	-4.701	0.073	0.519
Wealth quintile			
Low	[ref]		
Low middle	0.444	0.061	0.942
Middle	-4.127	0.061	0.500
High middle	1.393	0.066	0.832
High	5.770	0.073	0.432
Mother's age (years)			
15-19	[ref]		
20-24	5.985	0.074	0.417
25-34	3.966	0.076	0.600
35-44	11.908	0.092	0.195
45-49	6.044	0.142	0.671
Education level ǂ			
No education	[ref]		
Some primary	-6.470	0.047	0.169
Completed primary or more	-7.330	0.051	0.152
Birth order			
1	[ref]		
2-3	-3.997	0.059	0.501
4-5	-4.390	0.069	0.528
6+	-8.016	0.077	0.301

Table 5.37. Full model results of determinants of receipt of either ORS or RHF for treatment of diarrhea, among children under five (DID model) (n=654)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Sex of child			
Female	[ref]		
Male	-0.057	0.036	0.987
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	0.608	0.104	0.953
Currently working	2.635	0.055	0.631
World Bank program			
No support	[ref]		
Cash only	24.836	0.097	**0.010**
PBF	46.169	0.075	**<0.001**

ORS = oral rehydration salts; RHF = recommended home fluids; DID = difference-in-differences; SE = standard error; PBF = performance-based financing

ǂ Two categories (i.e. 'completed primary' and 'completed secondary') were collapsed due to small cell size of the latter.

Table 5.38. Sub-analysis for treatment of diarrhea with either ORS or RHF, by sex (Females: n=329)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	34.554	0.140	**0.014**
Year	-33.540	0.124	**0.007**
ASSP vs. non-ASSP	-34.062	0.189	0.071

Note: Model controls for sampling domain, setting, wealth quintile, mother's age, mother's education level, birth order, employment status, and the World Bank program.
ORS = oral rehydration salts; RHF = recommended home fluids; SE = standard error

Table 5.39. Sub-analysis for treatment of diarrhea with either ORS or RHF, by sex (Males: n=325)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.881	0.141	0.950
Year	-8.844	0.117	0.450
ASSP vs. non-ASSP	22.144	0.191	0.247

Note: Model controls for sampling domain, setting, wealth quintile, mother's age, mother's education level, birth order, employment status, and the World Bank program.
ORS = oral rehydration salts; RHF = recommended home fluids; SE = standard error

Table 5.40. Sub-analysis for treatment of diarrhea with either ORS or RHF, by wealth (Bottom 40 percent wealth quintile: n=254)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-17.580	0.176	0.318
Year	6.176	0.155	0.690
ASSP vs. non-ASSP	44.094	0.227	0.052

Note: Model controls for sampling domain, setting, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ORS = oral rehydration salts; RHF = recommended home fluids; SE = standard error

Table 5.41. Sub-analysis for treatment of diarrhea with either ORS or RHF, by wealth (Top 60 percent wealth quintile: n=400)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	31.066	0.116	**0.008**
Year	-35.489	0.097	**<0.001**
ASSP vs. non-ASSP	-32.017	0.160	**0.046**

Note: Model controls for sampling domain, setting, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ORS = oral rehydration salts; RHF = recommended home fluids; SE = standard error

Table 5.42. Sub-analysis for treatment of diarrhea with either ORS or RHF, by domain (Nord/Sud Ubangi: n=410)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-19.386	0.107	0.070
Year	17.752	0.087	**0.042**
ASSP vs. non-ASSP	21.472	0.162	0.184

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ORS = oral rehydration salts; RHF = recommended home fluids; SE = standard error

Table 5.43. Sub-analysis for treatment of diarrhea with either ORS or RHF, by domain (Maniema/Tshopo: n=244)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	3.753	0.129	0.770
Year	-19.465	0.092	**0.034**
ASSP vs. non-ASSP	18.835	0.192	0.327

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ORS = oral rehydration salts; RHF = recommended home fluids; SE = standard error

Table 5.44. Percent of children under five with diarrhea who received either ORS or RHF, by selected characteristics, study sample, and year (n=634)								
	ASSP				**Non-ASSP**			
	2014 (*n=145*)	**2017 (*n=173*)**	**Absolute change**	***p-value***	**2014 (*n=132)***	**2017 (*n=184*)**	**Absolute change**	***p-value***
Received either ORS or RHF	39.6	32.6	-7.0	0.422	27.9	28.3	0.5	0.950
Sampling domain								
Nord/ Sud Ubangi	28.8	28.5	-0.3	0.974	21.6	28.0	6.4	0.417
Maniema/ Tshopo	59.6	43.6	-16.0	0.174	59.6	29.9	-29.6	**0.024**
Setting								
Peri-urban	64.4	35.1	-29.3	0.064	59.7	45.3	-14.4	0.060
Rural	38.1	32.0	-6.1	0.498	26.9	26.0	-0.9	0.903
Wealth quintile								
Low	48.1	25.9	-22.2	0.342	25.3*	11.8	-13.6	0.368
Low middle	39.2	37.5	-1.7	0.880	20.6	15.9	-4.7	0.676
Middle	30.6	22.0	-8.6	0.533	20.0	49.5	29.4	**0.037**
High middle	36.2	30.5	-5.7	0.720	25.2	27.3	2.1	0.848
High	58.9	47.9	-11.0	0.466	67.8	28.9	-38.9	**0.046**
Total number of children 0-59 months with diarrhea given either ORS or RHF	58	59			35	55		

Note: Percentages are weighted

ORS = oral rehydration salts; RHF = recommended home fluids

* Indicates a cell size less than 5

Table 5.45. Percentage of children under five with diarrhea who received either ORS, RHF or increased fluids, by selected characteristics (n=654)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-4.496	0.098	0.648
Year	-13.835	0.081	0.086
ASSP vs. non-ASSP	24.332	0.137	0.077
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	3.067	0.049	0.530
Setting			
Peri-urban	[ref]		
Rural	-7.877	0.071	0.270
Wealth quintile			
Low	[ref]		
Low middle	-2.388	0.065	0.712
Middle	-0.915	0.066	0.889
High middle	2.831	0.068	0.677
High	-5.807	0.076	0.444
Mother's age (years)			
15-19	[ref]		
20-24	-2.711	0.082	0.741
25-34	1.615	0.085	0.850
35-44	5.713	0.099	0.565
45-49	6.411	0.145	0.659
Education level ‡			
No education	[ref]		
Some primary	-3.742	0.049	0.448
Completed primary or more	2.569	0.054	0.633
Birth order			
1	[ref]		
2-3	1.235	0.061	0.839
4-5	-4.697	0.072	0.517
6+	-6.900	0.082	0.402

Table 5.45. Percentage of children under five with diarrhea who received either ORS, RHF or increased fluids, by selected characteristics (n=654)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Sex of child			
Female	[ref]		
Male	1.908	0.038	0.614
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	22.885	0.101	**0.024**
Currently working	-0.669	0.060	0.911
World Bank program			
No support	[ref]		
Cash only	5.594	0.095	0.555
PBF	25.170	0.075	**0.001**

ORS = oral rehydration salts; RHF = recommended home fluids; DID = difference-in-differences; SE = standard error; PBF = performance-based financing

ⱡ Two categories (i.e. 'completed primary' and 'completed secondary') were collapsed due to small cell size of the latter.

Table 5.46. Sub-analysis for treatment of diarrhea with either ORS or RHF or increased fluids, by sex (Females: n=329)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	7.486	0.137	0.585
Year	-21.505	0.116	0.065
ASSP vs. non-ASSP	7.737	0.193	0.688

Note: Model controls for sampling domain, setting, wealth quintile, mother's age, mother's education level, birth order, employment status, and the World Bank program.
ORS = oral rehydration salts; RHF = recommended home fluids; SE = standard error

Table 5.47. Sub-analysis for treatment of diarrhea with either ORS or RHF or increased fluids, by sex (Males: n=316)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-23.832	0.145	0.101
Year	1.004	0.116	0.931
ASSP vs. non-ASSP	52.470	0.199	**0.009**

Note: Model controls for sampling domain, setting, wealth quintile, mother's age, mother's education level, birth order, employment status, and the World Bank program.
ORS = oral rehydration salts; RHF = recommended home fluids; SE = standard error

Table 5.48. Sub-analysis for treatment of diarrhea with either ORS or RHF or increased fluids, by wealth (Bottom 40 percent wealth quintile: n=254)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-14.077	0.184	0.444
Year	-5.981	0.157	0.704
ASSP vs. non-ASSP	36.665	0.242	0.130

Note: Model controls for sampling domain, setting, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ORS = oral rehydration salts; RHF = recommended home fluids; SE = standard error

Table 5.49. Sub-analysis for treatment of diarrhea with either ORS or RHF or increased fluids, by wealth (Top 60 percent wealth quintile: n=400)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-7.928	0.117	0.498
Year	-11.536	0.094	0.218
ASSP vs. non-ASSP	25.940	0.166	0.119

Note: Model controls for sampling domain, setting, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ORS = oral rehydration salts; RHF = recommended home fluids; SE = standard error

Table 5.50. Sub-analysis for treatment of diarrhea with either ORS or RHF or increased fluids, by domain (Nord/Sud Ubangi: n=410)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-31.928	0.117	**0.006**
Year	14.203	0.098	0.148
ASSP vs. non-ASSP	51.086	0.171	**0.003**

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.

ORS = oral rehydration salts; RHF = recommended home fluids; SE = standard error

Table 5.51. Sub-analysis for treatment of diarrhea with either ORS or RHF or increased fluids, by domain (Maniema/Tshopo: n=242)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-5.063	0.130	0.697
Year	-14.977	0.087	0.084
ASSP vs. non-ASSP	26.393	0.201	0.189

Note: Model controls for sampling domain, wealth quintile, setting, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.

ORS = oral rehydration salts; RHF = recommended home fluids; SE = standard error

Table 5.52. Percent of children under five with diarrhea who received either ORS, RHF or increased fluids, by selected characteristics, study sample, and year (n=634)								
	ASSP				**Non-ASSP**			
	2014 (*n=145*)	**2017 (*n=173*)**	**Absolute change**	***p-value***	**2014 (*n=132)***	**2017 (*n=184*)**	**Absolute change**	***p-value***
Received either ORS or RHF or increased fluids	75.7	56.2	-19.5	**0.015**	55.8	44.4	-11.4	0.171
Sampling domain								
Nord/ Sud Ubangi	76.3	53.6	-22.7	**0.028**	52.6	44.2	-8.4	0.356
Maniema/ Tshopo	74.6	63.0	-11.7	0.312	71.7	45.4	-26.4	0.128
Setting								
Peri-urban	90.4	69.7	-20.7	0.229	59.7	62.7	3.0	0.598
Rural	74.8	52.8	-22.0	**0.012**	55.7	41.9	-13.8	0.120
Wealth quintile								
Low	76.0	52.7	-23.3	0.367	50.6*	41.1	-9.6	0.789
Low middle	68.7	53.2	-15.5	0.159	64.6	31.7	-32.9	**0.019**
Middle	74.8	38.8	-36.1	**0.018**	48.0	59.1	11.1	0.451
High middle	87.1	81.0	-6.1	0.557	45.1	43.7	-1.5	0.924
High	69.3	55.0	-14.3	0.367	67.8	43.5	-24.3	0.291
Total number of children 0-59 months with diarrhea given either ORS or RHF or increased fluids	105	98			65	90		

Note: Percentages are weighted

ORS = oral rehydration salts; RHF = recommended home fluids

* Indicates a cell size less than five

Table 5.53. Full model results of determinants of receipt of antibiotics for treatment of symptoms of ARI, among children under five (DID model) (n=380)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	14.428	0.102	0.159
Year	-19.746	0.081	**0.015**
ASSP vs. non-ASSP	-6.030	0.148	0.683
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	27.455	0.051	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-0.126	0.067	0.985
Wealth quintile			
Low	[ref]		
Low middle	-0.721	0.072	0.921
Middle	3.759	0.079	0.634
High middle	10.196	0.082	0.216
High	1.858	0.077	0.809
Mother's age (years)			
15-19	[ref]		
20-24	13.499	0.062	**0.031**
25-34	13.373	0.062	**0.031**
35-44	18.792	0.090	**0.036**
45-49	47.870	0.134	**<0.001**
Education level ǂ			
No education	[ref]		
Some primary	7.071	0.053	0.186
Completed primary or more	13.949	0.056	**0.013**
Birth order			
1	[ref]		
2-3	-9.360	0.067	0.164
4-5	-9.884	0.079	0.210
6+	-16.046	0.086	0.062

Table 5.53. Full model results of determinants of receipt of antibiotics for treatment of symptoms of ARI, among children under five (DID model) (n=380)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Sex of child			
Female	[ref]		
Male	2.369	0.041	0.559
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	-24.031	0.075	**0.001**
Currently working	-3.211	0.060	0.595
World Bank program			
No support	[ref]		
Cash only	41.667	0.106	**<0.001**
PBF	44.949	0.097	**<0.001**

ARI = acute respiratory infection; DID = difference-in-differences; SE = standard error; PBF = performance-based financing

ǂ Two categories (i.e. 'completed primary' and 'completed secondary') were collapsed due to small cell size of the latter.

Table 5.54. Sub-analysis for treatment of symptoms of ARI with antibiotics, by sex (Females: n=180)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	17.091	0.137	0.213
Year	-17.073	0.108	0.114
ASSP vs. non-ASSP	-16.382	0.201	0.416

Note: Model controls for sampling domain, setting, wealth quintile, mother's age, mother's education level, birth order, employment status, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.55. Sub-analysis for treatment of symptoms of ARI with antibiotics, by sex (Males: n=191)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	15.762	0.155	0.308
Year	-19.596	0.128	0.125
ASSP vs. non-ASSP	5.010	0.225	0.824

Note: Model controls for sampling domain, setting, wealth quintile, mother's age, mother's education level, birth order, employment status, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.56. Sub-analysis for treatment of symptoms of ARI with antibiotics, by wealth (Bottom 40 percent wealth quintile: n=141)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	9.868	0.172	0.566
Year	-7.989	0.159	0.616
ASSP vs. non-ASSP	-2.531	0.254	0.921

Note: Model controls for sampling domain, setting, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.57. Sub-analysis for treatment of symptoms of ARI with antibiotics, by wealth (Top 60 percent wealth quintile: n=224)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	9.463	0.135	0.484
Year	-26.179	0.101	**0.010**
ASSP vs. non-ASSP	4.014	0.193	0.836

Note: Model controls for sampling domain, setting, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.58. Sub-analysis for treatment of symptoms of ARI with antibiotics, by domain (Nord/Sud Ubangi: n=213)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-11.965	0.119	0.317
Year	13.225	0.102	0.196
ASSP vs. non-ASSP	13.537	0.192	0.481

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.59. Sub-analysis for treatment of symptoms of ARI with antibiotics, by domain (Maniema/Tshopo: n=163)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	17.114	0.166	0.302
Year	-24.096	0.114	**0.034**
ASSP vs. non-ASSP	-3.940	0.243	0.871

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.60. Percent of children under five with symptoms of ARI in the past two weeks who received antibiotics, by selected characteristics, study sample, and year (n=364)								
	ASSP				Non-ASSP			
	2014 (*n=116*)	2017 (*n=98*)	Absolute change	*p-value*	2014 (*n=49)*	2017 (*n=101*)	Absolute change	*p-value*
Received antibiotics for symptoms of ARI	33.4	13.5	-20.0	**0.019**	25.4	32.6	7.2	0.488
Sampling domain								
Nord/ Sud Ubangi	18.8	6.2	-12.6	0.154	9.5*	29.0	19.4	**0.054**
Maniema/ Tshopo	49.6	36.0	-13.6	0.287	62.5	43.4	-19.1	0.186
Setting								
Peri-urban	44.6	29.2*	-15.5	0.523	20.4*	48.5*	28.1	0.362
Rural	31.5	11.9	-19.6	**0.028**	26.0	31.3	5.3	0.622
Wealth quintile								
Low	0.0*	10.7	10.7	0.442	55.9*	3.6*	-52.3	**<0.001**
Low middle	13.5	9.4*	-4.0	0.699	0.0*	44.1	44.1	0.096
Middle	37.2	21.4*	-15.8	0.446	0.0*	25.9	25.9	0.224
High middle	50.0	0.0*	-50.0	0.076	12.3*	10.5*	-1.8	0.873
High	35.9	21.5	-14.4	0.384	67.6	50.9	-16.7	0.377
Total number of children 0-59 months with symptoms of ARI who received antibiotics	38	17			9	28		

Note: Percentages are weighted

ARI = acute respiratory infection

* Indicates a cell size less than five

Table 5.61. Full model results of determinants of receipt of antimalarial treatment for treatment of fever, among children under five (DID model) (n=1,176)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	7.801	0.064	0.219
Year	12.287	0.049	**0.011**
ASSP vs. non-ASSP	-18.357	0.097	0.058
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	7.350	0.034	**0.032**
Setting			
Peri-urban	[ref]		
Rural	-6.742	0.046	0.146
Wealth quintile			
Low	[ref]		
Low middle	8.456	0.045	0.060
Middle	10.721	0.046	**0.019**
High middle	17.726	0.047	**<0.001**
High	14.261	0.048	**0.003**
Mother's age (years)			
15-19	[ref]		
20-24	5.697	0.051	0.268
25-34	8.212	0.054	0.129
35-44	16.027	0.065	**0.013**
45-49	18.653	0.118	0.113
Education level ǂ			
No education	[ref]		
Some primary	3.645	0.036	0.312
Completed primary or more	2.456	0.039	0.527
Birth order			
1	[ref]		
2-3	3.497	0.044	0.429
4-5	-0.562	0.051	0.912
6+	-9.390	0.055	0.086

Table 5.61. Full model results of determinants of receipt of antimalarial treatment for treatment of fever, among children under five (DID model) (n=1,176)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Sex of child			
Female	[ref]		
Male	-3.858	0.027	0.146
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	13.542	0.068	**0.045**
Currently working	7.410	0.035	**0.033**
World Bank program			
No support	[ref]		
Cash only	-6.836	0.057	0.234
PBF	-4.330	0.057	0.446

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

ǂ Two categories (i.e. 'completed primary' and 'completed secondary') were collapsed due to small cell size of the latter.

Table 5.62. Sub-analysis for treatment of fever with antimalarials, by sex (Females: n=549)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	15.103	0.093	0.104
Year	9.871	0.071	0.165
ASSP vs. non-ASSP	-30.908	0.142	**0.029**

Note: Model controls for sampling domain, setting, wealth quintile, mother's age, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 5.63. Sub-analysis for treatment of fever with antimalarials, by sex (Males: n=627)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	3.803	0.086	0.659
Year	12.659	0.066	0.054
ASSP vs. non-ASSP	-12.008	0.131	0.359

Note: Model controls for sampling domain, setting, wealth quintile, mother's age, mother's education level, birth order, employment status, and the World Bank program.
SE = standard error

Table 5.64. Sub-analysis for treatment of fever with antimalarials, by wealth (Bottom 40 percent wealth quintile: n=379)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-25.577	0.112	**0.022**
Year	39.815	0.088	**<0.001**
ASSP vs. non-ASSP	29.426	0.171	0.085

Note: Model controls for sampling domain, setting, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
SE = standard error

Table 5.65. Sub-analysis for treatment of fever with antimalarials, by wealth (Top 60 percent wealth quintile: n=798)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	18.058	0.076	**0.018**
Year	2.393	0.059	0.683
ASSP vs. non-ASSP	-34.517	0.116	**0.003**

Note: Model controls for sampling domain, setting, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
SE = standard error

Table 5.66. Sub-analysis for treatment of fever with antimalarials, by domain (Nord/Sud Ubangi: n=539)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-2.441	0.088	0.783
Year	9.938	0.069	0.150
ASSP vs. non-ASSP	5.227	0.140	0.709

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
SE = standard error

Table 5.67. Sub-analysis for treatment of fever with antimalarials, by domain (Maniema/Tshopo: n=638)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	18.507	0.077	**0.016**
Year	10.419	0.054	0.053
ASSP vs. non-ASSP	-38.299	0.124	**0.002**

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
SE = standard error

Table 5.68. Percent of children under five with fever in the past two weeks who received anti-malarials, by selected characteristics, study sample, and year (n=1,156)								
	ASSP				**Non-ASSP**			
	2014 (*n=268*)	**2017 (*n=313*)**	**Absolute change**	***p-value***	**2014 (*n=201)***	**2017 (*n=374*)**	**Absolute change**	***p-value***
Received antimalarials for fever	25.3	39.1	13.9	**0.019**	28.4	32.6	4.2	0.674
Sampling domain								
Nord/ Sud Ubangi	33.9	24.9	-8.9	0.217	14.3	29.2	14.8	0.074
Maniema/ Tshopo	21.7	51.7	30.0	**<0.001**	52.8	44.9	-8.0	0.475
Setting								
Peri-urban	40.0	52.4	12.5	0.521	40.0	58.3	18.3	0.243
Rural	23.7	35.5	11.8	**0.044**	27.8	30.2	2.4	0.820
Wealth quintile								
Low	12.0*	13.8	1.8	0.865	0.0*	21.1	21.1	0.427
Low middle	34.9	35.9	1.0	0.956	12.5	25.4	12.9	0.239
Middle	26.1	36.6	10.5	0.508	25.1	30.4	5.3	0.701
High middle	21.0	61.9	41.0	**0.001**	33.3	44.6	11.3	0.492
High	19.2	48.8	29.6	**<0.001**	50.3	35.2	-15.1	0.136
Total number of children 0-59 months with fever who received anti-malarials	59	119			63	141		

Note: Percentages are weighted

* Indicates a cell size less than 5

Table 5.69. Full model results of determinants of seeking treatment for ARI and/or fever at a health facility or from a health provider, for children under five (DID model) (n=555)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-11.517	0.053	**0.030**
Year	0.230	0.039	0.952
ASSP vs. non-ASSP	17.749	0.084	**0.034**
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-3.077	0.027	0.256
Setting			
Peri-urban	[ref]		
Rural	2.625	0.039	0.499
Wealth quintile			
Low	[ref]		
Low middle	0.332	0.045	0.942
Middle	-0.561	0.048	0.907
High middle	3.717	0.043	0.383
High	1.314	0.047	0.781
Mother's age (years)			
15-19	[ref]		
20-24	-6.127	0.041	0.135
25-34	-1.904	0.040	0.634
35-44	-0.933	0.047	0.842
45-49	-7.888	0.122	0.518
Education level ǂ			
No education	[ref]		
Some primary	6.968	0.034	**0.042**
Completed primary or more	2.446	0.039	0.528
Birth order			
1	[ref]		
2-3	3.751	0.034	0.270
4-5	0.142	0.047	0.976
6+	2.497	0.051	0.623

Table 5.69. Full model results of determinants of seeking treatment for ARI and/or fever at a health facility or from a health provider, for children under five (DID model) (n=555)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Sex of child			
Female	[ref]		
Male	0.826	0.021	0.695
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	-4.804	0.055	0.383
Currently working	-0.800	0.027	0.767
World Bank program			
No support	[ref]		
Cash only	-5.028	0.070	0.475
PBF	4.272	0.031	0.171

ARI = acute respiratory infection; DID = difference-in-differences; SE = standard error; PBF = performance-based financing

ǂ Two categories (i.e. 'completed primary' and 'completed secondary') were collapsed due to small cell size of the latter.

Table 5.70. Sub-analysis for seeking treatment for ARI and/or fever at a health facility or from a health provider, by sex (Females: n=273)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-11.138	0.075	0.135
Year	1.692	0.056	0.761
ASSP vs. non-ASSP	17.421	0.114	0.128

Note: Model controls for sampling domain, setting, wealth quintile, mother's age, mother's education level, birth order, employment status, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.71. Sub-analysis for seeking treatment for ARI and/or fever at a health facility or from a health provider, by sex (Males: n=254)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-12.405	0.086	0.147
Year	-2.433	0.058	0.673
ASSP vs. non-ASSP	20.032	0.142	0.157

Note: Model controls for sampling domain, setting, wealth quintile, mother's age, mother's education level, birth order, employment status, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.72. Sub-analysis for seeking treatment for ARI and/or fever at a health facility or from a health provider, by wealth (Bottom 40 percent wealth quintile: n=136)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-74.010	41.992	0.986
Year	64.517	41.991	0.988
ASSP vs. non-ASSP	82.113	41.992	0.984

Note: Model controls for sampling domain, setting, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.73. Sub-analysis for seeking treatment for ARI and/or fever at a health facility or from a health provider, by wealth (Top 60 percent wealth quintile: n=400)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-8.334	0.058	0.153
Year	-3.241	0.043	0.447
ASSP vs. non-ASSP	13.659	0.096	0.156

Note: Model controls for sampling domain, setting, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.74. Sub-analysis for seeking treatment for ARI and/or fever at a health facility or from a health provider, by domain (Nord/Sud Ubangi: n=143)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-7.191	0.107	0.501
Year	-6.243	0.074	0.401
ASSP vs. non-ASSP	12.857	0.181	0.477

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.75. Sub-analysis for seeking treatment for ARI and/or fever at a health facility or from a health provider, by domain (Maniema/Tshopo: n=332)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-11.651	0.066	0.077
Year	-0.756	0.045	0.866
ASSP vs. non-ASSP	17.538	0.110	0.111

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, birth order, sex of the child, employment status, and the World Bank program.
ARI = acute respiratory infection; SE = standard error

Table 5.76. Percentage of children under five for whom treatment for ARI and/or fever was sought at a health facility or from a health provider, by selected characteristics (n=539)								
	ASSP				**Non-ASSP**			
	2014 (*n=147*)	**2017 (*n=135*)**	**Absolute change**	***p-value***	**2014 (*n=94*)**	**2017 (*n=163*)**	**Absolute change**	***p-value***
Treatment for ARI and/or fever sought at a health facility or from a health provider	99.0	85.2	-13.8	**<0.001**	91.1	88.3	-2.8	0.722
Sampling domain								
Nord/ Sud Ubangi	98.4	88.1	-10.4	**0.041**	84.7	86.1	1.4	0.895
Maniema/ Tshopo	99.2	82.9	-16.3	**<0.001**	96.9	94.3	-2.6	0.602
Setting								
Peri-urban	100.0	80.9	-19.1	0.126	87.9	95.1	7.2	0.589
Rural	98.9	86.3	-12.5	**<0.001**	91.3	87.9	-3.4	0.678
Wealth quintile								
Low	100.0*	80.8	-19.3	0.253	5.1*	100.0	94.9	**<0.001**
Low middle	97.8	95.0	-2.8	0.534	100.0	71.4	-28.6	0.154
Middle	99.3	89.6	-9.7	0.005	73.0	99.6	26.6	**<0.001**
High middle	100.0	83.3	-16.7	**0.007**	100.0	83.3	-16.7	0.248
High	98.4	80.9	-17.5	**0.006**	98.3	95.6	-2.6	0.513
Total number of children under five for whom treatment for ARI and/or fever was sought at a health facility or from a health provider	144	117			88	154		

Note: Percentages are weighted

ARI = acute respiratory infection

* Indicates a cell size less than 5

Table 5.77. Full model results of determinants of receipt of all specified vaccinations at any time before the module, among children 12-23 months (DID model) (n=1,391)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	5.227	0.067	0.432
Year	-21.803	0.053	**<0.001**
ASSP vs. non-ASSP	-5.219	0.096	0.588
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	-14.491	0.031	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-7.390	0.050	0.143
Wealth quintile			
Low	[ref]		
Low middle	-0.912	0.045	0.839
Middle	1.563	0.045	0.726
High middle	0.374	0.048	0.937
High	8.786	0.051	0.086
Mother's age (years)			
15-19	[ref]		
20-24	0.586	0.051	0.908
25-34	4.563	0.055	0.406
35-44	2.695	0.064	0.674
45-49	-4.546	0.138	0.741
Education level			
No education	[ref]		
Some primary	3.819	0.033	0.250
Completed primary	7.519	0.036	**0.038**
Completed secondary	27.800	0.130	**0.032**
Birth order			
1	[ref]		
2-3	0.169	0.041	0.967
4-5	0.546	0.050	0.913
6+	-3.149	0.054	0.562

Table 5.77. Full model results of determinants of receipt of all specified vaccinations at any time before the module, among children 12-23 months (DID model) (n=1,391)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Sex of child			
Female	[ref]		
Male	1.249	0.026	0.628
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	-0.883	0.067	0.896
Currently working	-2.941	0.034	0.394
World Bank program			
No support	[ref]		
Cash only	9.931	0.065	0.126
PBF	10.104	0.064	0.112

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 5.78. Sub-analysis for receipt of all specified vaccinations at any time before the module, by sex (Females: n=673)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-0.874	0.095	0.927
Year	-17.187	0.075	**0.021**
ASSP vs. non-ASSP	3.744	0.139	0.788

Note: Model controls for sampling domain, setting, wealth quintile, mother's age, mother's education level, birth order, number of children under five years living in the household, employment status, and the World Bank program.
SE = standard error

Table 5.79. Sub-analysis for receipt of all specified vaccinations at any time before the module, by sex (Males: n=718)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	13.374	0.094	0.153
Year	-28.018	0.075	**<0.001**
ASSP vs. non-ASSP	-16.763	0.134	0.210

Note: Model controls for sampling domain, setting, wealth quintile, mother's age, mother's education level, birth order, number of children under five years living in the household, employment status, and the World Bank program.
SE = standard error

Table 5.80. Sub-analysis for receipt of all specified vaccinations at any time before the module, by wealth (Bottom 40 percent wealth quintile: n=494)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-10.718	0.116	0.354
Year	-15.669	0.095	0.099
ASSP vs. non-ASSP	17.294	0.161	0.284

Note: Model controls for sampling domain, setting, mother's age, mother's education level, birth order, sex of the child, number of children under five years living in the household, employment status, and the World Bank program.
SE = standard error

Table 5.81. Sub-analysis for receipt of all specified vaccinations at any time before the module, by

wealth (Top 60 percent wealth quintile: n=897)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	16.398	0.081	**0.044**
Year	-24.671	0.064	**<0.001**
ASSP vs. non-ASSP	-22.839	0.120	0.057

Note: Model controls for sampling domain, setting, mother's age, mother's education level, birth order, sex of the child, number of children under five years living in the household, employment status, and the World Bank program.
SE = standard error

Table 5.82. Sub-analysis for receipt of all specified vaccinations at any time before the module, by domain (Nord/Sud Ubangi: n=738)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-10.056	0.085	0.238
Year	-19.528	0.064	**0.002**
ASSP vs. non-ASSP	14.984	0.131	0.251

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, birth order, sex of the child, number of children under five years living in the household, employment status, and the World Bank program.
SE = standard error

Table 5.83. Sub-analysis for receipt of all specified vaccinations at any time before the module, by domain (Maniema/Tshopo: n=653)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	15.801	0.078	**0.044**
Year	-16.875	0.056	**0.003**
ASSP vs. non-ASSP	-19.439	0.125	0.120

Note: Model controls for setting, wealth quintile, mother's age, mother's education level, birth order, sex of the child, number of children under five years living in the household, employment status, and the World Bank program.
SE = standard error

Table 5.84. Full model results of determinants of receipt of all specified vaccinations at any time before the module, among children 12-23 months whose mother produced a vaccination card (DID model) (n=110)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Interaction (Year*ASSP)	-320.970	100.958	0.975
Year	272.357	100.959	0.978
ASSP vs. non-ASSP	346.574	100.959	0.973
Sampling domain			
Nord/ Sud Ubangi	[ref]		
Maniema/ Tshopo	5.625	0.154	0.715
Setting			
Peri-urban	[ref]		
Rural	33.744	0.168	**0.044**
Wealth quintile			
Low	[ref]		
Low middle	-33.444	0.150	**0.026**
Middle	-24.154	0.157	0.123
High middle	-16.513	0.160	0.303
High	-5.753	0.186	0.757
Mother's age (years)			
15-19	[ref]		
20-24	20.259	0.187	0.280
25-34	0.621	0.211	0.976
35-44	-17.558	0.240	0.465
Education level			
No education			
Some primary	[ref]		
Completed primary	8.554	0.113	0.450
	3.975	0.120	0.741
Birth order			
1			
2-3	[ref]		
4-5	17.396	0.171	0.310
6+	16.593	0.233	0.476

Table 5.84. Full model results of determinants of receipt of all specified vaccinations at any time before the module, among children 12-23 months whose mother produced a vaccination card (DID model) (n=110)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Sex of child			
Female	[ref]		
Male	6.565	0.091	0.471
Employment status			
Not working in past 12 months	[ref]		
Not currently working but worked in last 12 months	-42.459	0.142	**0.003**
Currently working	20.667	0.151	0.172
World Bank program			
No support	[ref]		
Cash only or Full PBF intervention	-60.250	0.041	**<0.001**

DID = difference-in-differences; SE = standard error; PBF = performance-based financing

Table 5.85. Percentage of children 12-23 months who received all specified vaccinations at any time before the module, by selected characteristics (n=1,365)								
	ASSP				**Non-ASSP**			
	2014 (*n=256*)	**2017 (*n=400*)**	**Absolute change**	***p-value***	**2014 (*n=285)***	**2017 (*n=424*)**	**Absolute change**	***p-value***
Received all specified vaccinations	43.6	31.1	-12.5	0.138	52.5	38.7	-13.8	**0.035**
Sampling domain								
Nord/ Sud Ubangi	62.9	24.7	-38.3	**<0.001**	58.9	39.4	-19.5	**0.005**
Maniema/ Tshopo	33.6	37.9	4.3	0.693	30.7	36.1	5.4	0.465
Setting								
Urban	72.6	44.9	-27.7	**0.017**	42.4	34.9	-7.5	0.433
Rural	41.0	29.0	-12.0	0.176	52.8	39.0	-13.8	**0.042**
Wealth quintile								
Low	59.6	20.0	-39.6	**0.012**	56.5	43.1	-13.4	0.585
Low middle	48.2	22.6	-25.6	**0.029**	49.3	30.4	-18.9	0.105
Middle	29.4	34.9	5.5	0.747	51.9	40.3	-11.7	0.324
High middle	37.2	25.4	-11.8	0.340	58.0	44.5	-13.5	0.144
High	55.4	50.7	-4.7	0.597	48.7	37.6	-11.1	0.441
Total number of children 12-23 months who received all specified vaccinations	130	141			142	150		

Note: Percentages are weighted

Chapter 6
Child Nutrition

Acronyms

AC	*Animateur Communautaire* (Community Outreach Worker)
ANJE	*Alimentation de Nourrisons et Jeunes Enfants* (Feeding Infants and Young Children)
ASSP	Access to Primary Health Care (Project)
CODESA	*Comité de Développement de L'aire de Santé* (Health Area Development Committee)
CMAM	Community Management of Acute Malnutrition
CPN	*Consultation Prénatale* (Antenatal Consultation)
CPS	*Consultation Pre-Scolaire* (Growth Monitoring Session)
DFID	Department for International Development
DRC	Democratic Republic of Congo
IMA	Interchurch Medical Assistance (dba IMA World Health)
MAD	Minimum Acceptable diet
MCZ	*Médecin Chef de Zone* (Health Zone Medical Officer)
MDD	Minimum Dietary Diversity
MMF	Minimum Meal Frequency
RECO	*Relais Communautaire* (Community Health Volunteer)
RUTF	Ready to Use Food
UNICEF	United Nations International Children's Emergency Fund
WASH	Water, Sanitation, and Hygiene

i. Overview of the ASSP approach

As part of the larger package of interventions, ASSP implemented a component aimed at combating malnutrition in children under five. Child nutrition activities were not part of the original business plan but were included after experts participating in initial field assessments insisted that child nutrition be part of the ASSP program. The main goals of the nutrition approach include 1) to identify malnourished children early before the condition becomes severe and 2) to empower caregivers to care for their children with locally available produce. ASSP's primary strategies to accomplish this are improving facility-based care, community screening of malnourished children, promotion of home gardening, and proper child feeding practices among caregivers of malnourished children.

Improving facility-based care. In the DRC, severely malnourished children with medical complications are referred to a reference hospital where they are supposed to be provided with Ready to Use Foods/Therapeutic Foods (RUTFs) and therapeutic milk. Children severely malnourished without complications can receive treatment in one of the three reference health centers providing Ambulatory Therapeutic Nutrition Unit (*Unité Nutritionnelle Thérapeutique Ambulatoire*) services in each health zone. Other children who present to the health facility with moderate malnutrition have their status confirmed using anthropometric measurements and are medically treated. Facility-based nurses counsel caregivers to follow ANJE (*Alimentation de Nourrisons et Jeunes Enfants*), an internationally recognized model promoting best feeding practices relative to the age of the child. Key messages conveyed through the program involve exclusive breastfeeding up to six months, preparation of enriched porridge made from ingredients grown in home gardens or purchased in local markets, providing children with a balanced diet, and adding a supplemental meal each day. During the first two years of the program, ASSP vehicles were used to transport RUTFs in the form of plumpy nut provided by UNICEF from health zone offices to health centers located in the program health zones for distribution to caregivers of malnourished children.

Community screening. The child nutrition approach aims to have ten RECOs per health area, two nurses from each health center, and one nurse from each maternity receive training. Malnourished children may be identified in health facilities or by RECOs who use middle upper arm circumference measurements to screen children at the community level. The goal was for each RECO to screen 20 children per month, referring those children with a middle upper arm circumference (MUAC) under 125mm to the health center where anthropometric measures were taken by a nurse to determine whether the child was eligible for enrollment. RECOs were expected to enroll two newly eligible children in the program monthly, which program organizers and RECOs believed was a reasonable caseload based on the scheduling of household visits (five visits for each child spaced out at two-week intervals over three months). Initially, there was not a systematic approach employed to ensure that all children living in health areas were screened; rather, the schedule was supposed to be determined by the health area RECOs, head nurse, and partners involved. As a result, program coordinators were unable to ascertain what percentage of children 6-59 months of age were being screened and the frequency of screening. Present changes are being made to try to ensure that all children between 6-59 months of age are screened four times annually.

Those children identified as malnourished by community volunteers were referred to the nearest health center where their health and nutritional status was assessed. Nurses carried out examinations which were supposed to include anthropometric measurements and a physical examination, with nurses responsible for providing medications such as mebendazole, vitamin A, iron, folic acid, and antibiotics as needed. Once a malnourished child was enrolled in the program, the RECO and facility-based nurses were to work with the child caregivers on a variety of skills, including how to plant a mixed garden comprised of perennial and short-term green leafy vegetables and fruit trees, how to prepare an enriched porridge, and when and how much to feed a malnourished child, as well as danger signs to look for as the child is treated.

RECOs were supposed to visit each enrolled child's household five times over a three-month period, which given the enrollment schedule meant they should make ten household visits per month, assuming that two new cases were identified monthly. At the outset of the project, this was determined to be a reasonable amount of time that RECOs could commit to household visits given other work activities (e.g. Water, Sanitation and Hygiene (WASH), family planning, vaccinations, growth monitoring visits, etc.) they were engaged in through the health center. Nurses were also encouraged to visit households of malnourished children whose arm circumference measurement did not increase after two household visits. During household visits, progress information was recorded, including information on relapse, death, and dropout rates, as well as counseling on child feeding and gardening. The nutritional status of other children in the household between 6-59 months of age was also supposed to be assessed. If a child did not improve after two weeks (as determined by upper arm circumference measurements and/or the presence of edema or other illness), the child was referred back to the facility for further evaluation.

Home gardening and nutrition education. The project promoted home gardening as a way to have vegetables and fruits readily available year-round for child feeding or to sell for cash to buy other foods to improve children's diets. Model gardens were supposed to be grown adjacent to the health centers and homes of RECOs, with the project encouraging gardening local vegetables (e.g. amaranth, sweet potato, spinach, red sorrel) as well as non-indigenous plants such as moringa and chaya (a drought-tolerant plant that produces green leaves year-round which are cooked in a similar way to cassava leaves). The project also promotes planting fruit trees such as papaya and avocado. Initially, seeds and cuttings of moringa and chaya were given to the RECOs to plant in the health center and home demonstration gardens. Subsequently, RECOs were supposed to distribute plant seeds and cuttings of moringa and chaya that had been grown locally in the demonstration gardens to caregivers of children enrolled in the approach. As part of the nutrition approach, education sessions on child nutrition were to be carried out by RECOs, perhaps with assistance by nurses, during growth monitoring sessions in the health center. RECOs were also tasked with conducting two demonstrations on how to make an enriched porridge in the homes of families enrolled in the program, with the first demonstration designed to teach the caregiver how to make the porridge and the second to observe and assess whether the caregiver understood how to make the porridge appropriately.

Project monitoring. At the outset of the project, monitoring and evaluation involved supervision of activities by provincial health officials and the zonal community animators (referred to as ACs) and monthly reporting based on the compilation of information collected through individual monitoring forms of malnourished children and RECO registers. Children who did not recover after the three-month period were encouraged to stay in the program. No monitoring was done on children who received program support and recovered from malnutrition.

Training, support, and supervision. Starting in 2013, a series of trainings were carried out across the ASSP target provinces which involved training program implementers, health professionals at the provincial and zonal levels, and facility-based nurses on the approach, followed by subsequent training of RECOs. During the training, RECOs were supposed to receive basic work materials such as counseling tools, registers, monitoring forms, and a bag to carry documents. Gardening tools, which were purchased by the implementing partners and delivered to the health zones responsible for getting the materials to the health area RECOs, were intended to only be distributed at the outset, with the vision that once home gardening was widely accepted, people would use their own gardening tools. Preliminary project activities in Tshopo and Maniema showed that the first group of RECOs recruited and trained did not meet the program selection criteria and were not fulfilling their work responsibilities.

Following “revitalization” of CODESA involvement, which started in the second year of the program and was gradually rolled out across the target provinces, active and new RECOs were identified following a more democratic and rigorous selection process and additional training was conducted including certification of successfully trained RECOs. Other adjustments made in the project approach involved the inclusion and briefing of a RECO coach to oversee RECO routine activities, train RECOs when needed, and provide a link to the health center staff; the training of the MCZ (*Médecin Chef de Zone*) on nutrition activities; the hiring of ASSP-supported AC’s trained in agronomy to carry out visits each trimester to all health areas; and the institution of formative supervision designed to entail a more intensive approach to monitoring of field activities and capacity building of technical skills required of RECOs and health zone staff implementing the approach. More recently, efforts were focused on systematizing screening and engaging community opinion leaders in nutrition activities. Specifically, a more formalized screening approach has been implemented, which involves community mapping to determine the number of children 6-59 months in each village as well as training and engaging local women participating in the *Groupe de Soutien* (support group) ANJE to take MUAC measurements to assist with screening for malnutrition. The revised strategy aims to ensure that every child between 6-59 months is screened four times a year. According to ASSP staff, the nutrition approach is constantly evolving based on field realities and needs.

ASSP activities prior to the baseline survey. According to ASSP’s quarterly reports, prior to the baseline survey the ASSP nutrition team, in conjunction with the National Nutrition Department (PRONANUT) staff, trained a core group of trainers in infant and young child feeding, case management of families with malnourished children, and home gardening. Through a series of trainings, nurses and community relays were then trained by this core group, using a very hands-on approach involving making raised bed gardens, one-on-one counseling during home visits, measuring arm circumference of children, and filling out the case management forms used to track growth. A series of briefings were held to ensure that one relay from each health area thoroughly understood how to complete the home visit forms and would be able to "coach" the other relays in their health area.

ASSP routine nutrition data. ASSP's routine monitoring system reported annual numbers of screenings conducted through the nutrition program, numbers of children referred to the health center for malnutrition, the proxy prevalence rate of malnutrition (referrals/screenings), and the rate at which children who were referred to the health center recovered. This data was disaggregated by health zone. "Malnutrition" and "recovery" were based on MUAC measurement.

In Nord Ubangi, 10.7 percent of screenings were positive for malnutrition. Of these, 65.1 percent recovered, and 34.9 percent did not. Based on their screenings ASSP found the prevalence of malnutrition to be lower in Maniema/Tshopo at 7.4 percent. Overall, among malnourished children identified, nearly 80 percent recovered.

At the beginning of the project, the number of times that individual children were screened was not tracked. Therefore, it is possible that a single child was screened multiple times per year while another child was not screened at all. The system of systematic screening introduced later in the project (with the goal of screening every child four times per year) was not yet operating at the time of the endline survey. The number of children who tested positive who actually presented at a health facility was also not tracked.

ii. Quantitative findings

This section presents findings from the baseline and endline modules on child nutrition status including stunting, wasting, and underweight, as well as breastfeeding indicators such as initiation and prevalence. Dietary diversity is also discussed.

Child nutritional status

In surveyed households, all children under five were weighed, measured, and assessed for the presence of edema, with caretakers' consent. For the purpose of this analysis, only children age 6-59 months were included. Stunting, wasting, underweight rates were calculated. Stunting, or low height-for-age, results from poor nutrition and/or repeated infection in children. Wasting, or low weight-for-height, is an indicator of inadequate nutrition over a relatively short time period. Underweight, calculated as low weight-for-age, encompasses both stunting and wasting.

Figure 6.2 displays the degree of ASSP impact on nutritional outcomes both overall and for subsets of the population (based on sex, wealth, and sampling domain). Results of the sub-analyses show that for all subgroups examined, the ASSP project had either a negative or no impact on the nutritional status of children.

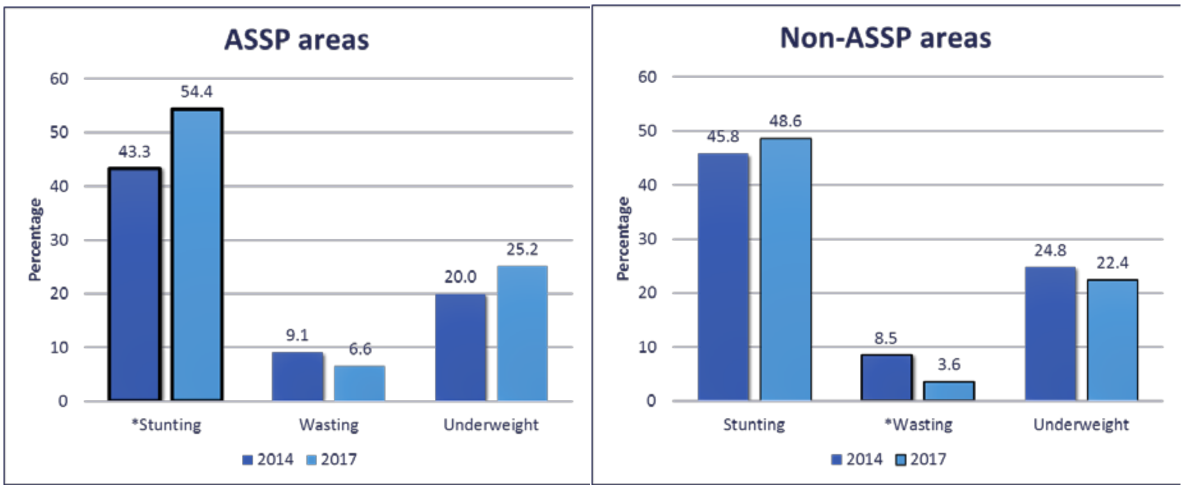
Figure 6.2. Direction of ASSP impact on malnutrition status overall and by subpopulations based on sex, wealth, and sampling domain.

	Stunting	Wasting	Underweight
Overall DID results	Increased	No impact	No impact
Sex			
Female	Increased	No impact	No impact
Male	Increased	Increased	No impact
Wealth quintile			
Low and Low middle	No impact	Increased	No impact
Middle, High-middle, and High	No impact	No change	No impact
Sampling domain			
Nord/Sud Ubangi	No impact	No impact	No impact
Maniema/Tshopo	Increased	No impact	Increased

Notes: Each line represents a fully-adjusted DID probit model. Impact is determined by statistical significance ($p<0.05$). Green shading indicates that the impact was in the desired direction, and orange shading indicates that the impact was in the undesired direction. White shading indicates that no impact was detected.

Figure 6.3 shows the prevalence of stunting, wasting, and underweight at baseline and endline separately for ASSP and non-ASSP areas. Rates of stunting were "very high" across both waves (IPC Global Partners, 2016). Rates of wasting indicated that both ASSP and non-ASSP areas were experiencing moderate/borderline food insecurity at baseline and endline, although rates decreased in both areas (IPC Global Partners, 2016).

Figure 6.3. Prevalence of stunting, wasting, and underweight among children age 6-59 months in ASSP and non-ASSP areas by year.



*Difference between 2014 and 2017 levels is statistically significant at p<0.05.

Stunting

Results of the fully adjusted difference-in-difference model (Table 6.1) showed that after controlling for relevant variables, rates of **stunting** increased significantly more in ASSP areas than in non-ASSP areas. Household-level characteristics that appeared to be protective against stunting belonged to the highest wealth quintile and non-ownership of agricultural land. Protective child-level characteristics included being female, younger, and larger size at birth. Maternal characteristics that appeared to be protective against stunting were education (primary or higher) and maternal age (35-49 years). The project resulted in worsened rates of stunting for both subgroups of females and males (Tables 6.2 and 6.3), for those in the two poorest wealth quintiles (Table 6.4), and for those in Maniema/Tshopo (Table 6.7) (Figure 6.2).

Table 6.8 displays the prevalence of stunting by selected characteristics at baseline and endline within ASSP and non-ASSP areas. Overall, rates of **s**tunting increased significantly in ASSP areas. Stunting also increased in non-ASSP areas; however, this change was not statistically significant. At baseline in ASSP areas, the prevalence of stunting was higher in Nord Ubangi than Maniema/Tshopo. However, by endline, the prevalence of stunting in Maniema/Tshopo had increased significantly while Nord/Sud Ubangi stayed relatively stable. At endline, the prevalence of stunting in ASSP areas was higher in Maniema/Tshopo than in Nord Ubangi. Rates of stunting decreased significantly in non-ASSP areas of Maniema/Tshopo.

The majority of the increase in stunting in ASSP areas occurred in rural areas, where stunting increased from 44.1 percent to 56.2 percent. Further, rates of stunting increased for both males and females within ASSP areas. Although males exhibited higher rates of stunting at both baseline and endline (49.9

Key Points

- Rates of stunting increased significantly in ASSP areas compared with non-ASSP areas ($p<0.05$).
- Overall rates of wasting and underweight did not change significantly in ASSP areas.
- For all subgroups examined, the ASSP project had a negative or no impact on the nutritional status of children.
- Stunting and wasting have worsened in Maniema/Tshopo since 2014.

percent and 56.3 percent, respectively), by endline females had nearly closed the gap, increasing from a prevalence of 36.4 percent to 52.5 percent.

Wasting

The fully adjusted model (Table 6.9) did not detect a significant impact of the ASSP project on rates of **wasting**. Household-level characteristics that appeared to protect against wasting included being located in Nord/Sud Ubangi or in an area in which the World Bank-supported Performance Based Financing (PBF). In terms of child-level characteristics, larger size at birth was associated with a lower probability of wasting. Ascending age also appeared to be associated with a lower probability of wasting with the exception of the oldest age bracket (48-59 months) which was more likely than the next-oldest age bracket to experience wasting. The sex of the child did not appear to have an impact, nor did the maternal characteristics included in the model. The project worsened rates of wasting for the subgroup of those in the poorest wealth quintiles (Table 6.12 and Figure 6.2).

Overall, rates of wasting decreased in both ASSP and non-ASSP areas but the change was only significant in non-ASSP areas. Table 6.16 shows the prevalence of wasting by selected characteristics. ASSP areas did not experience significant changes in rates of wasting within Nord Ubangi or Maniema/Tshopo or in rural or peri-urban areas. Rates of wasting decreased significantly in the non-ASSP areas of Maniema/Tshopo and in rural areas. There were no significant changes within the subsets of males or females in ASSP areas. In non-ASSP areas, the prevalence of wasting decreased within both sexes, although it decreased more for females.

Underweight

Again, results of the fully adjusted difference-in-difference model (Table 6.17) did not show that ASSP had a significant impact on the prevalence of **underweight**. Children in Maniema/Tshopo had a higher probability of experiencing underweight, as did male children and older children. Higher birth weight appeared protective against underweight, as did having a mother who had completed secondary school compared to those with no formal education. The ASSP project worsened rates of underweight in Maniema/Tshopo (Table 6.23 and Figure 6.2).

Overall, underweight rates did not change significantly in either ASSP or non-ASSP areas between baseline and endline. Table 6.24 shows the prevalence of underweight by selected characteristics. There was no change in underweight rates within ASSP areas in Nord Ubangi between baseline and endline; however, underweight rates increased significantly in ASSP areas of Maniema/Tshopo. As was the case with stunting, underweight was higher in Nord Ubangi at baseline, but higher in Maniema/Tshopo at endline in ASSP-supported areas. Underweight decreased significantly in non-ASSP areas of Maniema/Tshopo, while non-ASSP areas in Nord/Sud Ubangi did not experience significant differences in underweight. In contrast to the findings on stunting, there were no significant changes in peri-urban or rural areas in either ASSP or non-ASSP areas. The prevalence of underweight increased in both males and females in ASSP areas, although only the change in females was significant. There was no significant change by sex in non-ASSP areas.

Middle-Upper Arm Circumference

MUAC was measured at endline only. Overall, the prevalence of a MUAC of 12.5 cm or less was 15 percent in ASSP areas. The prevalence was 10.3 percent in ASSP areas Nord Ubangi and 17.5 percent in Maniema/Tshopo. This compared with an overall prevalence of 12.1 percent in non-ASSP areas (13.1 percent in Sud Ubangi and 8.7 Maniema/Tshopo). There were no significant differences between ASSP and non-ASSP areas with regards to MUAC at endline.

Robustness checks

The baseline and endline surveys were conducted in different months, creating the potential that differences due to the seasonality of malnutrition indicators may influence the results of the impact evaluation. This was primarily a concern in southern Maniema, which experienced the rainy season during the baseline survey and the dry season at endline. Therefore, the endline prevalence of stunting, wasting, and underweight was compared between ASSP areas of northern and southern Maniema. There were no significant differences in any of the three malnutrition indicators between the rainy northern region and the dry southern region of Maniema (results not shown).

As a robustness check, the difference-in-difference models for stunting, wasting, and underweight were estimated with the inclusion of a variable indicating the straight-line distance between the child's household and the nearest governmental health facility. There were no changes in the direction or significance of the impact of ASSP in any of the models, and the distance variable was never significant. There were also no significant differences in children's distance to the health facility between ASSP and non-ASSP areas at baseline or endline (results not shown).

Child feeding practices

Mothers were asked to report the types of foods and liquids (apart from breastmilk) that each of her children under five living with her in the household consumed during the day and night preceding the module. These foods were categorized into seven food groups: 1) grains, roots, and tubers, 2) legumes and nuts, 3) dairy products, 4) flesh foods, 5) eggs, 6) vitamin-A rich fruits and vegetables, and 7) other fruits and vegetables (*Indicators for assessing infant and young child feeding practices*, 2010). ASSP's impact on three indicators, minimum dietary diversity, minimum meal frequency, and minimum acceptable diet was assessed. Figure 6.3 displays the degree of the impact of ASSP on child feeding practices both overall and for subsets of the population (based on sex, wealth, and sampling domain).

Results of the sub-analyses show that for subgroups based on sex and wealth, the ASSP project had no impact on child feeding practices. ASSP's impact in Nord Ubangi was positive and its impact in Maniema/Tshopo was negative.

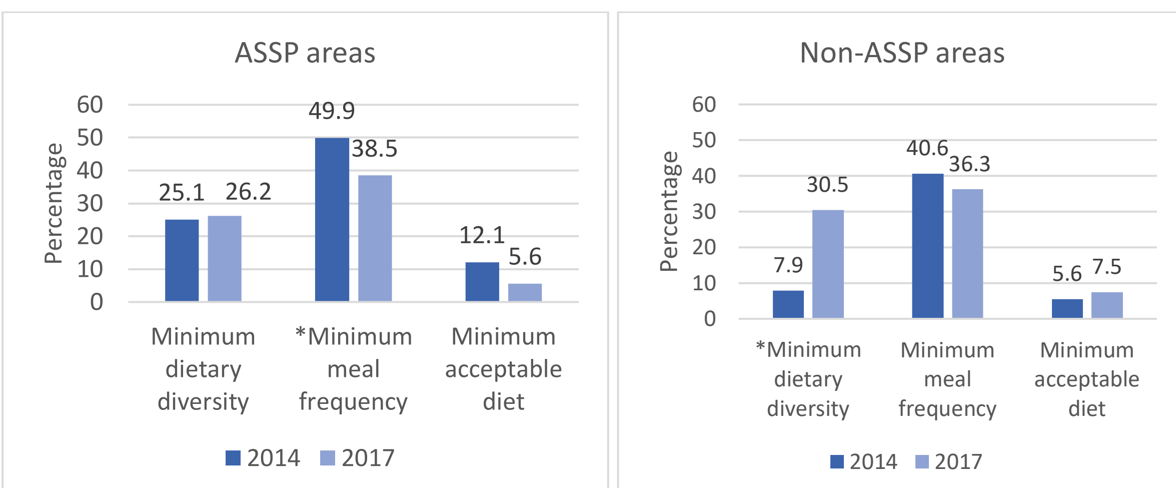
Figure 6.3. Direction of ASSP impact on malnutrition status overall and by subpopulations based on sex, wealth, and sampling domain.

	Minimum dietary diversity	Minimum meal frequency	Minimum acceptable diet
Overall DID results	No impact	No impact	No impact
Sex			
Female	No impact	No impact	No impact
Male	No impact	No impact	No impact
Wealth quintile			
Low and Low middle	No impact	No impact	No impact
Middle, High-middle, and High	No impact	No impact	No impact
Sampling domain			
Nord/Sud Ubangi	No impact	No impact	Increased
Maniema/Tshopo	No impact	No impact	Decreased

Notes: Each line represents a fully-adjusted DID probit model. Impact is determined by statistical significance ($p<0.05$). Green shading indicates that the impact was in the desired direction, and orange shading indicates that the impact was in the undesired direction. White shading indicates that no impact was detected.

Figure 6.4 shows the overall rates of child feeding practices at baseline and endline in ASSP and non-ASSP areas.

Figure 6.4. Prevalence of child feeding practices among children age 6-23 months in ASSP and non-ASSP areas by year.



*Difference between 2014 and 2017 levels is statistically significant at $p<0.05$.

Minimum dietary diversity (MDD) is defined as the proportion of children age 6-23 months who received foods from four or more food groups (*Indicators for assessing infant and young child feeding practices*, 2010). Results of the fully specified models did not detect a program impact on achievement of MDD (Table 6.25). Overall, the achievement of MDD was associated with living in Nord/Sud Ubangi, living in urban areas, living in a household in the high-middle or high wealth quintile, and living in a World Bank-supported health zone. Being age 12-23 months, having a mother in the highest maternal age bracket, and having a mother who reported being married or in a partnership were associated with achievement of MDD. Sub-analyses did not detect ASSP impact within individual sexes, wealth groups, or sampling domains (Tables 6.26-6.31).

Key Points

- Three in four children under five do not have a minimum dietary diversity. There was no significant change in this indicator.
- Minimum meal frequency declined significantly in ASSP areas.
- There was no significant change in minimum acceptable diets in ASSP or non-ASSP areas.

In ASSP areas, approximately one in four children achieve MDD. The proportion of children achieving MDD did not change significantly between baseline and endline in ASSP areas. MDD improved significantly in non-ASSP areas. Table 6.32 shows the prevalence of MDD in ASSP and non-ASSP areas by selected characteristics. In ASSP areas, approximately one in four children achieved minimum dietary diversity.

Minimum meal frequency (MMF) is the “proportion of breastfed and non-breastfed children 6-23 months of age who receive solid, semi-solid, or soft foods (but also including milk feeds for non-breastfed children) the minimum number of times or more.” For breastfed children, the minimum number of times is two for those age 6-8 months, and three for those age 9-23 months. For children who are not currently breastfeeding, the minimum number of times is four, regardless of age (*Indicators for assessing infant and young child feeding practices*, 2010).

The fully adjusted model (Table 6.33) did not show a significant ASSP project impact on this indicator. Children age 6-12 months and those living in households with five or more children under five were significantly more likely to achieve MMF. Sub-analyses did not detect ASSP impact within individual sexes, wealth groups, or sampling domains (Tables 6.34-6.39). Table 6.4 shows the prevalence of MMF in ASSP and non-ASSP areas by selected characteristics. Overall, the proportion of children receiving the MMF decreased significantly in ASSP areas (49.9 percent to 38.5 percent). There was no significant change in MMF in non-ASSP areas.

Minimum acceptable diet (MAD) is a measure of children who achieve both minimum dietary diversity and minimum meal frequency in the 24 hours prior to the module. Among children not currently breastfed, it also involves two milk feedings during those 24 hours. Overall, proportions of children with a MAD were low (Figure 6.4). One of the key drivers of these low rates appeared to be a lack of supplemental milk feedings for non-breastfed children (results not shown). There were no significant changes in rates of MAD in either ASSP or non-ASSP areas. Table 6.48 shows the prevalence of MAD in

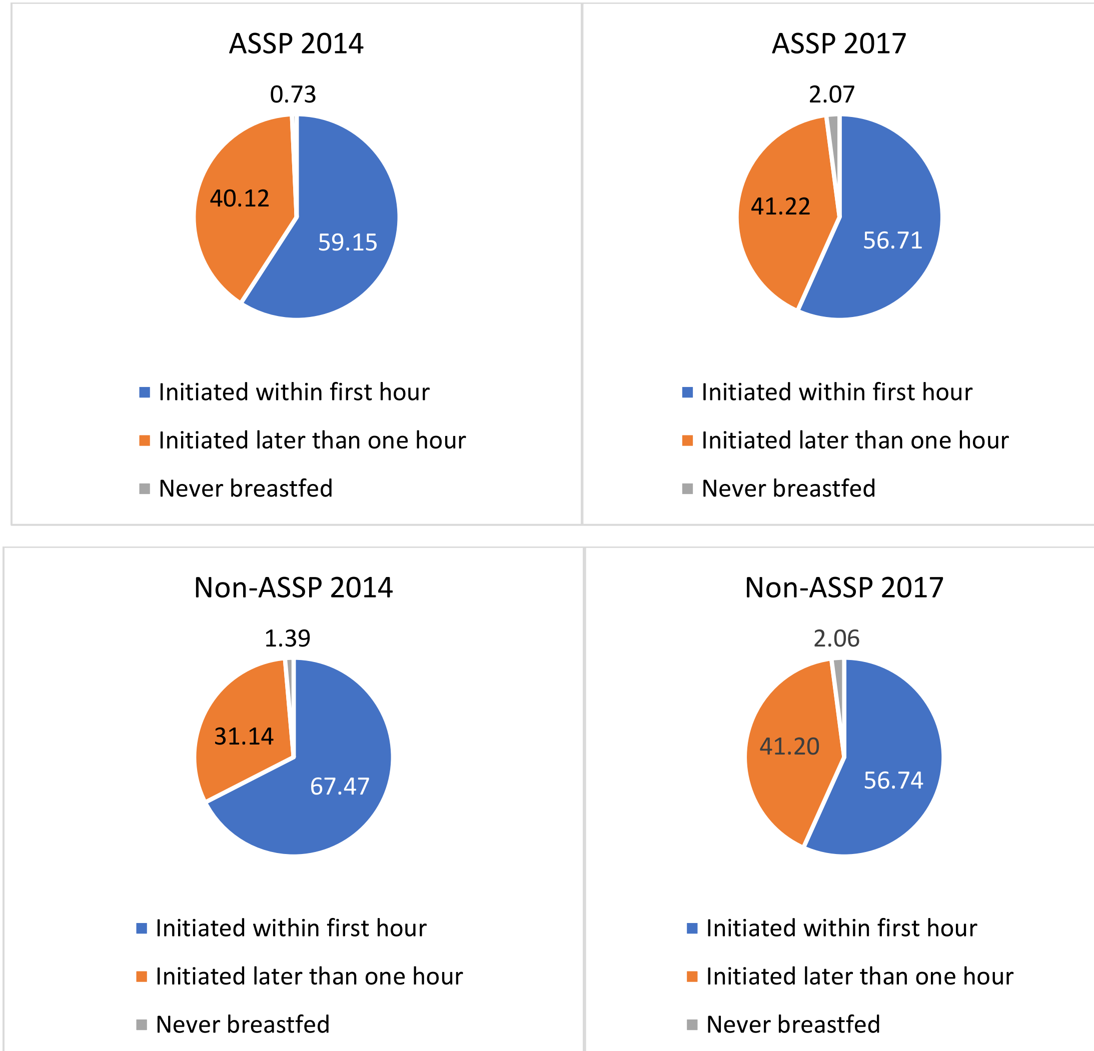
ASSP and non-ASSP areas by selected characteristics. The fully adjusted model (Table 6.41) did not detect an ASSP project impact. Overall, living in Nord/Sud Ubangi and being female were positively associated with achievement of a MAD.

Breastfeeding

The World Health Organization advises that exclusive breastfeeding for the first six months of life promotes the health of the infant by providing adequate nutrition and antibodies, and for the health of the mother through the reduction of the risk of uterine bleeding after birth, as well as ovarian cancer ("Breastfeeding", 2018). Early initiation (within the first hour of a child's life) of breastfeeding is important for both mother and child. Breast milk is high in nutritional value, and the breast milk produced in the first few days after delivery (colostrum) is rich in antibodies that can provide the infant with natural immunity (Ministère du Plan et Suivi de la Mise en oeuvre de la Révolution de la Modernité, 2014).

Women who had given birth in the two years preceding the module were asked whether they breastfed their youngest living child and if so, how long after giving birth they initiated breastfeeding. The vast majority of women (>97 percent) reported breastfeeding their child at both baseline and endline, and there were no significant changes in the prevalence of breastfeeding between baseline and endline in either ASSP or non-ASSP areas. Similarly, rates of initiating breastfeeding within the first hour of birth did not change significantly in either ASSP or non-ASSP areas. Figure 6.5 illustrates the differences in prevalence and timing of breastfeeding at baseline and endline.

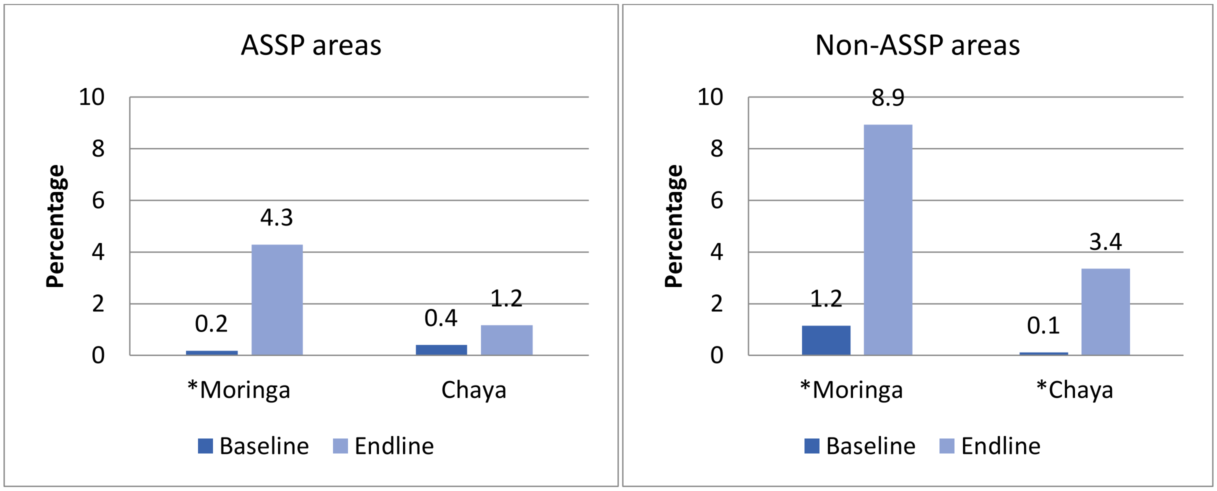
Figure 6.5. Timing of breastfeeding of youngest child born within two years preceding the module, ASSP and non-ASSP areas.



Non-indigenous crops

An emphasis of the ASSP project's nutrition strategy was the introduction of moringa and chaya. Therefore, heads of households who reported having a home garden were asked whether they were cultivating these crops. Both crops were quite rare at baseline. The prevalence of moringa in home gardens increased significantly in both ASSP and non-ASSP areas; while not statistically significant, an increase in the prevalence of chaya was also observed (Figure 6.5). The prevalence of chaya did not change significantly in ASSP areas, but did increase in non-ASSP areas. Overall, the presence of both crops was low; less than two percent of gardens had moringa and less than one percent of gardens had chaya.

Figure 6.5. Prevalence of moringa and chaya cultivation in home gardens in ASSP and non-ASSP areas by year.



*Difference between 2014 and 2017 levels is statistically significant at $p<0.05$.

iii. Qualitative findings

Qualitative research was carried out in the provinces of Nord Ubangi and Maniema between November and December 2017 in ASSP program health zones. In conjunction with ASSP program managers, we identified one high-performing (where child nutrition indicators had improved) and one low-performing (where child nutrition indicators had decreased) health zones according to changes that took place during the course of the ASSP intervention. Data collection was carried out in one health area in each of the four zones. A mix of qualitative methods was employed by two research teams each comprised of one supervisor and three research assistants to collect information from people involved in the implementation and beneficiaries of the project. Methods included key informant interviews with health officials and program implementers working at the national, provincial, and zonal levels (n=15); these included in-depth interviews with facility-based service providers (n=6) and RECOs involved in implementing child nutrition activities (n=8) and in-depth interviews with caregivers of malnourished children enrolled in ASSP child nutrition activities within the last six months (n=10).

Key Informants and Health Worker In-depth Interview Respondents

Implementation across the research sites

Due to the high attrition rates, particularly among the RECOs, many health area level study respondents had not participated in the early phases of project implementation. Those who had participated reported separate training of nurses (generally one per health center) and RECOs, with topics focusing on screening of malnourished children, identifying signs and symptoms of malnutrition, home gardening, child feeding, how to make an enriched porridge, reporting of nutrition activities, and for the health workers, how to handle acute and serious cases of malnutrition. Many perceived the initial training to be highly theoretical, with some RECOs complaining that the trainers led sessions in French, and they were therefore unable to fully understand the content. Although the training included orientation on proper procedures to carry out monitoring, completing the monitoring forms was consistently reported as a challenge.

High turnover of health workers was attributed to the transfer of facility-based nurses to other areas and lack of RECOs' motivation, who we were told originally agreed to participate based on the assumption that they would be remunerated. There were also reports of female RECOs who married and left the health area. As a result, activities had to be carried out with fewer than 10 RECOs per health area (study areas reported between 2-7 RECOs). In 2017, additional training led by the ASSP ACs was conducted to orient RECOs previously involved in the approach and train new recruits. This additional training was perceived as both informative and practical, permitting the health areas to increase the number of formally trained RECOs working on nutrition activities. In two of the four health areas studied, none of the health center nurses had received formal training on the nutrition approach. Since nurses' trainings only occurred at the beginning of the project, if trained nurses left the health area their replacements did not receive any training and therefore would not be familiar with the approach.

Nutrition activities were implemented in early 2014 shortly after training, which first involved training trainers followed by training nurses and RECOs. In Maniema, meetings designed to sensitize community members about the approach were reported to take place during the early phases of implementation. At the time of the study, activities entailed community screening of malnourished children, with most RECOs reporting screening 20 children and identifying 1-3 new cases eligible for enrollment once a month. While most RECOs indicated that children eligible for additional health center level screening should have an upper arm circumference measurement under 12.5 cm., nurses were not clear about the cut-off. Once identified, parents who agreed to take their children to the health center where a physical examination and anthropometric measurements were taken to confirm that the child was eligible for enrollment. We were told that some parents refused to go to the health center due to time constraints or distance, but the number of refusals was not monitored. Malnourished children were also identified in the health center, particularly during growth monitoring sessions. During the initial examination, the provision of medications to children appeared to be variable, with nurses reporting that the drugs supposed to be provided were not always available. Health workers reported frequent stock-outs or not always receiving all of the medications they ordered through the project. While severely malnourished children were referred to a reference center or hospital, we were told that plumpy nut and therapeutic milk is often not available in the reference facilities; parents are responsible for transport, though it was not always possible for them due to the cost. In Maniema, health official and providers said that children sent to the reference hospital frequently die.

During the initial stages of the project, malnourished children were given plumpy nut in the health centers weekly, but in three of the four research sites this had been discontinued. The final site had refugees and thus the health center received regular plumpy nut and maize flour for distribution to malnourished children. Several of the health workers claimed that it was difficult for caregivers to obtain ingredients to make an enriched porridge and that recovery from malnutrition is more successful when plumpy nut is available.

If the child was deemed moderately malnourished and eligible for enrollment, health personnel reported that they completed a child monitoring form and provide initial information to caregivers on the ASSP approach. Once enrolled, the frequency of household visits varied across the sites, with some RECOs claiming to follow the official two-week schedule, while others either carried out more (2-4 times a month) and some, less frequent (one head nurse advised RECOs to only visit “negligent” parents regularly) visits. During visits, RECOs reported assessing the child’s nutritional status and counseling parents on appropriate feeding practices according to the age and needs of the young children; as part of the approach, they instructed parents on how to make different types of enriched porridge using locally available protein-rich ingredients, or for older children, promoted vegetable-based dishes, advocating for a balanced diet utilizing four food groups. Household visits continued up to three months after enrollment. An ongoing difficulty was finding caregivers, who spend much time away from the household, at home. It was not clear what is done for children who do not recover from malnutrition during the three-month enrollment period.

In three sites, home gardens were not planted, with respondents from the two sites in Nord Ubangi claiming that gardening was not possible during the dry season which was ongoing during data collection; in these sites, RECOs were no longer promoting home gardens. Interestingly, many respondents reported that stigma is attached to families with malnourished children, which may dissuade people from planting home gardens. Only one health center maintained a garden; both of the RECOs interviewed in this health area also had home gardens. In all of the other health areas, we were told that the health center garden was abandoned and none of the RECOs had a home garden. We identified one moringa tree in two sites, four in one site, and none in the final health area; chaya was not found in any of the research areas.

In regard to materials, each RECO received gardening tools including one spade, rake, and watering can subsequent to the original training. Across all sites, respondents complained that the tools were insufficient and of poor quality, breaking quickly. Some seeds were distributed after the first training, but respondents claimed they were either insufficient, infiltrated with bugs, or had expired and did not germinate, or that the seeds conserved after the initial harvest did not grow. As a result, families were encouraged to plant local seeds. Some areas did not receive moringa seeds until recently and others claimed that most of the moringa seeds did not germinate; chaya cuttings were either never received or dry and did not produce plants. RECOs reported receiving arm circumference bands, a notebook (used as the register), a pen or pencil, folders, counseling guides, and monitoring forms, but in one health area they had run out of monitoring forms. None of the health area RECOs received bags to carry their work materials or identification badges to distinguish themselves from other inhabitants, which they perceived as disappointing. Nurses were given training modules and a height measurement board.

RECOs held monthly meetings during which monitoring data was compiled and the status of nutrition activities may have been discussed. Monthly reports were submitted to the head nurse and sent to the central health zone office and entered into the computerized database. Provincial-level DPS and Pronaunut staff in Maniema and Nord Ubangi claimed that some monthly nutrition reports were not regularly received. Several respondents reported that RECOs have problems completing the registers and child monitoring forms correctly, and Interchurch Medical Assistance (IMA) staff admitted that the data quality needed improvement. RECOs indicated that they did not receive feedback on monthly reports or interact with zonal staff.

We were told that the head nurse was responsible for supervising the RECO coach and the RECO coach supervised RECO field activities. Zonal supervisory visits were carried out monthly or every two months during which health facility records, including those related to the nutrition approach, were reviewed; however, these supervisions did not involve interactions with community health workers. In Nord Ubangi, visits from the ASSP AC appeared to be carried out every three months. Supervisions by other provincial staff were not reported. In Maniema, the health areas reported receiving multiple visits by health officials working at the provincial level; however, Ministry of Health's National Nutrition Department staff did not participate in these supervisions. In Maniema, health area respondents claimed that trimester or bi-annual visits were carried out by the ASSP AC, which may have involved other activities such as training or community meetings. In both provinces, zonal ACs did not accompany the IMA AC during supervisory visits claiming they lacked transport. Respondents complained that supervisors other than the ASSP ACs failed to spend time in the communities and thus were unable to get an accurate assessment of activities. It was also mentioned that during visits, promises were often made about provision of materials that were never fulfilled.

We were told that educational sessions on child malnutrition and appropriate feeding practices were conducted during prenatal care and growth monitoring sessions (*Consultation Pre-Scolaire*, or CPS); only one respondent claimed to lead support group meetings. Mother and child campaigns were not reported. The hotline was available in three of four sites; across sites, respondents universally reported that the hotline was never used.

Perceptions of the project

Respondents generally felt that nutrition counseling improved caregivers' understandings of child nutrition and appropriate age-specific feeding practices, albeit only reaching a small percentage of the population. Several maintained that nutrition counseling alone could not make a major difference in rates of malnutrition, and while gardening was perceived as a strong approach theoretically, they admitted that it had failed. Nurses claimed that the project had not reached its objectives, with most stating that malnutrition persists as a major problem. However, references to rates of malnutrition were based on anecdotal evidence and not data. Key informant interviews at the zonal and provincial levels suggested that the data collected was not reviewed by health officials. In Nord Ubangi, respondents were particularly negative about the approach, citing many impediments to implementation. The general consensus was that few community members were actually subscribing to the nutrition strategy, which respondents contended failed to provide the assistance needed for malnourished children to recover. Respondents raised many weaknesses in the approach, including the following:

Project inception • No formative research or piloting of the nutrition activities; the approach did not coincide with the community needs. *"I would only like to ask the authorities not to plan activities from a distance, it would be better to come first to the field to understand the details and reality in communities instead of planning everything at the national or provincial level. It's like a project that has just been thrown at us…. That's the problem we have, the authorities just bring us projects that do not take into account the needs of the community." (RECO respondent)*
Project implementation • The project repeatedly failed to deliver promised materials such as cuttings, seeds, badges, and bags • Supervisor visits are infrequent and most often limited to the health center
RECOS • RECOs are not remunerated, causing high turnover; other projects pay RECOs • Lack of other incentives (no identification, inadequate materials) limit RECO motivation • RECOs have not received adequate training, causing deficiencies in the approach • Inadequate numbers of RECOs handicap the work; RECOs are often required to cover more than one village necessitating that they travel long distances and work in sites where they are not known and may not be accepted
Health workers • Little financial incentive for facility health workers, who receive limited pay, to get involved in nutrition activities • Few facility-based workers were trained in nutrition activities; as a result, health worker personnel had limited understanding of activities
Treatment of malnutrition • The approach does not provide therapeutic foods for severely malnourished children • Community members have difficulties buying ingredients recommended for enriched porridge • Plumpy nut is more acceptable and effective in treatment of malnutrition
Outreach • Community members still do not understand malnutrition • Mothers are difficult to reach in their households • Limited efforts are made to target fathers of young children
Home gardening • Gardening materials distributed were of poor quality and inadequate, diminishing interest in gardening • Water is not easily accessible during the dry season (Nord Ubangi) • Domestic animals get into the gardens • Community members are accustomed to gardening in their fields where they spend the day; home gardening leads to additional work • Some of the vegetables promoted (moringa and chaya) are foreign to the community and would not necessarily be accepted for consumption • Local vegetables proposed for home gardens are already available and not appropriate for porridge • Residents did not understand the need to conserve seeds for future planting

Recommendations/solutions to guide future activities

There was agreement that RECOs should be compensated, with respondents suggesting that only if RECOs were remunerated would the project succeed. Across sites, respondents underlined the need for increased training to motivate RECOs and improve their understanding of the child nutrition activities; the provision of sufficient and quality gardening materials; and the distribution of basic materials such as a badge and bag to boost RECO morale. Other specific recommendations included that the project be tailored to local needs and contexts, therapeutic foods be available for severely malnourished children, supervisors interact more with community members, and community leaders be better engaged.

Caregivers of Malnourished Children

Participation in project activities

Most children were identified by RECOs 1-3 months prior to the interview during household visits and subsequently sent to a health facility for enrollment. Several children were being cared for by their grandmothers. Caregiver respondents indicated that community members perceived parents of malnourished children to be irresponsible and that stigma is attached to these families.

While all children were examined by health personnel, in one site the health workers did not take anthropometric measures to confirm that the child's nutritional status. During the health center visit, personnel were reported to provide medications and counseling on child feeding, including how to make an enriched porridge. In the site where plumpy nut was distributed, nutrition activities and counseling revolved around obtaining and feeding the young child plumpy nut, with respondents claiming never to have received information on gardening. Most caregivers living in the other sites asserted that they had received frequent household visits by the RECOs who were reported to measure the child's arm circumference, inquire what foods the child was receiving, provide information on child feeding and porridge preparation, and promote gardening. Only two respondents mentioned that a porridge demonstration was carried out in their homes; training or demonstrations on gardening were not conducted. One grandmother maintained that she had never received counseling from the RECO, indicating that she works during the day and the RECO had only interacted with the child's maternal aunt when making household visits.

Across three sites, only two caregivers had a home garden at the time of the study; one only grew eggplant, claiming eggplant was not consumed by pigs which infiltrate gardens, and the second only planted sweet potato, which she sold to buy other foods. Explanations for limited gardening included lack of access to water, limited space next to their home, difficulties in keeping domestic animals out of home gardens, lack of seeds and gardening materials, and time constraints, with many caregivers indicating that they spend their days farming and the local practice is to plant a garden in the agricultural fields. None of the caregivers were aware of or had ever participated in a support group for breastfeeding mothers or for mothers of malnourished children.

Caregiver perceptions

While caregivers appreciated what they had learned through nutrition counseling, many expressed frustrations that the project did not provide more assistance with respondents mentioning plumpy nut, as well as seeds and other gardening materials to enable them to follow the counseling messages. In the one site (peri-urban area) where respondents were more positive about the project benefits, caregivers mentioned that the RECOs provided them with hope, which served as a motivation to follow the recommended feeding practices. Those caregivers who incurred big bills for expenses related to treatment of the malnourished children lamented that the health center did not maintain the appropriate drugs and they therefore had to purchase medications. Respondents in Nord Ubangi claimed that it was impossible to garden during the dry season; overall, gardening was not perceived as beneficial, with respondents highlighting the many challenges to maintaining a successful garden. Many caregivers also stated that it was difficult to follow the child feeding recommendations, particularly related to the preparation of an enriched porridge, due to lack of money. Caregivers living in the area where plumpy nut and maize flour were provided were generally positive about the assistance received, despite complaints that they often did not receive the recommended quantity.

We received mixed reports in regard to changes in the child's health status, with some caregivers claiming that changed feeding practices were helping their child regain his or her health, while others expressed disappointment that the health center did not have good solutions to reverse malnutrition. In the peri-urban site, respondents were more positive, with all stating that ASSP activities (e.g. nutritional counseling, provision of medications, RECO assurances) had led to improvements in the child's health and nutritional status.

iv. Limitations

Timing of baseline survey: The baseline survey was administered after ASSP project activities had begun. However, in the arena of nutrition, no community-based activities appeared to have been carried out in survey areas. One would not expect the nutrition outcomes assessed in this chapter to be impacted.

Seasonality: Patterns of child malnutrition are seasonal, so it cannot be ruled out that the fact that the baseline and endline surveys occurred in different months impacted the results. An analysis of rates of stunting, wasting, and underweight in northern Maniema, which was rainy at endline, and southern Maniema, which was dry, did not detect significant differences. It is difficult to ascertain the direction of the potential seasonality bias without longitudinal malnutrition data from these regions, as the impact of season may vary based on climate, variation in disease prevalence, types of crops grown, prevalence of agriculture as a food source, the economic status of the region, and other factors.

Service interruptions: As the community education, screenings and home visits were not reliant on ASSP funding once trained occurred and the approach was launched, it is not expected that the project's service interruptions impacted rates of malnutrition or child feeding practices. The provision of medicines and supplements to malnourished children at health facilities may have been impacted; medication stock-outs are discussed in Chapter 8. The introduction of moringa and chaya and the home gardening practices may have slowed due to the interruption in funding; however, routine data on these activities was not available. ASSP's routine data, presented in the Year 5 Quarter 2 report, did show that overall the project exceeded its targets for the number of children who were identified as malnourished and who received five home visits during the first two quarters of Year 5 (i.e. during the service interruption). However, Maniema was at 61 percent of its target and Tshopo was at 75 percent in the second quarter. (The results from Nord Ubangi were not provided in the quarterly report.)

Power to detect differences in outcomes: As described in Chapter 2, the analysis was powered to detect differences among children under five overall. It was not powered to detect differences between subgroups. Nevertheless, some differences in the sub-analyses were found.

v. Discussion

This chapter describes the performance of the ASSP project relative to its goal of improving child health through increased access to nutritious food and providing treatment for those who are malnourished. Overall, findings from the household module indicate that rates of malnutrition not only did not improve significantly in ASSP or non-ASSP areas but are in fact at emergency levels. While malnutrition is typically worse in boys, for some indicators the gender gap has narrowed. Rates of stunting have increased significantly in ASSP areas relative to non-ASSP areas, particularly in rural settings. The nutrition situation in Maniema/Tshopo in particular has worsened. The reasons for this are likely complex but may include both difficulties in the implementation of the approach and weaknesses of the approach itself. The approach would benefit from formative research focused on community perceptions and needs, and pilot testing.

The qualitative analysis identified difficulties in implementing ASSP's nutrition approach, the impacts of which were seen in the quantitative findings. The project promoted enriched porridge; however, the caregivers interviewed were not making the time to prepare it due to time and financial constraints. Dietary diversity did not improve; although RECOs reported stressing the importance of children eating at least four food groups, none of the mothers of malnourished children reported receiving this information. In fact, the rates at which children achieved minimum meal frequency worsened. RECOs were trained to advise adding an extra meal to malnourished children's diets, but none of the staff or mothers mentioned this message. Overall, findings suggest that RECOS, the backbone of the nutrition approach, did not perform as hoped. This may be attributed to the fact that RECOs struggled to understand the content of trainings conducted in French, exhibited high levels of attrition, particularly early in the project, and reported being under-motivated by the lack of supervision, compensation, and supplies. Further, the approach's reliance on volunteer RECOS and on health facilities providing nutrition services which do not generate revenue, particularly in this resource-poor setting, appears to be limiting its effectiveness. Overall, the approach required that caregivers of small children make changes to child feeding practices which would likely not be successful without support from a strong behavioral change framework based on formative research in the local context.

The home gardens, which respondents thought were a good idea in principle, fell short of their potential. Women explained that it was difficult to have a garden at home due to the fact that they spend their days in the agricultural fields, livestock ruins the gardens, water is not always accessible, and gardening creates extra work. Relocating gardens to be adjacent to agricultural fields could mitigate these difficulties. Additionally, there were reports of stigma associated with having a malnourished child and therefore a home garden. Moving the gardens to the agricultural fields and encouraging all households to garden as a strategy to prevent malnutrition could be beneficial. However, any new approach should be informed by communities and health workers and pilot-tested prior to mass implementation.

There was evidence of success in some respects. The project, particularly the home gardening, appeared to be better received in peri-urban areas. Finally, the prevalence of moringa increased over the course of the project. While moringa is not currently prevalent, it may have the potential to become more widespread. Research into the extent to which moringa and chaya are acceptable as food or an addition to porridge across the project areas would inform efforts to introduce these non-indigenous crops.

ASSP's approach was to identify and treat cases of malnourishment, defined as having MUAC measurements under 12.5 cm. MUAC correlates to some extent with stunting and wasting. However, these types of impacts were not observed in the quantitative data, and qualitative findings suggested that service providers and community members still considered malnutrition a significant problem in 2017. Further, ASSP's routine data did not track the intervention coverage (i.e. the percentage of all children who were screened and/or malnourished), the percentage of those identified as malnourished who sought care, and did not track individual children over time. Children who were screened multiple times and/or who experienced recurrent cases of malnutrition would therefore appear multiple times in the routine data's prevalence and recovery data, potentially overstating the project's impact. The home gardening strategy would have prevented recurrent cases of malnutrition or clusters of malnutrition within families; however, it remains that the small numbers of children living in households that started a home garden would be unlikely to make significant change in population-level malnutrition prevalence.

The level of malnutrition in project areas and particularly the trend in Maniema is alarming. As ASSP's nutrition activities in the community had not yet begun when the baseline was conducted, this type of contamination can be ruled out as an explanation for the decline. The baseline rates were comparable to those found in the 2013/14 Demographic and Health Survey, lending credence to the conclusion that malnutrition is worsening.[1] This conclusion is also supported by a 2018 assessment by IPC Global Partners that found that 22 percent of the population of Maniema were experiencing crisis or emergency levels of malnutrition.

Although the nutrition situation is worsening nationwide, the evaluation found that the ASSP project significantly increased levels of stunting, specifically in Maniema. This may be explained by differences between ASSP and the predecessor project. If the predecessor project took a humanitarian approach

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[1] One exception is the estimate of wasting at 22.7 percent in Maniema/Tshopo, which is likely an anomaly in the DHS data.

that included the provision of food, it would be plausible that malnutrition would increase when ASSP, which did not provide food, was implemented. ASSP's approach of identifying and treating cases of malnutrition would not be expected to decrease the prevalence of stunting, as children who are stunted do not typically recover the lost height. Nord Ubangi, in contrast, had not had a predecessor project. Therefore, as was indeed observed in the data, one would not expect ASSP to have an adverse impact on malnutrition. In fact, the ASSP project significantly improved rates of children receiving a minimum acceptable diet in Nord Ubangi. More careful analysis of the differences between prior strategies and ASSP interventions in Maniema is urgently needed to ensure that future programs are tailored to the situation in that region.

Anthropometric indicators capture the multi-factor determinants of nutritional status. Morbidity and dietary intake are the immediate determinants of stunting, wasting, and global acute malnutrition. This chapter explored the relationship between direct nutrition interventions and nutritional outcomes, suggesting that program design and implementation factors might account for the lack of impact on, and in fact backsliding of, nutritional status in some project areas. A larger question, though, is whether the complement of components from the ASSP intervention package was designed and implemented such that diet and infection could be managed effectively. It is particularly important to identify those differences over time in Maniema that might explain the negative change in nutritional outcomes. This will be particularly useful in the design of strategies to promote the transition from humanitarian to development programming in DRC and elsewhere.

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Table 6.1. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on stunting for children age 6-59 months (n=5,077)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	11.245	3.350	**0.001**
Year	-6.018	2.789	**0.031**
ASSP vs. Non-ASSP	-1.875	2.000	0.348
Household characteristics			
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-0.626	1.634	0.702
Setting (peri-urban)	-4.224	2.624	0.107
Wealth quintile			
Low	[ref]		
Low middle	1.059	2.528	0.675
Middle	-0.022	2.532	0.993
High middle	-3.095	2.639	0.241
High	-7.005	2.824	**0.013**
Number of children under five in household			
1-2	[ref]		
3-4	0.290	1.665	0.862
5+	0.830	3.562	0.816
World Bank			
No assistance	[ref]		
Cash	6.750	3.628	0.063
Performance-based financing	3.896	3.418	0.254
Agricultural land	5.430	1.985	**0.006**

Table 6.1 (con't). Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on stunting for children age 6-59 months (n=5,077)

Characteristic	Marginal Effect	Standard Error	p-value
Child characteristics			
Sex (male)	6.878	1.346	**<0.001**
Age of child (months)			
6-11	[ref]		
12-23	18.676	2.383	**<0.001**
24-35	29.046	2.286	**<0.001**
36-47	28.467	2.274	**<0.001**
48-59	29.284	2.286	**<0.001**
Size at birth			
Very small	[ref]		
Smaller than average	0.313	6.395	0.961
Average	-5.611	5.576	0.314
Larger than average	-11.175	5.600	**0.046**
Very large	-12.592	5.691	**0.027**
Unknown	-16.181	7.243	**0.025**
Maternal characteristics			
Education			
None	[ref]		
Some primary	-0.542	1.808	0.764
Completed primary	-4.742	1.971	**0.016**
Completed secondary	-9.504	4.101	**0.020**
Marital status			
Not married	[ref]		
Married- monogamous	-1.555	2.406	0.518
Married- polygamous	1.645	2.714	0.545
Unknown	-5.973	3.286	0.069
Maternal age (years)			
<18	[ref]		
18-24	0.368	3.323	0.912
25-34	-2.073	3.252	0.524
35-49	-9.912	3.586	**0.006**
Unknown	10.877	6.081	0.074

Note: Statistical significance is considered at $p<0.05$.

Table 6.2. Impact of ASSP on rates of stunting for children age 6-59 months, restricted to females (n=2,554)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	10.711	4.653	**0.021**
Year	-2.931	3.865	0.448
ASSP vs. Non-ASSP	-1.769	2.800	0.528

Note: Statistical significance is considered at p<0.05.

Table 6.3. Impact of ASSP on rates of stunting for children age 6-59 months, restricted to males (n=2,523)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	12.073	4.809	**0.012**
Year	-9.033	4.008	**0.024**
ASSP vs. Non-ASSP	-1.795	2.855	0.530

Note: Statistical significance is considered at p<0.05.

Table 6.4. Impact of ASSP on rates of stunting for children age 6-59 months, restricted to low and low-middle wealth quintiles (n=1,682)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	21.516	6.176	**<0.001**
Year	-15.471	5.415	**0.004**
ASSP vs. Non-ASSP	-1.968	3.684	0.593

Note: Statistical significance is considered at p<0.05.

Table 6.5. Impact of ASSP on rates of stunting for children age 6-59 months, restricted to middle, high-middle, and high wealth quintiles (n=3,395)

Characteristic	Marginal Effect	SE	p-value
Interaction (Year*ASSP)	7.701	3.994	0.054
Year	-2.707	3.256	0.406
ASSP vs. Non-ASSP	-1.439	2.408	0.550

Note: Statistical significance is considered at p<0.05.

Table 6.6. Impact of ASSP on rates of stunting for children age 6-59 months, restricted to Nord/Sud Ubangi (n=2,537)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	2.442	4.347	0.574
Year	1.262	3.388	0.709
ASSP vs. Non-ASSP	-5.190	2.858	0.069

Note: Statistical significance is considered at p<0.05.

Table 6.7. Impact of ASSP on rates of stunting for children age 6-59 months, restricted to Maniema/Tshopo (n=2,540)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	29.137	10.960	**0.008**
Year	-13.358	8.189	0.103
ASSP vs. Non-ASSP	2.423	7.788	0.756

Note: Statistical significance is considered at p<0.05.

Table 6.8. Percent of children age 6-59 months exhibiting stunting, by selected characteristics, study sample, and year (n=5,276)

	ASSP				Non-ASSP			
	2014 (*n=1,210*)	**2017 (*n=1,432*)**	**Absolute change**	***p-value***	**2014 (*n=1,298)***	**2017 (*n=1,336*)**	**Absolute change**	***p-value***
Stunting	43.3	54.4	11.1	**0.001**	45.8	48.6	2.8	0.396
Household characteristics								
Sampling domain								
Nord/ Sud Ubangi	45.5	50.3	4.8	0.188	47.2	52.5	5.3	0.223
Maniema/Tshopo	42.0	57.4	15.4	**0.001**	42.2	37.2	-5.0	**0.048**
Setting								
Peri-urban	37.1	38.5	1.4	0.869	39.5	40.9	1.5	0.873
Rural	44.1	56.2	12.2	**0.001**	46.0	49.1	3.1	0.369
Wealth quintile								
Low	36.6	55.7	19.1	**0.022**	51.2	54.5	3.3	0.762
Low middle	50.4	58.7	8.3	0.171	49.8	58.9	9.1	0.263
Middle	44.0	57.7	13.8	**0.014**	50.6	47.3	-3.3	0.548
High middle	47.0	49.6	2.6	0.675	43.7	52.1	8.4	0.100
High	34.9	50.1	15.2	**0.028**	38.3	37.8	-0.5	0.924
Children under five in household								
1-2	42.0	54.8	12.8	**<0.001**	45.8	46.4	0.6	0.890
3-4	49.6	52.0	2.4	0.686	44.9	50.4	5.5	0.518
5+	31.5	55.4	23.9	**0.013**	55.8	66.2	10.4	0.548
Agricultural land								
No land	41.5	44.8	3.3	0.660	32.2	35.6	3.4	0.717
Owns land	43.6	55.7	12.1	**<0.001**	50.8	52.6	1.8	0.583

Notes: Percentages are weighted. Statistical significance is considered at p<0.05. *If mother's education level was unknown, the education level of the head of the household was used.

Table 6.8 (con't). Percent of children age 6-59 months exhibiting stunting, by selected characteristics, study sample, and year (n=5,276)

	ASSP				Non-ASSP			
	2014 (*n=1,210*)	**2017 (*n=1,432*)**	**Absolute change**	***p-value***	**2014 (*n=1,298)***	**2017 (*n=1,336*)**	**Absolute change**	***p-value***
Child characteristics								
Sex of child								
Female	36.4	52.5	16.1	**0.003**	-15.9	40.8	45.2	0.395
Male	49.9	56.3	6.4	**0.046**	-1.7	51.2	52.1	0.854
Age of child (months)								
6-11	19.1	21.4	2.3	0.718	12.9	29.2	16.3	**0.036**
12-23	31.4	52.6	21.2	**0.008**	39.8	42.0	2.1	0.766
24-35	50.6	58.3	7.8	0.179	52.1	55.9	3.8	0.585
36-47	50.2	58.9	8.7	0.164	59.9	52.2	-7.7	0.213
48-59	50.9	58.9	8.0	0.178	50.1	53.2	3.0	0.649
Size at birth								
Very small	57.9	60.3	2.4	0.865	44.3	71.8	27.5	0.137
Smaller than average	50.0	75.2	25.2	**0.030**	50.8	42.2	-8.7	0.525
Average	45.3	56.4	11.1	**0.010**	49.9	51.9	2.0	0.754
Larger than average	35.6	53.8	18.3	**0.001**	45.0	43.0	-2.0	0.639
Very large	43.5	37.7	-5.8	0.467	41.4	46.4	5.0	0.407
Maternal characteristics								
Education*								
None	42.3	56.9	14.7	**0.003**	55.8	56.0	0.2	0.980
Some primary	48.6	54.2	5.6	0.245	47.3	50.7	3.4	0.420
Completed primary	40.5	53.4	12.9	**0.032**	37.4	43.2	5.8	0.378
Completed secondary	37.1	27.3	-9.8	0.485	49.6	38.0	-11.5	0.541

Notes: Percentages are weighted. Statistical significance is considered at p<0.05. *If mother's education level was unknown, the education level of the head of the household was used.

Table 6.8 (con't). Percent of children age 6-59 months exhibiting stunting, by selected characteristics, study sample, and year (n=5,276)

	ASSP				Non-ASSP			
	2014 (*n=1,210*)	**2017 (*n=1,432*)**	**Absolute change**	***p-value***	**2014 (*n=1,298)***	**2017 (*n=1,336*)**	**Absolute change**	***p-value***
Maternal characteristics								
Marital status								
Not married	54.7	56.5	1.8	0.824	42.9	45.4	2.4	0.770
Married- monogamous	39.1	53.4	14.3	**<0.001**	46.5	44.7	-1.7	0.618
Married- polygamous	47.2	47.6	0.4	0.967	49.8	63.7	13.9	**0.045**
Maternal age (years)								
<18	42.7	57.5	14.8	0.236	48.8	55.2	6.4	0.648
18-24	45.5	59.0	13.5	**0.033**	46.6	55.2	8.6	0.337
25-34	43.3	54.0	10.7	**0.030**	45.7	44.7	-1.0	0.844
35-49	31.0	38.4	7.4	0.279	44.0	41.2	-2.8	0.769

Notes: Percentages are weighted. Statistical significance is considered at p<0.05. *If mother's education level was unknown, the education level of the head of the household was used.

Table 6.9. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on wasting for children age 6-59 months (n=5,077)

Characteristic	**Marginal Effect**	**Standard Error**	**p-value**
Interaction (Year*ASSP)	-1.768	1.721	0.304
Year	-1.605	1.411	0.255
ASSP vs. Non-ASSP	1.404	1.011	0.165
Household characteristics			
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	2.544	0.869	**0.003**
Setting (peri-urban)	-1.665	1.167	0.154
Wealth quintile			
Low	[ref]		
Low middle	-2.198	1.422	0.122
Middle	-1.778	1.436	0.216
High middle	-1.178	1.501	0.433
High	0.576	1.669	0.730
Number of children under 5 years living in household			
1-2	[ref]		
3-4	0.627	0.923	0.497
5+	-1.983	1.682	0.238
World Bank			
No assistance	[ref]		
Cash	-0.276	2.026	0.892
Performance-based financing	-4.070	1.305	**0.002**
Agricultural land	-1.506	1.001	0.132

Note: Statistical significance is considered at $p<0.05$.

Table 6.9 (con't). Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on wasting for children age 6-59 months (n=5,077)

Child characteristics			
Sex (male)	0.364	0.728	0.617
Age of child (months)			
6-11	[ref]		
12-23	-1.357	1.742	0.436
24-35	-6.035	1.587	**<0.001**
36-47	-8.749	1.524	**<0.001**
48-59	-7.645	1.554	**<0.001**
Size at birth			
Very small	[ref]		
Smaller than average	-8.372	5.031	0.096
Average	-9.911	4.572	**0.030**
Larger than average	-12.445	4.595	**0.007**
Very large	-11.675	4.623	**0.012**
Unknown	-15.569	5.768	**0.007**
Maternal characteristics			
Education			
None	[ref]		
Primary	0.181	1.021	0.859
Secondary plus	-0.734	1.068	0.492
Unknown	-4.907	1.468	**0.001**
Marital status			
Not married	[ref]		
Married- monogamous	-0.772	1.323	0.560
Married- polygamous	-1.675	1.466	0.253
Unknown	-1.170	1.746	0.503
Maternal age (years)			
<18	[ref]		
18-24	-2.710	1.743	0.120
25-34	-1.738	1.731	0.315
35-49	-1.805	1.892	0.340
Unknown	6.595	6.364	0.300

Note: Statistical significance is considered at $p<0.05$.

Table 6.10. Impact of ASSP on rates of wasting for children age 6-59 months, restricted to females (n=2,525)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.313	2.431	0.898
Year	-1.793	1.985	0.366
ASSP vs. Non-ASSP	-0.233	1.447	0.872

Note: Statistical significance is considered at p<0.05.

Table 6.11. Impact of ASSP on rates of wasting for children age 6-59 months, restricted to males (n=2,504)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-3.809	2.435	0.118
Year	-1.391	1.995	0.486
ASSP vs. Non-ASSP	2.621	1.416	0.064

Note: Statistical significance is considered at p<0.05.

Table 6.12. Impact of ASSP on rates of wasting for children age 6-59 months, restricted to low and low-middle wealth quintiles (n=1,651)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-8.825	2.837	**0.002**
Year	4.416	2.399	0.066
ASSP vs. Non-ASSP	3.878	1.835	**0.035**

Note: Statistical significance is considered at p<0.05.

Table 6.13. Impact of ASSP on rates of wasting for children age 6-59 months, restricted to middle, high-middle, and high wealth quintiles (n=3,361)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	1.648	2.186	0.451
Year	-4.426	1.784	**0.013**
ASSP vs. Non-ASSP	0.041	1.255	0.974

Note: Statistical significance is considered at p<0.05.

Table 6.14. Impact of ASSP on rates of wasting for children age 6-59 months, restricted to Nord/Sud Ubangi (n=2,478)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	2.548	2.362	0.281
Year	-4.841	1.990	**0.015**
ASSP vs. Non-ASSP	1.652	1.327	0.213

Note: Statistical significance is considered at p<0.05.

Table 6.15. Impact of ASSP on rates of wasting for children age 6-59 months, restricted to Maniema/Tshopo (n=2,496)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-2.725	2.338	0.244
Year	-2.037	1.712	0.234
ASSP vs. Non-ASSP	1.072	1.589	0.500

Note: Statistical significance is considered at p<0.05.

Table 6.16. Percent of children age 6-59 months exhibiting wasting, by selected characteristics, study sample, and year (n=2,635)

	ASSP				Non-ASSP			
	2014 (*n=1,155*)	**2017 (*n=1,432*)**	**Absolute change**	***p-value***	**2014 (*n=1,299)***	**2017 (*n=1,336*)**	**Absolute change**	***p-value***
Wasting	9.1	6.6	-2.6	0.174	8.5	3.6	-4.9	**0.010**
Household characteristics								
Sampling domain								
Nord/Sud Ubangi	6.9	6.5	-0.4	0.805	5.4	3.4	-2.1	0.090
Maniema/Tshopo	10.5	6.6	-3.9	0.190	16.5	4.4	-12.1	**0.004**
Setting								
Peri-urban	12.4	6.0	-6.4	0.154	3.6	3.9	0.3	0.947
Rural	8.7	6.6	-2.1	0.313	8.7	3.6	-5.1	**0.00**9
Wealth quintile								
Low	10.4	6.1	-4.3	0.150	7.3	3.0	-4.4	0.193
Low middle	11.3	4.5	-6.8	**0.027**	3.9	4.2	0.3	0.890
Middle	7.5	4.6	-3.0	0.377	7.2	4.2	-3.0	0.175
High middle	7.6	8.3	0.7	0.837	6.5	3.9	-2.6	0.346
High	10.4	9.2	-1.2	0.766	16.0	2.8	-13.2	**0.005**
Number of children under five in household								
1-2	23.2	6.5	-16.7	**<0.001**	28.7	3.2	-25.5	**<0.001**
3-4	26.6	7.5	-19.1	**<0.001**	28.9	5.2	-23.7	**<0.001**
5+	6.4	3.5	-3.0	0.486	32.8	2.1	-30.7	**<0.001**
Agricultural land								
No land	11.8	8.8	-3.0	0.573	12.8	3.9	-8.9	0.070
Owns land	8.6	6.2	-2.4	0.164	7.0	3.5	-3.4	**0.014**

Table 6.16 (con't). Percent of children age 6-59 months exhibiting wasting, by selected characteristics, study sample, and year (n=2,635)

	ASSP				Non-ASSP			
	2014 (*n=1,155*)	**2017 (*n=1,432*)**	**Absolute change**	***p-value***	**2014 (*n=1,299)***	**2017 (*n=1,336*)**	**Absolute change**	***p-value***
Child characteristics								
Sex of child								
Female	8.4	6.0	-2.4	0.202	9.7	3.5	-6.2	**0.021**
Male	9.8	7.2	-2.6	0.335	7.3	3.7	-3.6	**0.043**
Age of child (months)								
6-11	11.6	10.1	-1.5	0.736	20.0	4.2	-15.8	**0.003**
12-23	12.7	8.1	-4.6	0.309	12.1	8.5	-3.6	0.292
24-35	9.7	7.4	-2.4	0.398	6.9	4.0	-2.9	0.297
36-47	7.5	4.9	-2.6	0.421	2.2	1.1	-1.1	0.269
48-59	5.3	5.6	0.4	0.868	5.7	2.5	-3.2	0.168
Size at birth								
Very small	7.1	13.9	6.8	0.507	18.4	14.9	-3.6	0.809
Smaller than average	16.2	12.5	-3.7	0.654	8.4	3.1	-5.3	0.264
Average	9.2	7.6	-1.6	0.649	6.7	3.6	-3.1	0.105
Larger than average	9.8	5.1	-4.7	0.092	7.3	2.4	-4.9	**0.028**
Very large	8.7	6.4	-2.3	0.602	15.9	3.1	-12.9	**0.002**
Maternal characteristics								
Education*								
None	6.4	5.3	-1.2	0.587	7.3	3.6	-3.7	0.096
Some primary	9.9	6.9	-3.1	0.211	10.7	4.3	-6.4	**0.014**
Completed primary	10.1	7.6	-2.5	0.528	8.8	3.4	-5.4	0.078
Completed secondary	12.3	9.4	-2.9	0.768	0.6	0.0	-0.6	0.317

Notes: Percentages are weighted. Statistical significance is considered at p<0.05. *If mother's education level was unknown, the education level of the head of the household was used.

Table 6.16 (con't). Percent of children age 6-59 months exhibiting wasting, by selected characteristics, study sample, and year (n=2,635)

	ASSP				Non-ASSP			
	2014 (*n=1,155*)	**2017 (*n=1,432*)**	**Absolute change**	***p-value***	**2014 (*n=1,299*)**	**2017 (*n=1,336*)**	**Absolute change**	***p-value***
Maternal characteristics								
Marital status								
Not married	14.6	8.8	-5.8	0.261	5.0	4.0	-1.0	0.733
Married- monogamous	9.2	6.2	-3.0	0.353	13.6	3.0	-10.6	**0.001**
Married- polygamous	7.0	8.2	1.3	0.070	4.7	3.6	-1.1	0.687
Maternal age (years)								
<18	14.1	6.8	-7.2	0.292	9.6	7.9	-1.6	0.795
18-24	8.4	6.9	-1.5	0.589	5.4	1.7	-3.7	**0.024**
25-34	9.5	7.3	-2.2	0.487	10.6	3.5	-7.1	**0.004**
35-44	10.4	5.4	-5.0	0.220	10.6	4.2	-6.5	0.122
45+								

Notes: Percentages are weighted. Statistical significance is considered at $p<0.05$. *If mother's education level was unknown, the education level of the head of the household was used.

Table 6.17. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on underweight for children age 6-59 months (n=5,066)

Characteristic	**Marginal Effect**	**Standard Error**	**p-value**
Interaction (Year*ASSP)	4.692	2.857	0.101
Year	-3.886	2.351	0.098
ASSP vs. Non-ASSP	-4.470	1.710	**0.009**
Household characteristics			
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	4.056	1.404	**0.004**
Setting (peri-urban)	-3.611	2.173	0.097
Wealth quintile			
Low	[ref]		
Low middle	1.209	2.182	0.580
Middle	-0.270	2.174	0.901
High middle	0.123	2.276	0.957
High	-2.797	2.387	0.241
Number of children under 5 years living in household			
1-2	[ref]		
3-4	1.349	1.448	0.352
5+	1.748	3.111	0.574
World Bank			
No assistance	[ref]		
Cash	0.500	3.209	0.876
Performance-based financing	-5.055	2.706	0.062
Agricultural land	4.102	1.747	**0.019**

Note: Statistical significance is considered at $p<0.05$.

Table 6.17 (con't). Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on underweight for children age 6-59 months (n=5,066)

Characteristic	Marginal Effect	Standard Error	p-value
Child characteristics			
Sex (male)	3.327	1.168	**0.004**
Age of child (months)			
6-11	[ref]		
12-23	6.458	2.129	**0.002**
24-35	5.276	2.025	**0.009**
36-47	4.628	2.007	**0.021**
48-59	6.524	2.043	**0.001**
Size at birth			
Very small	[ref]		
Smaller than average	-0.436	6.471	0.946
Average	-7.375	5.653	0.192
Larger than average	-13.831	5.649	**0.014**
Very large	-14.661	5.710	**0.010**
Unknown	-19.168	6.943	**0.006**
Maternal characteristics			
Education			
None	[ref]		
Some primary	-0.221	1.603	0.890
Completed primary	-4.724	1.691	**0.005**
Completed secondary	-5.587	3.396	0.100
Marital status			
Not married	[ref]		
Married- monogamous	-2.041	2.129	0.338
Married- polygamous	0.260	2.427	0.915
Unknown	-4.687	2.835	0.098
Maternal age (years)			
<18	[ref]		
18-24	1.323	2.676	0.621
25-34	-0.499	2.605	0.848
35-44	-4.110	2.849	0.149
45-49	15.416	6.295	**0.014**

Note: Statistical significance is considered at p<0.05.

Table 6.18. Impact of ASSP on rates of underweight for children age 6-59 months, restricted to females (n=2,546)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	2.106	3.898	0.589
Year	-0.609	3.181	0.848
ASSP vs. Non-ASSP	-4.618	2.371	0.051

Note: Statistical significance is considered at p<0.05.

Table 6.19. Impact of ASSP on rates of underweight for children age 6-59 months, restricted to males (n=2,520)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	7.797	4.190	0.063
Year	-7.709	3.475	**0.027**
ASSP vs. Non-ASSP	-4.126	2.467	0.094

Note: Statistical significance is considered at p<0.05.

Table 6.20. Impact of ASSP on rates of underweight for children age 6-59 months, restricted to low and low-middle wealth quintiles (n=1,684)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	2.349	5.398	0.663
Year	-5.829	4.685	0.213
ASSP vs. Non-ASSP	-3.137	3.222	0.330

Note: Statistical significance is considered at p<0.05.

Table 6.21. Impact of ASSP on rates of underweight for children age 6-59 months, restricted to middle, high-middle, and high wealth quintiles (n=3,382)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	6.517	3.365	0.053
Year	-3.258	2.708	0.229
ASSP vs. Non-ASSP	-5.424	2.040	**0.008**

Note: Statistical significance is considered at p<0.05.

Table 6.22. Impact of ASSP on rates of underweight for children age 6-59 months, restricted to Nord/Sud Ubangi (n=2,542)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	2.606	3.729	0.485
Year	-6.516	2.897	**0.025**
ASSP vs. Non-ASSP	-4.115	2.386	0.085

Note: Statistical significance is considered at p<0.05.

Table 6.23. Impact of ASSP on rates of underweight for children age 6-59 months, restricted to Maniema/Tshopo (n=2,524)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	7.660	3.518	**0.029**
Year	-3.431	2.577	0.183
ASSP vs. Non-ASSP	-5.130	2.513	**0.041**

Note: Statistical significance is considered at p<0.05.

Table 6.24. Percent of children age 6-59 months exhibiting underweight, by selected characteristics, study sample, and year (n=5,260)

	ASSP				Non-ASSP			
	2014 (*n=1,172*)	**2017 (*n=1,432*)**	**Absolute change**	***p-value***	**2014 (*n=1,320)***	**2017 (*n=1,336*)**	**Absolute change**	***p-value***
Underweight	20.0	25.2	5.2	0.067	24.8	22.4	-2.4	0.375
Household characteristics								
Sampling domain								
Nord/ Sud Ubangi	22.3	20.7	-1.6	0.507	23.4	23.5	0.1	0.981
Maniema/Tshopo	18.6	28.6	10.0	**0.026**	28.3	19.1	-9.2	**0.003**
Setting								
Peri-urban	10.9	18.9	8.1	0.084	24.1	23.3	-0.9	0.891
Rural	21.2	26.0	4.7	0.143	24.8	22.3	-2.5	0.381
Wealth quintile								
Low	21.0	22.8	1.7	0.778	20.1	21.9	1.8	0.840
Low middle	24.7	24.9	0.2	0.969	28.1	24.1	-4.0	0.586
Middle	18.3	26.4	8.2	0.211	25.9	25.4	-0.5	0.921
High middle	21.2	31.3	10.1	0.064	20.1	22.5	2.4	0.534
High	16.1	21.4	5.4	0.291	26.0	18.8	-7.2	0.152
Number of children under five in household								
1-2	23.5	25.4	1.9	0.585	28.9	20.2	-8.7	**0.039**
3-4	26.7	23.9	-2.8	0.550	29.0	24.5	-4.5	0.288
5+	6.8	28.0	21.2	**0.036**	32.8	38.1	5.3	0.631
Agricultural land								
No land	16.2	20.2	4.0	0.567	22.7	20.9	-1.9	0.766
Owns land	20.7	25.9	5.2	0.082	25.6	22.9	-2.7	0.360

Table 6.24 (con't). Percent of children age 6-59 months exhibiting underweight, by selected characteristics, study sample, and year (n=5,260)

	ASSP				Non-ASSP			
	2014 (*n=1,172*)	**2017 (*n=1,432*)**	**Absolute change**	***p-value***	**2014 (*n=1,320)***	**2017 (*n=1,336*)**	**Absolute change**	***p-value***
Child characteristics								
Sex of child								
Female	17.6	23.2	5.6	**0.036**	22.2	20.6	-1.6	0.597
Male	22.3	27.4	5.0	0.238	27.6	24.2	-3.5	0.424
Age of child (months)								
6-11	12.9	17.0	4.1	0.477	11.5	16.8	5.3	0.223
12-23	20.5	28.9	8.4	0.060	21.2	19.8	-1.4	0.781
24-35	25.4	21.5	-4.0	0.318	29.6	25.9	-3.7	0.614
36-47	19.4	26.3	6.9	0.302	27.7	25.3	-2.4	0.613
48-59	17.7	28.1	10.4	**0.013**	28.5	20.4	-8.2	0.195
Size at birth								
Very small	19.5	31.6	12.1	0.490	17.8	26.8	9.0	0.587
Smaller than average	26.1	55.6	29.5	**0.024**	27.5	24.8	-2.7	0.806
Average	23.9	24.6	0.7	0.885	30.4	22.0	-8.4	0.129
Larger than average	16.6	23.4	6.8	0.113	24.6	16.9	-7.7	0.180
Very large	18.7	18.3	-0.5	0.925	21.5	19.8	-1.7	0.725
Maternal characteristics								
Education*								
None	20.2	23.6	3.4	0.382	28.9	27.3	-1.6	0.754
Some primary	20.7	25.4	4.7	0.280	27.3	19.7	-7.5	0.056
Completed primary	18.3	27.4	9.1	0.055	21.2	21.0	-0.2	0.963
Completed secondary	25.5	20.5	-5.0	0.736	24.6	23.1	-1.5	0.927

Notes: Percentages are weighted. Statistical significance is considered at p<0.05. *If mother's education level was unknown, the education level of the head of the household was used.

Table 6.24 (con't). Percent of children age 6-59 months exhibiting underweight, by selected characteristics, study sample, and year (n=5,260)

	ASSP				Non-ASSP			
	2014 (*n=1,172*)	**2017 (*n=1,432*)**	**Absolute change**	***p-value***	**2014 (*n=1,320)***	**2017 (*n=1,336*)**	**Absolute change**	***p-value***
Maternal characteristics								
Marital status								
None	20.2	23.6	3.4	0.382	28.9	27.3	-1.6	0.754
Not married	33.3	24.6	-8.7	0.222	19.2	26.5	7.2	0.269
Married- monogamous	16.5	26.8	10.3	**0.012**	28.9	19.6	-9.3	**0.026**
Married- polygamous	26.0	20.4	-5.6	0.328	24.2	19.9	-4.3	0.415
Maternal age								
<18	10.9	29.6	18.7	**0.017**	22.4	15.5	-6.9	0.428
18-24	21.4	27.5	6.1	0.258	26.8	22.1	-4.7	0.436
25-34	21.5	25.9	4.4	0.362	24.0	20.0	-4.0	0.332
35-44	13.4	15.1	1.7	0.756	29.9	17.2	-12.7	0.056
45+	23.3	25.7	2.4	0.637	19.7	28.0	8.2	0.075

Notes: Percentages are weighted. Statistical significance is considered at p<0.05. *If mother's education level was unknown, the education level of the head of the household was used.

Table 6.25. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on minimum dietary diversity for children age 6-59 months (n=2,161)

	Marginal effect	**Standard Error**	**p-value**
Interaction (Year*ASSP)	5.170	4.540	0.255
Year	7.714	3.055	**0.012**
ASSP vs. Non-ASSP	9.924	3.762	**0.008**
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-6.282	2.084	**0.003**
Setting (peri-urban)	8.529	3.451	**0.013**
Wealth quintile			
Low	[ref]		
Low middle	3.679	2.677	0.169
Middle	4.375	2.678	0.102
High middle	5.802	2.840	**0.041**
High	10.876	3.134	**0.001**
World Bank			
None	[ref]		
Cash	10.033	4.645	**0.031**
Performance-based financing	22.249	4.893	**<0.001**
Age of child (months)			
6-11	[ref]		
12-23	8.116	1.653	**<0.001**
Sex (male)	-3.147	1.660	0.058
Number of children under five in household			
1-2	[ref]		
3-4	-1.520	2.151	0.480
5+	2.746	3.889	0.480

Note: Statistical significance is considered at $p<0.05$.

Table 6.25 (con't). Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on minimum dietary diversity for children age 6-59 months (n=2,161)

	Marginal effect	Standard Error	p-value
Mother's education			
None	[ref]		
Some primary	-4.499	2.158	**0.037**
Completed primary	1.522	2.557	0.552
Completed secondary	-9.813	6.632	0.139
Maternal age			
<18	[ref]		
18-24	3.356	3.972	0.398
25-34	4.941	3.970	0.213
35-49	7.421	4.305	0.085
Mother's marital status			
No married	[ref]		
Married- monogamous	5.211	2.446	**0.033**
Married- polygamous	6.428	2.916	**0.028**

Note: Statistical significance is considered at p<0.05.

Table 6.26. Impact of ASSP on rates of minimum dietary diversity for children age 6-59 months, restricted to females (n=1,085)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	7.449	6.468	0.249
Year	8.746	4.158	**0.035**
ASSP vs. Non-ASSP	5.683	5.423	0.295

Note: Statistical significance is considered at p<0.05.

Table 6.27. Impact of ASSP on rates of minimum dietary diversity for children age 6-59 months, restricted to males (n=1,076)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	3.025	6.461	0.640
Year	6.543	4.575	0.153
ASSP vs. Non-ASSP	14.851	5.282	**0.005**

Note: Statistical significance is considered at p<0.05.

Table 6.28. Impact of ASSP on rates of minimum dietary diversity for children age 6-59 months, restricted to low and low-middle wealth quintiles (n=738)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-3.337	8.595	0.698
Year	7.248	5.878	0.218
ASSP vs. Non-ASSP	22.866	7.513	**0.002**

Note: Statistical significance is considered at p<0.05.

Table 6.29. Impact of ASSP on rates of minimum dietary diversity for children age 6-59 months, restricted to middle, high-middle, and high wealth quintiles (n=1,423)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	7.062	5.486	0.198
Year	6.989	3.700	0.059
ASSP vs. Non-ASSP	6.554	4.482	0.144

Note: Statistical significance is considered at p<0.05.

Table 6.30. Impact of ASSP on rates of minimum dietary diversity for children age 6-59 months, restricted to Nord/Sud Ubangi (n=1,128)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	2.624	5.907	0.657
Year	-5.477	4.651	0.239
ASSP vs. Non-ASSP	23.750	4.181	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 6.31. Impact of ASSP on rates of minimum dietary diversity for children age 6-59 months, restricted to Maniema/Tshopo (n=1,028)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-9.254	5.482	0.091
Year	18.107	4.418	**<0.001**
ASSP vs. Non-ASSP	15.741	4.450	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 6.32. Percent of children age 6-59 months meeting the minimum dietary diversity, by selected characteristics, study sample, and year (n=2,169)

	ASSP				Non-ASSP			
	2014 (*n=386*)	**2017 (*n=633*)**	**Absolute change**	***p-value***	**2014 (*n=479*)**	**2017 (*n=671*)**	**Absolute change**	***p-value***
Minimum dietary diversity	25.1	26.2	1.1	0.908	7.9	30.5	22.7	**<0.001**
Sampling domain								
Nord/ Sud Ubangi	7.5	28.9	21.4	**<0.001**	9.7	29.0	19.3	**0.005**
Maniema/Tshopo	35.5	23.7	-11.9	0.319	2.1	35.0	32.9	**<0.001**
Setting								
Peri-urban	24.9	24.5	-0.4	0.972	7.8	29.2	21.5	**0.001**
Rural	27.8	37.1	9.3	0.483	9.8	49.6	39.9	**0.015**
Wealth quintile								
Low	21.4	21.2	-0.1	0.993	0.0	20.6	20.6	0.238
Low middle	16.5	31.4	14.9	0.191	3.9	30.4	26.5	**0.001**
Middle	34.5	22.4	-12.1	0.507	12.2	22.9	10.7	0.225
High middle	20.7	27.9	7.2	0.309	9.0	24.7	15.7	**0.009**
High	28.5	29.7	1.2	0.908	6.3	44.8	38.5	**0.001**
Age of child (months)								
6-11	19.0	20.6	1.7	0.880	3.6	22.7	19.2	**0.002**
12-23	28.0	30.2	2.3	0.811	10.1	36.2	26.1	**<0.001**
Sex of child								
Female	33.6	27.1	-6.5	0.597	11.9	30.6	18.6	**0.014**
Male	14.8	25.4	10.6	0.095	3.8	30.5	26.7	**<0.001**

Notes: Percentages are weighted. Statistical significance is considered at p<0.05. *If mother's education level was unknown, the education level of the head of the household was used.

Table 6.32 (con't). Percent of children age 6-59 months meeting the minimum dietary diversity, by selected characteristics, study sample, and year (n=2,169)

	ASSP				Non-ASSP			
	2014 (*n=386*)	**2017 (*n=633*)**	**Absolute change**	***p-value***	**2014 (*n=479)***	**2017 (*n=671*)**	**Absolute change**	***p-value***
Number of children under five in the household								
1-2	21.2	26.0	4.8	0.568	9.0	31.3	22.4	**0.001**
3-4	35.2	25.3	-10.0	0.495	5.0	31.4	26.4	**0.001**
5+	62.9	32.5	-30.3	0.252	0.0	17.3	17.3	0.395
Mother's education*								
None	17.6	26.5	8.9	0.482	7.2	36.1	28.9	**<0.001**
Some primary	26.2	21.6	-4.6	0.719	5.7	27.5	21.8	**0.003**
Completed primary	28.8	32.5	3.8	0.653	9.7	30.4	20.7	**0.030**
Completed secondary	36.2	7.0	-29.2	0.182	N/A	N/A	N/A	N/A
Maternal age								
<18	25.6	20.8	-4.7	0.708	0.5	15.9	15.4	**<0.001**
18-24	14.4	29.5	15.1	0.060	14.0	28.2	14.3	0.134
25-34	31.7	23.1	-8.6	0.544	4.4	28.4	24.0	**<0.001**
35-49	20.0	29.4	9.4	0.366	9.7	42.7	33.0	**0.010**
Mother's marital status								
Not married	27.4	24.0	-3.4	0.789	7.3	30.0	22.7	**0.008**
Married- monogamous	23.3	29.3	6.0	0.569	11.2	28.2	17.0	0.052
Married- polygamous	31.5	35.5	4.0	0.792	7.5	57.6	50.1	**0.005**

Notes: Percentages are weighted. Statistical significance is considered at $p<0.05$. *If mother's education level was unknown, the education level of the head of the household was used.

Table 6.33. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on minimum meal frequency for children age 6-59 months (n=2,221)

	Marginal effect	**Standard Error**	**p-value**
Interaction (Year*ASSP)	-6.726	4.971	0.176
Year	1.978	3.249	0.543
ASSP vs. Non-ASSP	-0.609	3.966	0.878
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	1.912	2.487	0.442
Setting (peri-urban)	2.189	3.842	0.569
Wealth quintile			
Low	[ref]		
Low middle	-0.646	3.641	0.859
Middle	5.267	3.647	0.149
High middle	3.241	3.785	0.392
High	-2.495	3.948	0.527
World Bank			
None	[ref]		
Cash	-8.350	4.725	0.077
Performance-based financing	-6.630	4.578	0.148
Age of child (months)			
6-11	[ref]		
12-23	-17.952	2.134	**<0.001**
Sex (male)	-1.823	2.029	0.369
Number of children under five in household			
1-2	[ref]		
3-4	2.364	2.710	0.383
5+	19.570	4.349	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 6.33 (con't). Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on minimum meal frequency for children age 6-59 months (n=2,221)

	Marginal effect	Standard Error	p-value
Mother's education			
None	[ref]		
Some primary	-0.978	2.653	0.712
Completed primary	-2.369	2.946	0.421
Completed secondary	-8.061	9.481	0.395
Maternal age			
<18	[ref]		
18-24	2.152	5.229	0.681
25-34	-0.268	5.205	0.959
35-49	-1.087	5.551	0.845
Mother's marital status			
No married	[ref]		
Married- monogamous	-0.924	3.131	0.768
Married- polygamous	-0.262	3.624	0.942

Note: Statistical significance is considered at p<0.05.

Table 6.34. Impact of ASSP on rates of minimum meal frequency for children age 6-59 months, restricted to females (n=1,115)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-2.253	6.936	0.745
Year	-4.026	4.526	0.374
ASSP vs. Non-ASSP	-3.498	5.497	0.525

Note: Statistical significance is considered at p<0.05.

Table 6.35. Impact of ASSP on rates of minimum meal frequency for children age 6-59 months, restricted to males (n=1,106)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-12.031	7.077	0.089
Year	8.359	4.628	0.071
ASSP vs. Non-ASSP	3.139	5.698	0.582

Note: Statistical significance is considered at p<0.05.

Table 6.36. Impact of ASSP on rates of minimum meal frequency for children age 6-59 months, restricted to low and low-middle wealth quintiles (n=755)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-5.576	8.682	0.521
Year	-10.027	5.698	0.078
ASSP vs. Non-ASSP	-6.353	7.134	0.373

Note: Statistical significance is considered at p<0.05.

Table 6.37. Impact of ASSP on rates of minimum meal frequency for children age 6-59 months, restricted to middle, high-middle, and high wealth quintiles (n=1,466)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-8.834	6.041	0.144
Year	8.021	3.993	**0.045**
ASSP vs. Non-ASSP	3.868	4.776	0.418

Note: Statistical significance is considered at p<0.05.

Table 6.38. Impact of ASSP on rates of minimum meal frequency for children age 6-59 months, restricted to Nord/Sud Ubangi (n=1,153)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-3.189	6.486	0.623
Year	-6.985	4.473	0.118
ASSP vs. Non-ASSP	-9.191	4.992	0.066

Note: Statistical significance is considered at p<0.05.

Table 6.39. Impact of ASSP on rates of minimum meal frequency for children age 6-59 months, restricted to Maniema/Tshopo (n=1,068)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-8.818	6.164	0.153
Year	10.693	4.718	**0.023**
ASSP vs. Non-ASSP	5.904	4.402	0.180

Note: Statistical significance is considered at p<0.05.

Table 6.40. Percent of children age 6-59 months meeting the minimum meal frequency, by selected characteristics, study sample, and year (n=2,229)

	ASSP				Non-ASSP			
	2014 (*n=387*)	**2017 (*n=668*)**	**Absolute change**	***p-value***	**2014 (*n=486)***	**2017 (*n=688*)**	**Absolute change**	***p-value***
Minimum meal frequency	49.9	38.5	-11.5	**0.014**	40.6	36.3	-4.4	0.468
Sampling domain								
Nord/ Sud Ubangi	45.0	29.3	-15.8	**0.033**	45.3	34.7	-10.6	0.047
Maniema/Tshopo	52.8	47.2	-5.6	0.302	26.0	40.5	14.6	0.088
Setting								
Peri-urban	51.1	36.3	-14.9	**0.002**	41.1	35.9	-5.3	0.404
Rural	37.7	52.5	14.8	0.242	24.0	42.2	18.2	**0.031**
Wealth quintile								
Low	53.1	30.5	-22.7	0.090	70.1	30.5	-39.6	**0.002**
Low middle	38.4	24.8	-13.6	0.136	41.8	42.3	0.5	0.953
Middle	52.9	49.6	-3.3	0.693	51.2	38.1	-13.1	0.127
High middle	56.0	41.0	-15.0	0.146	25.9	36.4	10.5	0.234
High	52.0	45.5	-6.5	0.487	36.2	33.4	-2.8	0.863
Age of child (months)								
6-11	49.3	40.1	-9.2	0.823	51.6	34.6	-17.1	**0.042**
12-23	51.4	36.8	-14.6	**0.018**	29.6	38.0	8.3	0.143
Sex of child								
Female	33.6	27.1	-6.5	0.597	11.9	30.6	18.6	**0.014**
Male	14.8	25.4	10.6	0.095	3.8	30.5	26.7	**<0.001**

Table 6.40 (con't). Percent of children age 6-59 months meeting the minimum meal frequency, by selected characteristics, study sample, and year (n=2,229)

	ASSP				**Non-ASSP**			
	2014 (*n=387*)	**2017 (*n=668*)**	**Absolute change**	***p-value***	**2014 (*n=486)***	**2017 (*n=688*)**	**Absolute change**	***p-value***
Number of children under five in the household								
1-2	50.5	35.5	-15.0	**0.009**	34.7	34.4	-0.3	0.962
3-4	53.6	40.9	-12.7	0.150	57.7	39.0	-18.8	0.064
5+	19.3	62.5	43.2	**0.038**	62.3	51.6	-10.7	0.430
Mother's education*								
None	45.8	35.8	-10.1	0.160	41.2	33.0	-8.2	0.217
Some primary	50.6	36.6	-14.1	**0.029**	37.8	35.5	-2.2	0.814
Completed primary	50.8	43.2	-7.6	0.232	42.3	39.7	-2.6	0.702
Completed secondary	64.3	45.8	-18.5	0.520	N/A	N/A	N/A	N/A
Maternal age								
<18	44.1	59.0	14.9	0.522	51.8	32.6	-19.2	0.497
18-24	42.2	42.6	0.4	0.967	52.3	38.3	-14.0	0.111
25-34	54.8	37.1	-17.7	**0.002**	38.9	37.3	-1.7	0.791
35-49	47.6	29.0	-18.6	0.069	24.1	30.6	6.5	0.645
Mother's marital status								
Not married	53.0	35.8	-17.2	**0.008**	38.1	37.2	-0.8	0.911
Married- monogamous	48.1	37.3	-10.8	0.296	47.0	27.3	-19.6	**0.031**
Married- polygamous	50.1	53.9	3.8	0.778	36.2	46.3	10.1	0.596

Notes: Percentages are weighted. Statistical significance is considered at p<0.05. *If mother's education level was unknown, the education level of the head of the household was used.

Table 6.41. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on minimum acceptable diet for children age 6-59 months (n=2,221)

	Marginal effect	Standard Error	p-value
Interaction (Year*ASSP)	-2.125	2.595	0.413
Year	1.296	1.672	0.438
ASSP vs. Non-ASSP	2.750	2.123	0.195
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-4.629	1.274	**<0.001**
Setting (peri-urban)	3.479	2.262	0.124
Wealth quintile			
Low	[ref]		
Low middle	-0.753	1.478	0.610
Middle	1.441	1.615	0.372
High middle	1.588	1.715	0.354
High	3.376	1.969	0.086
World Bank			
None	[ref]		
Cash	-2.520	1.912	0.188
Performance-based financing	-1.206	2.188	0.582
Age of child (months)			
6-11	[ref]		
12-23	-0.557	1.037	0.591
Sex (male)	-2.092	0.990	**0.035**
Number of children under five in household			
1-2	[ref]		
3-4	-1.434	1.229	0.243
5+	-2.372	1.786	0.184

Note: Statistical significance is considered at p<0.05.

Table 6.41 (con't). Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on minimum acceptable diet for children age 6-59 months (n=2,221)

	Marginal effect	Standard Error	p-value
Mother's education			
None	[ref]		
Some primary	-1.348	1.268	0.288
Completed primary	0.552	1.524	0.717
Completed secondary	-2.614	3.632	0.472
Maternal age			
<18	[ref]		
18-24	-0.451	2.522	0.858
25-34	0.250	2.538	0.922
35-49	-0.221	2.689	0.935
Mother's marital status			
No married	[ref]		
Married- monogamous	2.267	1.317	0.085
Married- polygamous	1.638	1.568	0.296

Note: Statistical significance is considered at p<0.05.

Table 6.42. Impact of ASSP on rates of minimum acceptable diet for children age 6-59 months, restricted to females (n=1,115)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-0.126	3.851	0.974
Year	-0.219	2.423	0.928
ASSP vs. Non-ASSP	1.352	3.100	0.663

Note: Statistical significance is considered at p<0.05.

Table 6.43. Impact of ASSP on rates of minimum acceptable diet for children age 6-59 months, restricted to males (n=1,091)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-4.779	3.617	0.186
Year	3.554	2.475	0.151
ASSP vs. Non-ASSP	5.239	3.036	0.084

Note: Statistical significance is considered at p<0.05.

Table 6.44. Impact of ASSP on rates of minimum acceptable diet for children age 6-59 months, restricted to low and low-middle wealth quintiles (n=755)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-10.172	5.307	0.055
Year	2.785	3.216	0.387
ASSP vs. Non-ASSP	9.948	4.816	**0.039**

Note: Statistical significance is considered at p<0.05.

Table 6.45. Impact of ASSP on rates of minimum acceptable diet for children age 6-59 months, restricted to middle, high-middle, and high wealth quintiles (n=1,443)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.492	3.368	0.884
Year	0.627	2.156	0.771
ASSP vs. Non-ASSP	0.998	2.715	0.713

Note: Statistical significance is considered at p<0.05.

Table 6.46. Impact of ASSP on rates of minimum acceptable diet for children age 6-59 months, restricted to Nord/Sud Ubangi (n=1,148)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	8.258	3.768	**0.028**
Year	-7.129	2.949	**0.016**
ASSP vs. Non-ASSP	-0.983	2.619	0.708

Note: Statistical significance is considered at p<0.05.

Table 6.47. Impact of ASSP on rates of minimum acceptable diet for children age 6-59 months, restricted to Maniema/Tshopo (n=1,068)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-10.629	3.354	**0.002**
Year	8.931	2.814	**0.002**
ASSP vs. Non-ASSP	6.683	2.787	**0.016**

Note: Statistical significance is considered at p<0.05.

Table 6.48. Percent of children age 6-59 months with a minimum acceptable diet, by selected characteristics, study sample, and year (n=2,229)

	ASSP				Non-ASSP			
	2014 (*n=387*)	**2017 (*n=668*)**	**Absolute change**	***p-value***	**2014 (*n=486)***	**2017 (*n=688*)**	**Absolute change**	***p-value***
Minimum acceptable diet	12.1	5.6	-6.5	0.135	5.6	7.5	2.0	0.606
Sampling domain								
Nord/ Sud Ubangi	2.6	8.4	5.7	**0.029**	7.2	5.7	-1.5	0.645
Maniema/Tshopo	17.7	3.0	-14.7	**0.001**	0.5	12.6	12.1	**0.001**
Setting								
Peri-urban	12.1	4.3	-7.8	0.077	5.7	6.9	1.2	0.763
Rural	12.9	14.0	1.2	0.879	0.0	16.7	16.7	0.178
Wealth quintile								
Low	21.4	3.7	-17.6	**0.039**	0.0	3.9	3.9	0.532
Low middle	9.1	5.5	-3.6	0.586	0.0	7.2	7.2	**0.028**
Middle	13.0	5.2	-7.8	0.224	9.2	4.0	-5.2	0.181
High middle	5.1	5.0	-0.1	0.979	7.9	3.8	-4.1	0.305
High	18.1	8.6	-9.5	0.120	4.8	14.3	9.5	0.259
Age of child (months)								
6-11	16.0	5.1	-10.9	0.095	3.5	9.0	5.6	0.228
12-23	10.4	6.0	-4.4	0.224	6.6	6.5	-0.2	0.957
Sex of child								
Female	14.5	6.5	-8.0	0.145	9.6	6.0	-3.7	0.405
Male	9.3	4.7	-4.6	0.161	1.5	9.1	7.6	**0.023**

Table 6.48 (con't). Percent of children age 6-59 months with a minimum acceptable diet, by selected characteristics, study sample, and year (n=2,229)

	ASSP				Non-ASSP			
	2014 (*n=387*)	**2017 (*n=668*)**	**Absolute change**	***p-value***	**2014 (*n=486)***	**2017 (*n=688*)**	**Absolute change**	***p-value***
Number of children under five in the household								
1-2	12.4	6.1	-6.3	0.173	6.1	7.6	1.5	0.750
3-4	13.3	5.8	-7.5	0.235	4.3	8.2	3.9	0.461
5+	0.0	0.5	0.5	0.596	0.0	4.8	4.8	0.587
Mother's education*								
None	8.3	7.2	-1.1	0.843	2.7	5.6	2.8	0.340
Some primary	8.3	7.2	-1.1	0.843	2.7	5.6	2.9	0.334
Completed primary	12.4	3.8	-8.6	0.127	3.7	9.5	5.9	0.283
Completed secondary	12.0	6.8	-5.2	0.259	8.9	6.2	-2.7	0.605
Maternal age								
<18	19.1	11.6	-7.4	0.534	0.0	6.2	6.2	0.366
18-24	7.2	6.8	-0.4	0.934	12.4	2.5	-9.9	**0.012**
25-34	16.6	4.6	-12.0	**0.034**	2.4	8.5	6.1	0.069
35-49	3.0	4.5	1.5	0.713	5.0	14.6	9.5	0.273
Mother's marital status								
Not married	15.3	4.9	-10.4	0.073	3.9	8.3	4.3	0.400
Married- monogamous	8.5	8.4	-0.1	0.984	8.5	1.1	-7.4	**0.010**
Married- polygamous	10.9	1.9	-9.1	**0.033**	5.6	31.6	26.0	0.096

Notes: Percentages are weighted. Statistical significance is considered at p<0.05. *If mother's education level was unknown, the education level of the head of the household was used.

Chapter 7
Family Planning

Acronyms

ASSP	Accès aux Soins de Santé Primaires (Access to Primary Health Care Project)
BCC	Behavior Change Communication
DFID	Department for International Development
DHS	Demographic and Health Survey
DID	Difference-in-Differences
DMPA-SC	Depot-medroxyprogesterone Acetate Sub-Cutaneous
DRC	Democratic Republic of Congo
IMA	Interchurch Medical Assistance (dba IMA World Health)
IUD	Intra-Uterine Device
LAM	Lactational Amenorrhea Method
LARC	Long-Acting Reversible Contraceptive
LMIC	Low and Middle-Income Country
MCH	Maternal and Child Health
MCPR	Modern Contraceptive Prevalence Rate
MOH	Ministry of Health
PNDS	National Health Development Program
PNSR	National Reproductive Health Program
SDG	Sustainable Development Goals
SDM	Standard Days Method
SE	Standard Error
SNIS	Système National d'Information Sanitaire (National Health Information System)
UN	United Nations

i. Overview of the ASSP approach

Expanding access to family planning services is the primary objective of global family planning efforts and has been a driving force behind family planning programs in recent years. Especially after the London Summit in 2012, the goal of "expanding access to family planning information, services, and supplies to an additional 120 million women and girls in the world's poorest countries by 2020" became prominent in the family planning global community (FP2020, 2013 Choi et al, 2016). More recently, goal 3.7 of the Sustainable Development Goals (SDG), calls for: "By 2030, to ensure universal access to sexual and reproductive healthcare services, including family planning, information and education, and the integration of reproductive health into national strategies and programs" (UN General Assembly, 2015). Consistent with this priority, the *Accès aux Soins de Santé Primaires* project (Access to Primary Health Care Project, ASSP) supports family planning as part of a package of integrated health services, including malaria, nutrition, antenatal care, immunization, and child health. Family planning and maternal health services are highly complementary and often provided together in low and middle-income country (LMIC) settings. As a result of family planning programs in the last decade, maternal mortality rates have decreased by 26 percent in developing countries (Cleland et al., 2012). According to the same study, contraceptive use is responsible for averting 10 percent of child deaths.

The Democratic Republic of Congo (DRC) is among the countries with the highest fertility rates and lowest levels of modern contraceptive use in Sub-Saharan Africa. The DRC has the third-highest fertility rate worldwide, with 6.6 births per woman (DHS 2013-14). Fertility varies from 5.4 children per woman in urban areas to 7.3 in rural areas. Modern contraceptive use among all women of reproductive age differs among 26 different provinces, ranging from 1.4 percent in Sankuru province (formerly part of Kasai-Oriental) to 16.0 percent in Kongo Central (formerly Bas Congo) (DHS 2013-14). The most recent survey in Kinshasa showed modern contraceptive prevalence rate (MCPR) to be 22.0 percent among all women in reproductive age (PMA2020, 2018).

In an effort to strengthen the health system and assist the Congolese government in improving the delivery of family planning services in the DRC, IMA World Health and local partners implemented the ASSP between 2013 and 2018. During this period, ASSP provided a set of interventions focused on increasing access to contraceptive services that included:

- **Family planning service delivery:** ASSP offered support for family planning services to facilities including 55 general reference hospitals, 114 reference health centers, and 803 health centers in intervention areas. All ASSP-supported facilities were expected to provide family planning service (including contraceptive methods and counseling) by a trained provider. In addition to facility-based family planning services, in each health zone, ASSP supported community-based distribution of pills, condoms, and Cyclebeads. If a woman was interested in a long-acting method, the community-based distributor would refer her to a facility offering family planning services.
- **Human resources for family planning services:** To ensure providers were capable of offering family planning services, ASSP trained 64 national-level "Master Trainers". Master trainers were selected from *10ème Direction*, National Reproductive Health Program (PNSR), Roi Baudin Hospital, and other hospitals and maternity clinics in Kinshasa, the Centre de Formation en Santé de la Reproduction Aboubakar Touré, as well as the Maternal and Child Health (MCH) focal point from

each ASSP implementing partner. Master trainers were expected to conduct a 14-day training at the provincial and health zone level.

- **Commodities, specific inputs/infrastructure, and equipment:** Providing a wide range of family planning methods was a priority for the ASSP project. Methods provided by the project included: IUD, implants (Implanon NXT, Implanon, Jadelle), injectables (DMPA-SC, Depo-Provera, Noristerat), female condoms, pills, and male condoms. In addition to family planning commodities, ASSP provided facilities with reproductive health equipment including scales, blood pressure monitors, and gynecological tables. ASSP also supported selected hospitals with surgical instruments needed for male and female sterilization.

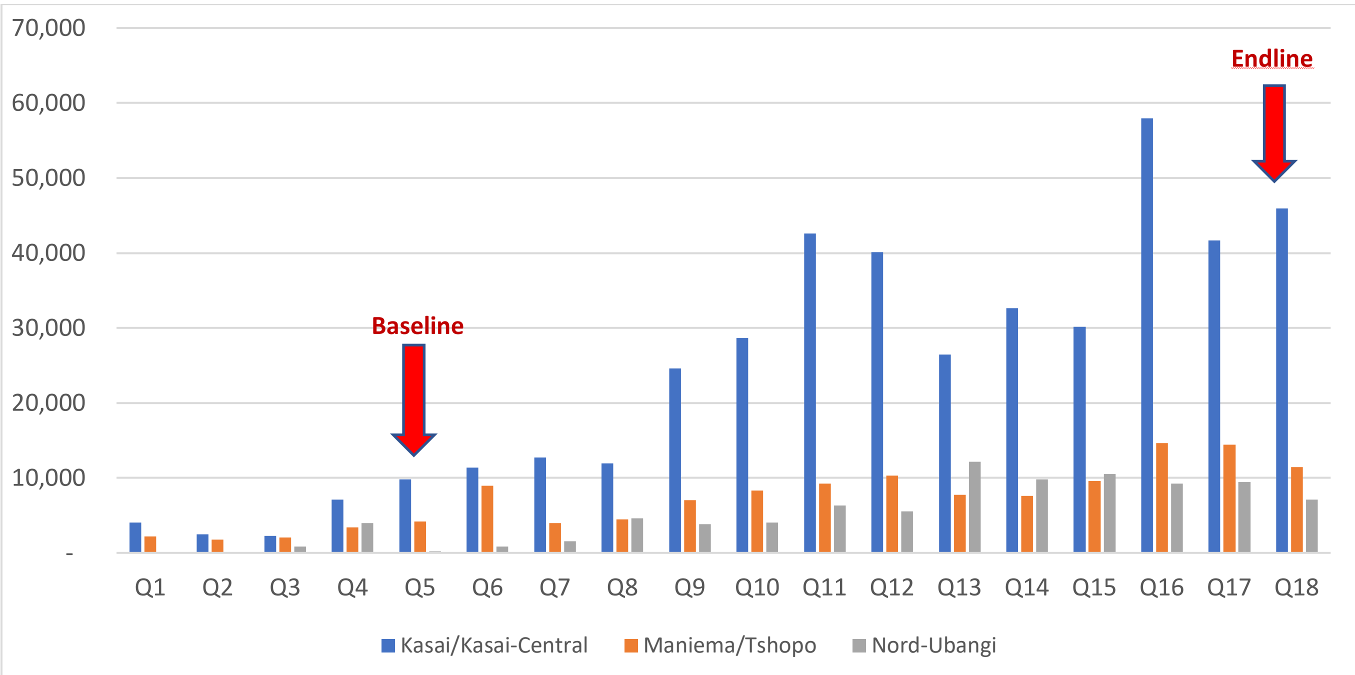
Additionally, when the Système National d'Information Sanitaire (National Health Information System, SNIS) started to use the web-based health data information system DHIS2 as the platform for collecting health information in the DRC, ASSP provided training on DHIS2 in ASSP-supported health zones.

ASSP activities prior to the baseline survey. According to ASSP's quarterly reports, prior to the baseline survey, the ASSP started the training for "Master trainers" selected from the *10ème Direction* PNSR, Roi Baudin Hospital, and other hospitals and maternity clinics in Kinshasa, the Centre de Formation en Santé de la Reproduction Aboubakar Touré, as well as the MCH focal point from each ASSP implementing partner. Also, most general reference hospitals, reference health centers, and health centers in intervention areas that were supported by the ASSP project initiated the family planning service and contraceptive provision.

ASSP routine family planning data. Performance in family planning programs in developing countries is generally measured in two ways: in terms of the outputs produced by the program (measured at the program level with routine service statistics) and by the outcomes (measured at the population level through population-based surveys). In the ASSP project, the two outputs of interest are couple-years of protection (CYP) and MCPR. Couple-years of protection is the estimated protection provided by contraceptive methods for a one-year period, based upon the volume of all contraceptives sold or distributed free of charge to clients during that period. CYP is calculated by multiplying the number of each type of contraceptive sold or distributed free of charge by a conversion factor, to generate an estimate of contraceptive protection by unit of each method. CYP represents a measure of output ("the volume of contraception dispensed to clients"), which can be reported for a single health facility or aggregated to the district, provincial, or national level. Routine service statistics were reported on a monthly, quarterly, and annual basis. Figure 7.1 shows the CYP generated by different domains during the first 4.5 years of the ASSP project.

Analysis of the routine service data shows that more than 66 percent of the total CYP generated over 18 trimesters of the project (four and a half years) were in the Kasai/Kasai Central domain. Kasai/Kasai Central was the largest domain among the three domains of the ASSP project which of the 52 health zones supported by ASSP, 28 health zones (54 percent) were in this domain. Thus, the majority of family planning output in the ASSP project occurred in Kasai/Kasai Central domain. The rest of the CYP was generated in Nord Ubangi (14 percent) and Maniema/Tshopo (20 percent). The routine service statistics showed that the ASSP supported facilities inserted 12,464 IUDs during the first 18 trimesters of the project. Of all IUDs inserted, 69 percent of IUDs were administered in Kasai/Kasai Central domain. The rest of the IUDs were distributed in Nord Ubangi (11 percent) and Maniema/Tshopo (17 percent). Furthermore, in Maniema/Tshopo domain, 73 percent of the IUDs were distributed in 6 ASSP-supported health zones (out of 13 supported health zones). Similarly, in Nord Ubangi, 93 percent of the IUDs were distributed in 5 health zones (out of 11 health zones) (results not shown).

Figure 7.1. Total CYP by domain from April 2013 (Q1)- September 2017 (18) generated from routine service statistics



This chapter of the report summarizes the findings from the family planning section of the baseline and endline survey. We assess the impact of the ASSP project by comparing change in the treatment (ASSP-supported) area versus comparison areas (not supported by ASSP). And we examine whether the project achieved the 1.8 percentage point increase per year expected by Department for International Development (DFID) in the modern contraceptive prevalence rate.

ii. Quantitative findings

Difference-in-differences model

This chapter presents key findings from the family planning section of the women's surveys conducted in 2014 and 2017. The analysis assesses the impact of the ASSP project on two main contraceptive indicators: the knowledge of women of reproductive age of modern contraceptive methods and use of modern contraception. In the field of family planning, MCPR and other indicators are calculated based on two different populations: married women of reproductive age and all women of reproductive age. In this analysis, we follow the indicator championed by the FP2020 initiative and use all women of reproductive age, which reflects the goal of increasing access to and use of contraceptives by both married and unmarried women. For reasons explained earlier and in greater detail, the endline survey was limited to only two domains (Nord Ubangi and Maniema/Tshopo), due to political unrest in Kasai/Kasai Central.

To assess the impact of the project on modern contraceptive use, we used the difference-in-difference (DID) method. The DID model compares the difference in the outcome variable (modern contraceptive use) over time (between 2014 and 2017) between ASSP and non-ASSP areas. The adjusted DID models for modern contraceptive use are shown in Tables 7.1 to 7.4. Table 7.1 displays the fully adjusted DID model for modern contraceptive use among women of reproductive age in ASSP and non-ASSP areas. There was no significant program effect on modern contraceptive use. The fully-adjusted model indicates that, of seven independent variables tested as possible correlates of contraceptive use, four were significant. Women living in Maniema (compared to Nord Ubangi), in peri-urban settings (compared to rural areas), having more children (3-4, +5), and those who were more educated are significantly more likely to use modern contraceptives.

Since the descriptive analysis showed an increase in the proportion of women using long-acting reversible contraceptive (LARC) methods (i.e., implants and IUDs), we performed a separate DID analysis to assess the impact of the program, with use of LARCs among women of reproductive age as the dependent variable. Table 7.2 illustrates the fully adjusted DID model for modern contraceptive use limited to LARC methods. Our analysis showed a significant effect of the project on the use of LARCs. Specifically, women in the intervention areas in 2017 had a significantly higher probability of using LARCs compared to their counterparts (p=0.045). The same model shows that women in peri-urban areas, with some primary, completed primary, or completed secondary education, married or in union, and/or women with 5+ children have significantly higher probabilities of using LARCs compared to the reference groups.

Key Points

- Overall, the impact evaluation did not show a significant increase in MCPR.
- The overall result masks the significant effect in Nord Ubangi that was not found in Maniema/Tshopo.
- The project achieved the 1.8 percentage points increase per annum in MCPR in Nord Ubangi, consistent with DFID's expectation.
- The project showed a significant impact on LARC method use.

In another attempt to capture the impact of the program on modern contraceptive use and to control for any other differences at village level (which could affect the outcome), we jointly used DID and fixed-effects methods. Results from village fixed-effect model also showed no significant program effect on modern contraceptive use among women in the treatment area (data not shown).

Since there was a significant correlation between modern contraceptive use and the sampling domain, we conducted further analysis to assess the DID model for each sampling domain (Table 7.3). Results from these two fully adjusted models suggest that there was a significant effect in Nord Ubangi (marginal effect: 3.6 percent, p=0.025), while a significantly negative effect was detected for Maniema/Tshopo (marginal effect: -6.3 percent, p=0.002). In short, ASSP had the expected effect on modern contraceptive use in Nord Ubangi (that was not found in the non-ASSP areas), but no such effect occurred in Maniema/Tshopo.

Specific to the family planning intervention, in 2015 DFID indicated to ASSP project staff an expectation of an increase of 1.8 percentage points per year in MCPR in the ASSP treatment areas, consistent with goals set by the 2012 London Summit for different countries. The descriptive statistics shown in Table 7.2 show that in the three-year period between 2014 and 2017, MCPR in Nord Ubangi increased from 2.7 percent to 8.1 percent. This increase of 5.4 percentage points over the three years equates to 1.8 percentage points per year, exactly the level of change that DFID expected from this project. However, the same results were not evident in Maniema/Tshopo, for reasons discussed elsewhere.

Table 7.4 illustrates ASSP's program effect on different wealth categories of the women population. The analysis was carried out to assess the DID model limited to constructed wealth categories based on wealth quintile. The respondents were re-coded as two levels of wealth; 1- Low and low-middle quintile, 2- middle, high-middle, and high quintile. Results from these two fully adjusted models suggest that there was no significant program impact on modern contraceptive use in any of the wealth categories. Figure 7.2 summarizes the results of DID models by survey domain and wealth.

To assess the potential impact of seasonality on the results, we calculated the difference between MCPR in northern Maniema, which was experiencing the rainy season, and southern Maniema, which was experiencing the dry season at endline. There were no significant differences found.

Furthermore, as a robustness check, we included a variable in the DID models for modern contraceptive use that estimated the straight-line distance between the woman's household and the nearest governmental health facility. There were no changes in the direction or significance of the impact of ASSP in any of the models, and the distance variable was never significant. Also, there was no significant association related to woman's distance to the nearest health facility between ASSP and non-ASSP areas at baseline or endline (results not shown).

Figure 7.2. Direction of the impact of ASSP on modern contraceptive use overall and within subpopulations based on sex, wealth, and sampling domain.

	Modern contraceptive use
Overall DID results	No impact
Wealth quintile	
Low and Low-middle	No impact
Middle, High-middle, and High	No impact
Sampling domain	
Nord/Sud Ubangi	Increased
Maniema/Tshopo	Decreased

Notes: Each line represents a fully-adjusted DID probit model. Impact is determined by statistical significance ($p<0.05$). Green shading indicates that the impact was in the desired direction, and orange shading indicates that the impact was in the undesired direction. White shading indicates that no impact was detected.

Descriptive statistics

Results of the descriptive analysis of the baseline and endline survey on knowledge of women of any modern contraceptive method appear in Table 7.5, and on contraceptive use in Table 7.6 and Table 7.7.

Percent of women who know specific methods

Table 7.7 reports the comparison of knowledge of women on modern contraceptive methods at baseline and endline. The total number of known methods was calculated for each woman in each survey. The mean number of methods known for women increased from 5.1 in 2014 to 5.5 in 2017 in ASSP areas, and from 5.3 to 6.0 in non-ASSP areas, which is statistically significant at the 0.05 level in both areas. The percentage of women in ASSP areas familiar with the injectable and implant methods increased significantly between the baseline (2014) and endline (2017) surveys, whereas no significant change was detected on knowledge of these methods in non-ASSP areas (2014: 51.3 percent vs. 2017: 68.7 percent, p=<0.001). Paradoxically, in ASSP areas, the percent of women who knew any modern method significantly declined between the 2014 and 207 surveys by 5.1 percentage points (p=0.015), despite the increase in the mean number known.

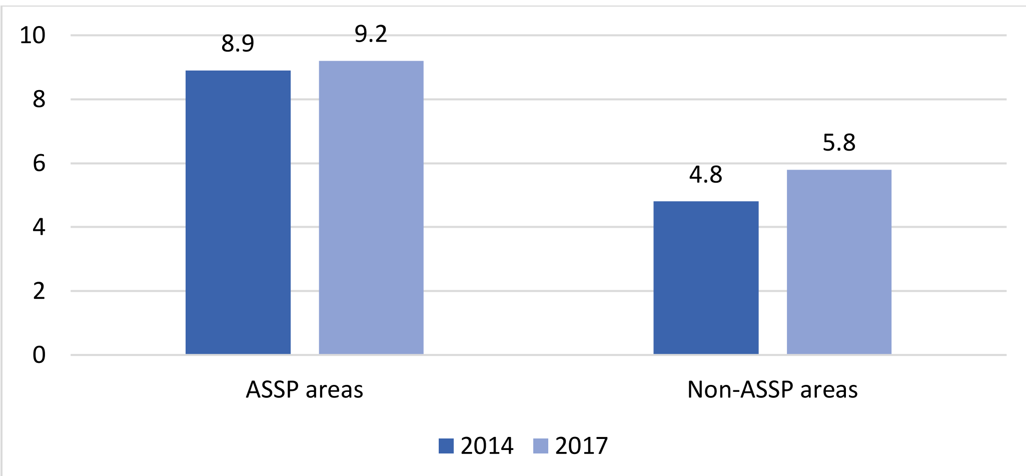
Percent of reproductive-aged women using modern contraception among all women of reproductive age and mix method

Table 7.8 shows the change in MCPR between baseline in 2014 and endline in 2017 separately for the ASSP areas (two domains combined) and the non-ASSP areas. MCPR changed from 8.9 percent to 9.2

percent in the ASSP areas and from 4.8 percent to 5.8 percent in the non-ASSP; neither change was statistically significant.

Table 7.9 provides detail on contraceptive method mix in both ASSP and non-ASSP areas at baseline and endline. The percent of women using implants and injectables increased in ASSP areas between two surveys (0.9 percent vs. 3.1 percent for implants, 0.2 percent vs. 0.9 percent for injectables), whereas male condom use declined by 2.6 percentage points in ASSP areas but increased in non-ASSP areas. Although not taken into consideration in measuring MCPR, the proportion of women using traditional methods in ASSP areas decreased slightly from 7.8 percent to 3.6 percent, whereas it increased from 2.7 percent to 4.4 percent in non-ASSP areas. The change in the percentage of use of specific methods was not tested for significance due to the small numbers of women using each method.

Figure 7.3. Percentage of all reproductive-aged women using modern contraception in ASSP and non-ASSP areas, by year.



*Difference between 2014 and 2017 levels is statistically significant at *p*<0.05.

iii. Qualitative findings

The qualitative research conducted on other aspects of the ASSP project, (e.g., maternal health, child health, and child nutrition) to further explain the findings from the impact assessment, was not carried out for family planning. However, we did conduct qualitative research in two ASSP-supported health zones in 2015 to better understand cultural norms regarding fertility and barriers to contraceptive use among both adults and young people in these communities. The results of these qualitative studies appear in two peer-reviewed journal articles (Muandu et al., 2017: Muandu et al., 2018).

iv. Limitations

The analysis had several limitations, though not specific to family planning alone:

Timing of baseline survey. The baseline survey was administered after ASSP project activities had begun (in quarter 5 of the project). This means that family planning service delivery had begun one year before the baseline survey. Although the primary activities were not carried out as intensely as in later quarters, the project activity before the baseline survey might have some impact on the finding of the baseline survey (thus reducing the observed effects of the project).

Seasonality. While the entire sampling area was experiencing the rainy season at baseline, one area, southern Maniema/Tshopo, was in the dry season at endline. This may have biased the findings toward an ASSP impact, as commodities may be more likely to be in stock during the dry season. Although a comparison of wet and dry regions did not find significant differences in MCPR, this potential bias cannot be ruled out.

Service interruptions. Over the 4.5-year intervention period, the project experienced multiple implementation challenges in service delivery, financing, transfer of commodities, and related issues. This can be found in the family planning stockouts reported at baseline and endline. The majority of the sampled facilities in ASSP areas were most likely to have condoms (60 percent in Maniema/Tshopo and 39 percent in Nord Ubangi). Also, more than 97 percent of the facilities in Nord Ubangi and 78 percent in Maniema/Tshopo were stocked out on IUDs on the day of the endline survey. Additionally, 60 percent of facilities in Maniema/Tshopo and 97 percent in Nord Ubangi were stocked out on oral contraceptive pills on the day of the endline survey (results are shown in detail in chapter 3). Also, the service statistics data from DHIS2 shows that family planning commodities were not distributed in equal amounts between health zones and consistent between quarters of the project. In other words, there is a pattern of high-volume distribution at some quarters and some heath zones, while service data shows very few activities in other quarters and health zones.

Exclusion of Kasai/Kasai Central from endline survey. The project was implemented in 52 health zones, divided into three sampling clusters or domains. Because of political unrest in Kasai/Kasai Central, it was not possible to collect endline data in one of the three domains. However, Kasai/Kasai Central had the largest number of ASSP-supported health zones and the most active uptake of contraception, based on routine service statistics converted to couple-years of protection. For example, in the first 18 quarters of the project (four and a half years), more than 65 percent of the CYP generated in ASSP-supported facilities were in Kasai/Kasai Central domain. Also, the analysis of service data shows that 69 percent of the IUDs were distributed in the Kasai/Kasai Central. A major limitation of the study is the absence of data at the endline from this domain.

All these issues make the comparison of ASSP and non-ASSP areas more difficult and may have diminished the observed impact of the family planning intervention.

v. Discussion

This chapter describes the performance of the ASSP project relative to the objective of improving modern contraceptive use through increased access to family planning services. Overall the impact evaluation did not show a significant increase in MCPR in ASSP areas that can be attributed to ASSP. This finding masks the fact that in one of the two domains (Nord Ubangi), the project did have a significant effect on MCPR, whereas in the other, MCPR showed no improvement. Moreover, the project achieved an increase of 1.8 percentage points per year in Nord Ubangi, consistent with the goal that DFID stipulated in 2015. This finding is particularly noteworthy since Nord Ubangi started at the very low end of the "S curve," where increases in MCPR are most difficult to achieve (Track 20, 2018). Another noteworthy result was the effect of the project on the use of LARC methods. Given the importance of LARCs on the continuity of contraceptive use, this result was also positive in terms of project impact.

The third finding of interest was higher knowledge of and use of modern contraceptive methods among women in Maniema/Tshopo as compared to the other sampling areas in the ASSP baseline. One possible explanation is that women from Maniema/Tshopo were significantly higher on the wealth index than their counterparts in Nord/Sud Ubangi. Also, this higher MCPR most likely reflects the effects of previous family planning interventions in this area.

For future projects we propose the following recommendations:

1) Reduce/avoid stockouts of all contraceptive methods, but in particular the implant, given its widespread popularity in the DRC.
2) Conduct a mid-term process evaluation to ensure that the project is being implemented as planned and to identify problems that require mid-course correction.
3) Improve the data quality through training of the personnel on the importance of routine service data.
4) Improve data quality through monitoring and data quality control using a bottom-up data validation system.

In conclusion, both descriptive analysis and fully adjusted DID models highlight that the ASSP project has significantly increased use of LARC methods. Specifically, the ASSP project had a significant impact on implant use. Also, the descriptive analyses show that the project achieved the increase of 1.8 percentage points per year in MCPR in Nord Ubangi. Furthermore, both descriptive analysis and fully adjusted DID models suggest that the ASSP project had a significant impact on modern contraceptive use in Nord Ubangi. However, this impact was not detected in Maniema/Tshopo. **T**he analysis did not show a significant increase in knowledge of modern contraception, in part because the percentage of women that knew specific methods in ASSP and non-ASSP areas varied over surveys in ways that were difficult to interpret (e.g., loss of knowledge in terms of CycleBeads and female condom).

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Table 7.1. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on modern contraceptive use (n=6,374)

	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-0.008	0.013	0.512
Year	0.015	0.010	0.116
ASSP vs. non-ASSP	0.046	0.022	**0.034**
Region			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	0.020	0.007	**0.003**
Setting			
Rural	[ref]		
Peri-urban	0.030	0.009	**0.001**
Age			
15-19	[ref]		
20-24	0.026	0.012	**0.027**
25-34	0.010	0.012	0.394
35-44	0.017	0.014	0.205
45-49	-0.025	0.014	0.071
Education			
No education	[ref]		
Some primary	0.027	0.007	**<0.001**
Completed primary	0.062	0.009	**<0.001**
Completed secondary	0.247	0.057	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 7.1 (con't). Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on modern contraceptive use (n=6,374)

	Marginal Effect	**Standard Error**	**p-value**
Marital status			
Not married	[ref]		
Married/in a union	-0.012	0.015	0.442
Divorced/separated/widowed	0.011	0.019	0.546
Wealth quintile			
Low	[ref]		
Low middle	-0.004	0.012	0.726
Middle	-0.004	0.012	0.722
High middle	0.015	0.012	0.227
High	0.011	0.013	0.391
Number of living children			
0	[ref]		
1-2	0.017	0.010	0.068
3-4	0.049	0.012	**<0.001**
5+	0.062	0.014	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 7.2. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on modern contraceptive use (limited to LARC users) (n=6,374)

	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.018	0.009	**0.045**
Year	0.010	0.007	0.153
ASSP vs. non-ASSP	-0.007	0.016	0.659
Region			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-0.009	0.004	**0.040**
Setting			
Rural	[ref]		
Peri-urban	0.018	0.006	**0.002**
Age			
15-19	[ref]		
20-24	0.004	0.007	0.589
25-34	0.003	0.007	0.696
35-44	0.016	0.009	0.063
45-49	0.009	0.011	0.411
Education			
No education	[ref]		
Some primary	0.012	0.004	**0.004**
Completed primary	0.018	0.005	**0.001**
Completed secondary	0.030	0.023	0.204
Marital status			
Not married	[ref]		
Married/in a union	0.013	0.006	**0.038**
Divorced/separated/widowed	0.034	0.010	**0.001**

Note: Statistical significance is considered at p<0.05.

Table 7.2 (con't). Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on modern contraceptive use (limited to LARC users) (n=6,374)

	Marginal Effect	Standard Error	p-value
Wealth quintile			
Low	[ref]		
Low middle	0.002	0.007	0.741
Middle	-0.002	0.006	0.721
High middle	0.014	0.007	0.054
High	0.003	0.007	0.632
Number of living children			
0	[ref]		
1-2	0.005	0.006	0.332
3-4	0.015	0.007	**0.025**
5+	0.028	0.008	**0.001**

Note: Statistical significance is considered at $p<0.05$.

Table 7.3. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on modern contraceptive use, restricted to Nord/Sud Ubangi (n=3,265)

	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	3.621	0.016	**0.025**
Year	0.310	0.012	0.790
ASSP vs. non-ASSP	-3.090	0.028	0.271

Note: Statistical significance is considered at $p<0.05$.

Table 7.4. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on modern contraceptive use, restricted to Maniema/Tshopo (n=3,298)

	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-0.063	0.021	**0.002**
Year	0.035	0.016	**0.027**
ASSP vs. non-ASSP	0.135	0.034	**<0.001**

Note: Statistical significance is considered at $p<0.05$.

Table 7.5. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on modern contraceptive use, restricted to low and low-middle wealth quintiles (n=2,131)

Low and low-middle quintiles	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.425	0.233	0.068
Year	0.054	0.179	0.763
ASSP vs. non-ASSP	-0.194	0.411	0.637

Note: Statistical significance is considered at $p<0.05$.

Table 7.6. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on modern contraceptive use, restricted to middle, high-middle, and high wealth quintiles (n=4,432)

Middle, high-middle, and high quintiles	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.038	0.021	0.070
Year	0.005	0.016	0.763
ASSP vs. non-ASSP	-0.017	0.037	0.637

Note: Statistical significance is considered at $p<0.05$.

Table 7.7. Comparison of contraception knowledge among all women age 15-49

	ASSP			Non-ASSP		
	2014	**2017**	**p-value**	**2014**	**2017**	**p-value**
n (not weighted)	1,443	2,109		1,523	2,053	
Percent (weighted)						
Knowledge of any modern method	92.0	86.9	**0.015**	90.8	91.4	0.760
Know female sterilization	35.8	40.3	0.239	61.7	51.9	**0.011**
Know male sterilization	12.9	15.1	0.344	16.9	20.3	0.379
Know intrauterine device	19.5	25.8	**0.073**	31.1	30.4	0.933
Know injectables	51.3	68.7	**<0.001**	64.4	71.7	0.131
Know implants	30.6	64.6	**<0.001**	22.7	41.8	**0.041**
Know the pill	47.6	48.5	0.870	51.0	58.5	0.205
Know condom	83.2	77.0	0.076	83.2	79.0	0.155
Know female condom	38.3	29.4	**0.025**	37.7	33.2	0.289
Know jelly or foam	12.6	8.1	0.064	9.4	6.3	0.548
Know emergency contraception	25.0	17.6	0.083	10.0	18.1	0.124
Know standard days/CycleBeads	32.0	23.0	**0.014**	19.9	22.0	0.750
Know lactational amenorrhea	39.1	38.9	0.956	44.0	46.1	0.601
Mean number of modern methods known	5.1	5.5	**0.003**	5.3	6.0	**0.001**

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Table 7.8. Percentage of reproductive-aged women using a modern contraceptive method by selected characteristics, study sample, and year

	ASSP				**Non-ASSP**			
	2014 (*n=1,443*)	**2017 (*n=2,109*)**	**Absolute change**	***p-value***	**2014 (*n=1,523)***	**2017 (*n=2,053*)**	**Absolute change**	***p-value***
Modern contraceptive use	8.9	9.2	0.3	0.799	4.8	5.8	1.0	0.491
Sampling domain								
Nord/Sud Ubangi	2.7	8.1	5.4	**0.001**	2.5	4.1	1.5	0.200
Maniema/Tshopo	12.0	10.2	-1.8	0.319	11.0	10.8	-0.2	0.934
Setting								
Peri-urban	14.2	18.6	4.4	0.234	7.9	16.1	8.1	0.094
Rural	8.2	7.6	-0.6	0.693	4.7	5.1	0.4	0.783
Wealth quintile								
Low	3.0	5.4	2.4	0.320	0.4	3.7	3.2	**0.010**
Low middle	6.4	13.1	6.7	0.165	2.8	3.4	0.6	0.811
Middle	5.8	7.2	1.4	0.584	1.2	4.6	3.4	**0.010**
High middle	10.2	11.5	1.3	0.690	2.4	6.3	3.8	**0.043**
High	14.3	9.6	-4.7	0.119	12.4	9.0	-3.4	0.178
Level of education								
No education	4.6	3.9	-0.7	0.766	1.7	1.5	-0.1	0.933
Some primary	6.8	9.0	2.1	0.265	2.0	6.5	4.6	**0.006**
Completed primary	13.7	12.7	-0.9	0.745	8.5	7.0	-1.5	0.672
Completed secondary	45.9	35.9	-10.0	0.524	25.6	26.9	1.3	0.962

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Table 7.8 (con't). Percentage of reproductive-aged women using a modern contraceptive method by selected characteristics, study sample, and year

	ASSP				Non-ASSP			
	2014 (*n=1,443*)	**2017 (*n=2,109*)**	**Absolute change**	***p-value***	**2014 (*n=1,523)***	**2017 (*n=2,053*)**	**Absolute change**	***p-value***
Marital status								
Never married	10.5	7.2	-3.4	0.459	10.6	6.9	-3.7	0.330
Married/in a union	8.4	9.1	0.7	0.667	2.8	5.8	3.0	**0.042**
Divorced/widowed	9.2	15.7	6.5	0.179	8.5	4.3	-4.2	0.397
Number of living children								
0	5.8	5.7	-0.1	0.971	9.6	6.1	-3.5	0.321
1-2	8.8	8.3	-0.5	0.858	2.1	5.1	3.0	**0.046**
3-4	12.8	8.9	-3.9	0.108	4.9	6.9	2.0	0.414
5+	7.9	13.3	5.3	**0.030**	3.5	5.3	1.8	0.553
Total number of women using modern contraceptive methods	111	185			64	116		

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Table 7.9. Comparison of contraception use among all women age 15-49,

	ASSP			Non-ASSP		
	2014	**2017**	**p-value**	**2014**	**2017**	**p-value**
n (not weighted)	1,443	2,109		1,523	2,053	
% (weighted)						
Currently using any method	16.0	13.0	0.182	7.4	10.6	0.231
Currently using a modern method	8.9	9.2	0.798	4.8	5.8	0.489
Current contraceptive method used						
None	84.0	87.2		92.6	89.9	
Modern methods						
Female sterilization	0.4	0.5		0.7	0.3	
Male sterilization	0.0	0.1		0.0	0.0	
Implants	0.9	3.1		0.6	0.2	
Injectable	0.2	0.9		0.0	0.4	
Intrauterine device	0.1	0.0		0.0	0.3	
Pill	0.2	0.4		0.0	0.2	
Male condom	5.0	2.4		2.8	3.4	
Female condom	0.1	0.1		0.0	0.2	
Foam/Jelly	0.0	0.0		0.0	0.0	
Standard days/CycleBeads	0.1	0.1		0.0	0.0	
Lactational amenhorrea	1.1	1.3		0.5	0.5	
Other modern methods	0.1	0.2		0.0	0.2	
Traditional methods						
Rhythm/calendar	6.3	1.6		1.6	2.3	
Withdrawal	1.2	1.2		0.7	1.4	
Other traditional methods	0.3	0.8		0.4	0.7	

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Chapter 8
Health Service Utilization

Acronyms

ASSP	Access to Primary Health Care (Project)
CHE	Community Health Endowment
DFID	Department for International Development
DID	Difference-in-Differences
DRC	Democratic Republic of Congo
GLM	Generalized linear model
LLIN	Long Lasting Insecticidal Nets
PMTCT	Prevention of Mother to Child Transmission

i. Overview of ASSP approach

In the Access to Healthcare Program, the Department for International Development (DFID)-funded health systems strengthening project that preceded Access to Primary Health Care (ASSP), a key aim was to minimize the financial burden of health care costs to users. Health services were provided free of charge to pregnant women and children under five years of age, and nominal fees were charged to other categories of patients, consistent with the Democratic Republic of Congo (DRC) government's policy that users participate in health care financing. The Access to Healthcare Program also provided supplemental payments to health workers, in addition to the government salary that they received.

In order to improve the availability and quality of health services, as well as to make progress towards the financial sustainability of the health system, the ASSP project introduced an array of health financing initiatives in project-assisted health zones. These included the following:

- **Elimination of primes for health workers.** In the health zones that were previously receiving financial and technical assistance from DFID's Access to Healthcare Program, ASSP eliminated supplemental primes paid to health workers in addition to their government salaries.
- **Introduction of human resource information system.** At the same time, ASSP implemented a complex intervention to improve the payment and distribution of health workers in Kasai Central and Kasai provinces. This was done through introducing a human resource information system, in order to remove ghost workers from the payroll, improve the timeliness of salary payments to health workers, and updating staff norms to enable more efficient staffing of facilities. This intervention was also supposed to be introduced in Maniema and Nord Ubangi, but this had not occurred by the time the endline survey was administered.
- **Mobilizing community financing**. In selected health zones, ASSP introduced community-based income generation schemes (Community Health Endowments [CHE]) that were aimed to provide financial risk protection to community members. The CHEs were intended to be a new source of funds for the health system, thereby permitting a reduction in user fees charged to clients. In 2015, routine program data and operations research suggested that the enrollment rates in the program were low due to a number of factors, and in response, ASSP's project management team made a number of changes. These include: improving the program's communication strategy, discontinuing technical support for community-based agricultural income-generation activities, and improving the quality of health services offered at the health center by strengthening health center management and supervision.
- **Standardizing user fees.** In all project health zones, ASSP introduced guidelines aimed at standardizing the user fees setting approach, while allowing for differences in fees level across health zones. Provincial health departments (divisions) participate in the exercise. The guidelines included provisions to exempt the poor and other vulnerable populations for curative care in all ASSP health zones and delineate selected services to be free of charge for all populations. The covered services (services exempt from user charges) included: immunizations, growth monitoring, administration of Vitamin A, distribution of long-lasting insecticide-treated nets (LLINs) to pregnant

women and infants during antenatal care and immunization visits, distribution of LLINs in campaigns, prevention of mother-to-child transmission (PMTCT), and basic family planning services.

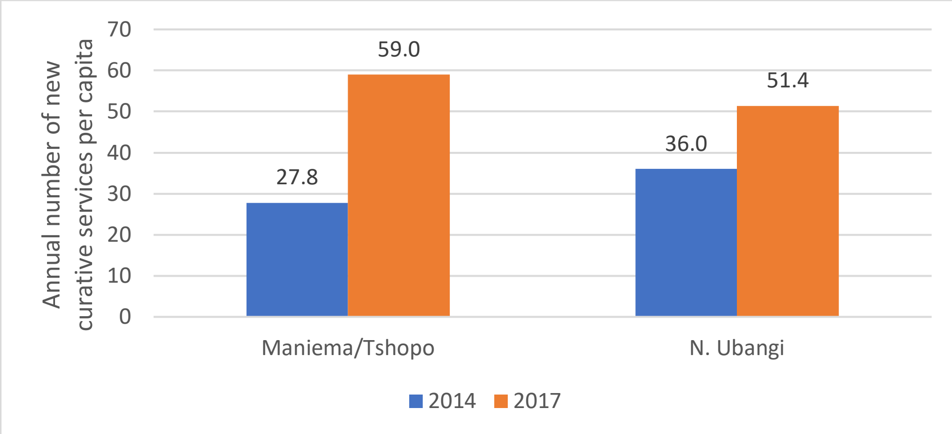
In addition to the financing interventions described above, ASSP carried out other strategies that aimed to improve health service utilization, including those that aimed to improve a) the availability of medicines and equipment and b) community engagement in the management of health services. These strategies are described in the Service Quality chapter of this report.

ASSP activities prior to the baseline survey. A key activity initiated during from the very first three months of the project (but which would take several quarters to complete) was negotiation with the communities for a new pricing of health services for health centers and hospitals. In most places, the project reported that this initiative was well-received, with prices being decreased by 25 percent to 50 percent; in some health zones, however, where health services previously free, the prices were set too high to be affordable. Data from ASSP's routine project monitoring system suggests that, over the course of Year 1, an increase in health service utilization was noted, with identified well-performing health zones in Maniema (3), Province Orientale (3), and South-Kivu (2). Specifically, when disaggregated by the former Access to Healthcare Program and new ASSP health zones, trends over Year 1 suggested that initially decreasing utilization in the former Access to Healthcare Program health zones began stabilizing, while the new ASSP health zones continued to experience modest increases in utilization rates.

The ASSP program also provided primes and support to the health zone central office. Given that primes as implemented by the Access to Healthcare Program were very high and included primes for health facilities so they could provide reduced cost or free health services, IMA requested that the health zones that were part of the Access to Healthcare program progressively decrease primes during the last 6 months of the project. Ultimately, Merlin reduced the primes in the Maniema area to 25 percent, but IRC continued paying 100 percent of primes to the end of the project. ASSP aimed to maintain primes for the district provincial health office and health zone central office until the end of the project, but progressively decrease primes for health services as other mechanisms for health financing, such as the CHE strategy described above, increased. As of quarter 3, routine project monitoring data indicated that performance primes, running costs, and supervision expenses were paid to all ASSP assisted health zones on time.

ASSP routine data on outpatient services. ASSP's routine monitoring system included an indicator of the annual number of new curative consultations in health facilities per capita. Services included in the indicator include those that were provided by health centers, reference general hospitals, and reference health centers supported by ASSP. The indicator was disaggregated by health zone and was reported every month. As indicated in Figure 8.1, the number of new services provided by ASSP-assisted health facilities increased between 2014 and 2017 in both Maniema/Tshopo and Nord Ubangi.

Figure 8.1. Reported annual number of new curative services per capita by sampling domain, 2014 and 2017 ASSP routine data.



ii. Quantitative findings

Below, we present findings on several dimensions of outpatient health service utilization, including the prevalence of illnesses and injuries, health service utilization, out of pocket health expenditures, and client perceptions of care. We analyze the overall impact of the ASSP strategies on outpatient health service utilization among individuals of all ages as well as among sex, wealth, and survey domain subgroups. It was beyond the scope of the chapter to separately assess the impact of each of the interventions described above. However, it should be noted that separate evaluations of ASSP's CHE intervention, the human resource information system intervention, and the community engagement intervention were completed by Tulane as part the Operations Research and Impact Evaluation component of ASSP. In addition, other chapters of this report focus on the effects of the ASSP project on specific types of maternal and child health service utilization.

Key Points

- The results do not provide empirical evidence of an ASSP program effect on the utilization of outpatient services.
- The ASSP project was found to have had a statistically significant impact on decreasing the probability of paying a) a non-zero amount for any type of outpatient health care cost and b) a non-zero amount for outpatient consultation.
- The ASSP project was found to have had a significant impact on improved perceptions of both equipment availability and the cleanliness of the facility, but not on improved drug availability.

The prevalence of illnesses and injuries was assessed by asking the household representative if each member of the household, including the representative, had been sick or injured without being hospitalized during the four-week period prior to the survey. Individuals who had an illness or injury without being hospitalized were eligible for the outpatient module of the questionnaire. (Another module focused on inpatient health services, but those results are not reported here). Interviewers asked the household representative a series of questions about the type of illness and injury of each eligible household member, whether health services were sought, and if so where, how much was spent on health services, and the perception of several dimensions of health care. Household representatives were encouraged to consult with other household members if they were unsure of the response.

Illness and injuries

In the adjusted DID models, there was no evidence that the ASSP project had a significant impact on the prevalence of illnesses and injuries in the past four weeks (Figure 8.2 and Table 8.1), both for the total population and for each of the subgroups of the population analyzed (based on sex, wealth, and sampling domain).

Figure 8.2. Direction of the impact of ASSP on prevalence of illnesses and injuries during the four-week period prior to the survey overall and within subpopulations based on sex, wealth, and sampling domain.

	Illness or injury in past 4 weeks
Overall DID results	No impact
Sex	
Female	No impact
Male	No impact
Wealth quintile	
Low and Low-middle wealth	No impact
Middle, High-middle, and High	No impact
Sampling domain	
Nord/Sud Ubangi	No impact
Maniema/Tshopo	No impact

Notes: Each line represents a fully-adjusted DID probit model. Impact is determined by statistical significance ($p<0.05$). Green shading indicates that the impact was in the desired direction, and orange shading indicates that the impact was in the undesired direction. White shading indicates that no impact was detected.

The descriptive results of the changes over time indicate that, in both ASSP and non-ASSP areas, the prevalence of illness and injuries declined between baseline and endline (Table 8.2). In ASSP areas, the percentage of individuals sick or injured in the four weeks prior to the survey declined from 16.0 percent at baseline to 12.3 percent at endline, a reduction that was marginally significant (Table 8.2; $p = 0.052$). In non-ASSP areas, the percentage dropped from 16.1 percent to 13.9 percent and did not emerge as statistically significant (Table 8.2; $p = 0.535$).

Robustness checks

The baseline and endline surveys were conducted in different months, creating the potential that differences due to the seasonality of some illnesses may influence the results. This was primarily a concern in southern Maniema, which experienced the rainy season during the baseline survey and the dry season at endline. Therefore, the endline prevalence of illness was compared between ASSP areas of northern and southern Maniema. The results indicate that illnesses more frequently reported in southern Maniema, which was experiencing the dry season at endline, compared to northern Maniema, which was experiencing the rainy season (53.4 percent vs. 46.6 percent, $p<0.001$).

Treatment

Regarding the treatment received for illnesses and injuries over the one-month period before the survey, there was no evidence of an ASSP program effect on the utilization of outpatient services, as the coefficient for the DID term in the adjusted DID model was not found to be statistically significant among all individuals reported to have been ill or injured, or for the various subgroups analyzed (Figure 8.3). For the other variables included in the full model, individuals living in Maniema were more likely to utilize health services than individuals living in Nord Ubangi (Table 8.2; $p < 0.001$), as were individuals living in peri-urban areas compared to individuals living in rural areas (Table 8.3, $p = 0.001$).

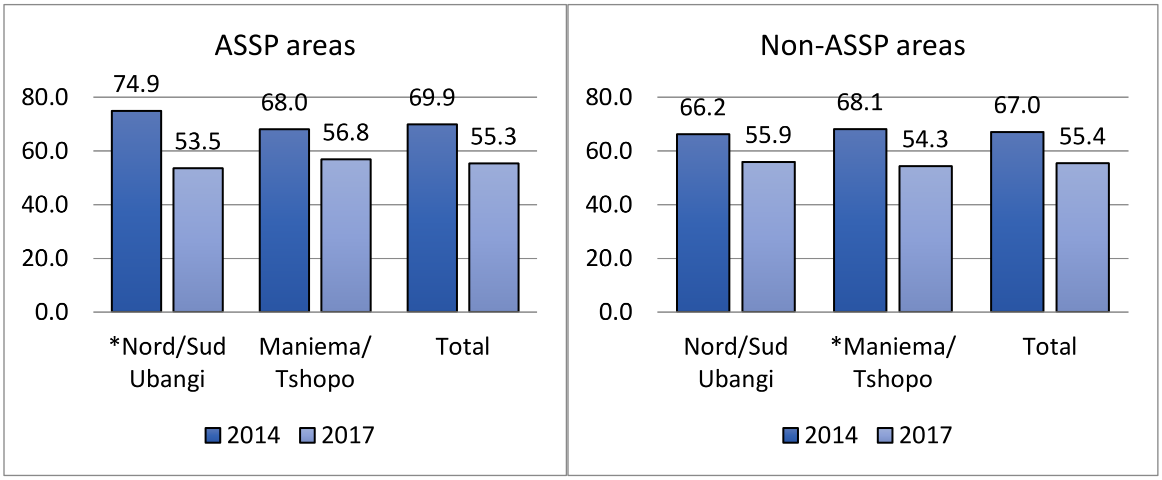
Figure 8.3. Direction of the impact of ASSP on outpatient health service utilization overall and within subpopulations based on sex, wealth, and sampling domain.

	Use of outpatient care
Overall DID results	No impact
Sex	
Female	No impact
Male	No impact
Wealth quintile	
Low and Low-middle wealth	No impact
Middle, High-middle, and High	No impact
Sampling domain	
Nord/Sud Ubangi	No impact
Maniema/Tshopo	No impact

Note: Each line represents a fully-adjusted DID probit model. Impact is determined by statistical significance ($p<0.05$). Green shading indicates that the impact was in the desired direction, and orange shading indicates that the impact was in the undesired direction. White shading indicates that no impact was detected.

Descriptive results of the changes in outpatient health service utilization in ASSP and non-ASSP areas helps explain why ASSP was not found to have had an impact on the use of outpatient services. Among those individuals who were reported to have been ill or injured, the percentage of individuals who received outpatient treatment dropped in both ASSP and non-ASSP areas (Figure 8.4). In ASSP areas, the percentage dropped by 14.5 percentage points (Table 8.3; p = 0.001), and in non-ASSP areas, the percentage dropped by 11.7 percentage points (Table 8.4; p = 0.007).

Figure 8.4. Percentage of individuals reported to have been ill or injured in the past four weeks who utilized health services in ASSP and non-ASSP areas by year.



*Difference between 2014 and 2017 levels is statistically significant at p<0.05.

Robustness checks

We also estimated a DID model that included as an additional independent variable the distance from households to the closest health facility, to assess whether the exclusion of distance in the models reported above help explains the lack of impact of the ASSP project on health service utilization. Distance was measured by the average straight-line distance of households in each village surveyed to the closest facility, based on GPS coordinates collected from households and health facilities. While distance was found to have had a statistically significant on service utilization, the effect of the ASSP project remained statistically insignificant.

In addition, we also investigated whether the endline utilization rates were different in southern Maniema, which was experiencing the dry season, then in northern Maniema, which was experiencing the rainy season. The results indicate that the percentage of the ill or injured who used services was larger in southern Maniema (57.9 percent) than among those in northern Maniema (42.1 percent) (p<0.05)).

Out-of-pocket health expenditures

To explore the impact of the ASSP project on out of pocket expenditures for outpatient care, the baseline and endine surveys included questions on the total amount spent on outpatient visits. In addition, item-specific questions on the amount spent on consultations, drugs, tests, and transportation were asked.

For this analysis, we analyzed two dichotomous indicators and two continuous indicators. The first dichotomous indicator measures whether the client spent any non-zero amount on the first visit associated with the illness and injury. This can include the amount spent on travel, consultations, drugs, and tests. The second indicator measures whether the individuals spent any non-zero amount on consultation fees for the visit only. The first continuous indicator measures the total amount spent on the first visit in US dollars, and the second measures the amount spent on consultation fees in US dollars. Households paid for health services using both Congolese Francs and US dollars, but all costs were converted to US dollars for this analysis using the prevailing exchange rates at the time of the surveys. The rates were obtained from the OANDA website (https://www.oanda.com/currency/converter/). For 2014 and 2017, the exchange rates used were 900 Congolese Francs per US dollar and 1,400 Congolese Francs per US dollar, respectively. To assess the impact of ASSP on the amount of out-of-pocket expenditure, a generalized linear model (GLM) with log link was used, which can account for zero expenditures as well as the skewed distribution of out-of-pocket health spending. The results are reported as marginal effects and statistical tests are against the null hypotheses of equal spending between the ASSP and non-ASSP groups.

The results of the adjusted DID models of the determinants of spending any non-zero amount on health service costs and consultations suggest that the project did have a financially protective effect on households, as indicated by Figure 8.5 (second and fourth columns). For example, the ASSP project was associated with a 4.9 percent decrease in the probability of spending *anything* for outpatient care, and a 17.1 percent decrease in the probability of spending *anything* for the consultation service, compared to those living in non-ASSP areas (Tables 8.5 and 8.7). For the latter outcome, the results on impact were also found to be significant among each of the sex, wealth, and survey domain subgroups analyzed (Figure 8.5).

Figure 8.5. Direction of the impact of ASSP on out of pocket spending for outpatient services overall and within subpopulations based on sex, wealth, and sampling domain.

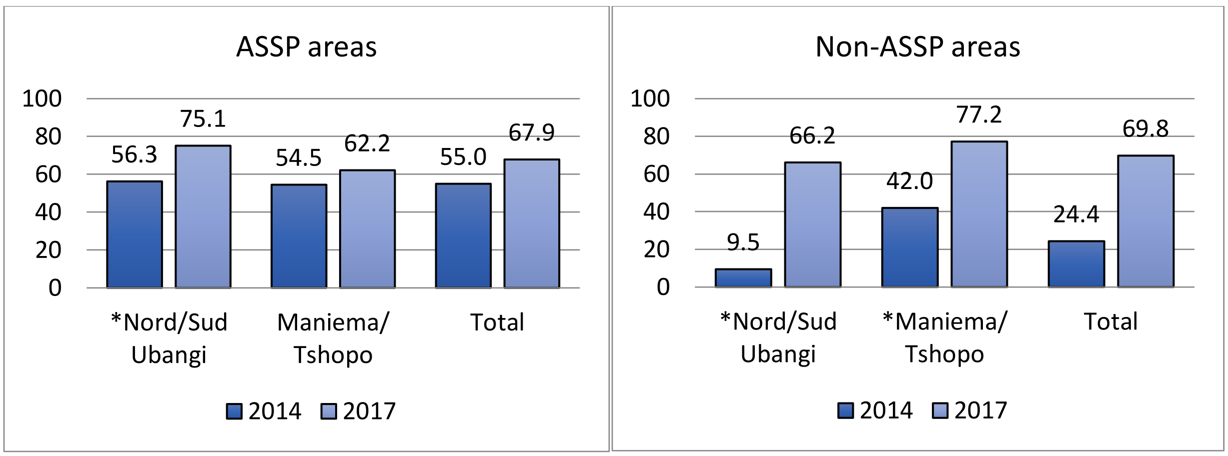
	Paid anything for health services	Amount paid for health services	Paid anything for the consultation	Amount paid for consultation
Overall DID results	Decreased	Increased	Decreased	Decreased
Sex				
Female	No impact	Increased	Decreased	No impact
Male	No impact	Increased	Decreased	No impact
Wealth quintile				
Low and Low-middle wealth	No impact	No impact	Decreased	No impact
Middle, High-middle, and High	Decreased	Increased	Decreased	No impact
Sampling domain				
Nord/Sud Ubangi	Decreased	No impact	Decreased	Decreased
Maniema/Tshopo	No impact	Increased	Decreased	No impact

Notes: Each line represents a fully-adjusted DID probit model. Impact is determined by statistical significance (p<0.05). Green shading indicates that the impact was in the desired direction, and orange shading indicates that the impact was in the undesired direction. White shading indicates that no impact was detected.

For the models of the determinants of the level of spending, the results of the GLM DID model suggest that the ASSP project had a statistically significant impact in reducing the amount spent on consultations (Table 8.11), as on average, ASSP clients spent 1.7 US Dollars less than their non-ASSP counterparts, after controlling for other factors. The question of how much households pay for outpatient consultations is of particular interest as guidelines on what consultation fees health facilities should charge were introduced in ASSP health zones with technical support from IMA World Health and its implementing partners. Of course, this indicator excludes other expenditures items, such as drugs, tests, and transportation. This protective effect was also evident among individuals in Nord/Sud Ubangi, but not among those in Maniema/Tshopo. However, it should be noted that the results on ASSP impact were not found to be significant among any of the sex and wealth groups analyzed.

Interesting, despite the fact that the ASSP project was found to have had an impact on decreasing the probably spending anything for consultations, the descriptive results on changes in these health expenditure indicators suggest that the percentage of outpatient clients who paid any non-zero amount for the consultation increased in ASSP areas but by much less than clients in non-ASSP areas. As reported in Figure 8.6 and Table 8.8, the percentage increased by 12.8 percentage points in ASSP areas (Table 8.8, $p = 0.007$) and by 45.4 percentage points in non-ASSP areas (Table 8.8, $p < 0.001$).

Figure 8.6. Percentage of clients who reported paying anything for consultations in ASSP and non-ASSP areas by year.



*Difference between 2014 and 2017 levels is statistically significant at $p<0.05$.

Satisfaction with care among clients

Respondents were also asked about their satisfaction with the care that members of the household had received. Respondents were asked whether or not they felt providers had the adequate skills, equipment, and medication necessary to treat the injury or illness, as well as their degree of satisfaction with the time it took to reach the facility and the time the patient spent waiting to be treated. Respondents were also asked about their impressions of the way providers explained the situation to the patient and their impression of the general cleanliness of the facility, including the rooms and toilets. Responses were collected on a scale which consisted of “excellent,” “good,” “acceptable,” “bad,” “very bad,” and “don’t know.”

For the purposes of this report, we analyzed three indicators of satisfaction – perceptions of equipment available, perceptions of the drugs available, and perceptions of the cleanliness of the facility. As indicated in Figure 8.7, the results of the DID models suggest that the ASSP project had a significant impact on improved perceptions of both equipment availability and the cleanliness of the facility, after controlling for other factors. For perceptions of cleanliness, the estimate of ASSP impact also emerged as statistically significant for all of the sex, wealth, and sampling domain subgroups analyzed. For the outcome, satisfaction with equipment, there was evidence of impact among female clients and among individuals living in poorer households, but not among individual in the other subgroups. However, as indicated also indicated in Figure 8.8, the ASSP project was not found to have had a significant impact on drug perceptions, as the DID term was not statistically significant.

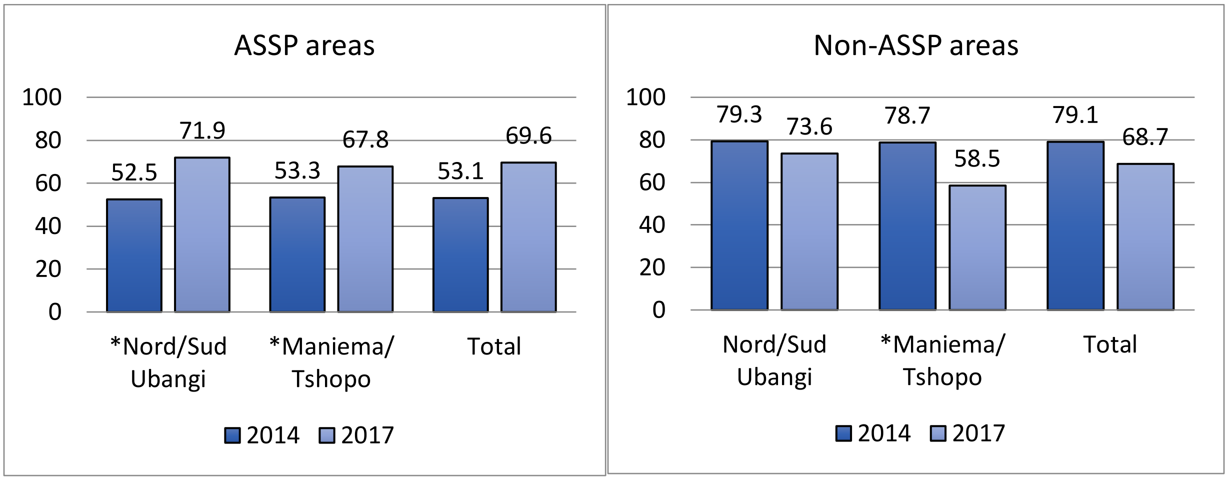
Figure 8.7. Direction of impact of ASSP on perceptions of specified aspects of service quality overall and within subpopulations based on sex, wealth, and sampling domain.

	Satisfaction with equipment	Satisfaction with drugs	Satisfaction with cleanliness
Overall DID results	Increased	No impact	Increased
Sex			
Female	Increased	No impact	Increased
Male	No impact	No impact	Increased
Wealth quintile			
Low and Low-middle wealth	Increased	Increased	Increased
Middle, High-middle, and High	No impact	Decreased	Increased
Sampling domain			
Nord/Sud Ubangi	No impact	No impact	Increased
Maniema/Tshopo	No impact	No impact	Increased

Notes: Each line represents a fully-adjusted DID probit model. Impact is determined by statistical significance ($p<0.05$). Green shading indicates that the impact was in the desired direction, and orange shading indicates that the impact was in the undesired direction. White shading indicates that no impact was detected.

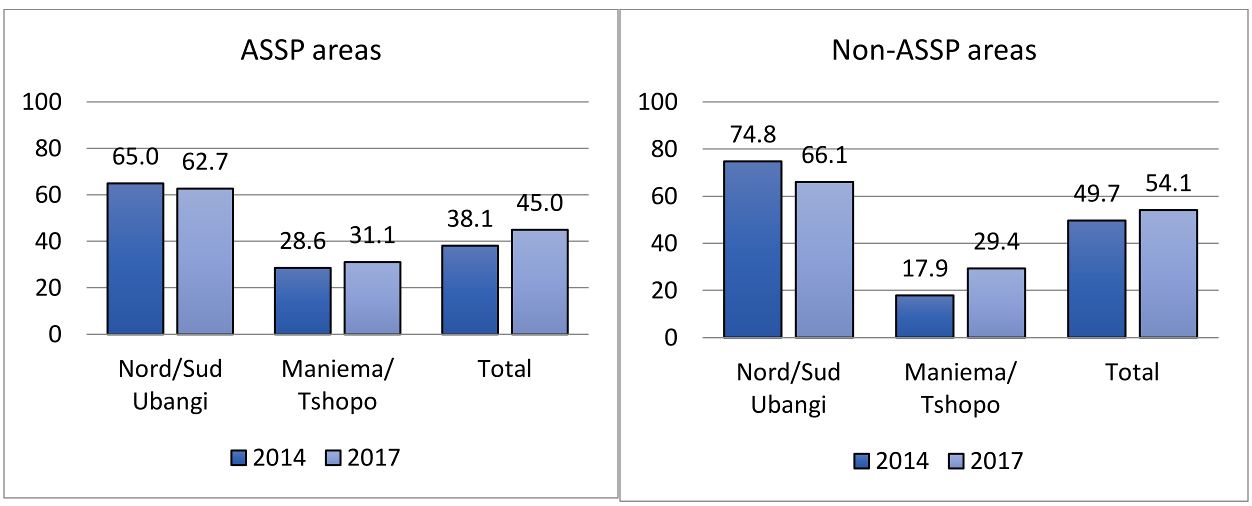
As can be seen from Figures 8.8, 8.9, and 8.10, the percentage who rated the facility as good or excellent on these three dimensions increased in ASSP areas, and the increase was found to be statistically significant for the indicators of equipment and cleanliness (Table 8.13, p = 0.001, and Table 8.17, p = 0.001, respectively). In non-ASSP areas, client ratings of equipment declined significantly, by 10.4 percentage points, between baseline and endline (Table 8.13, p = 0.004), while client ratings of drug availability and cleanliness did not significantly change between baseline and endline.

Figure 8.8. Percentage of clients who report availability of equipment was good or excellent in ASSP and non-ASSP areas by year.



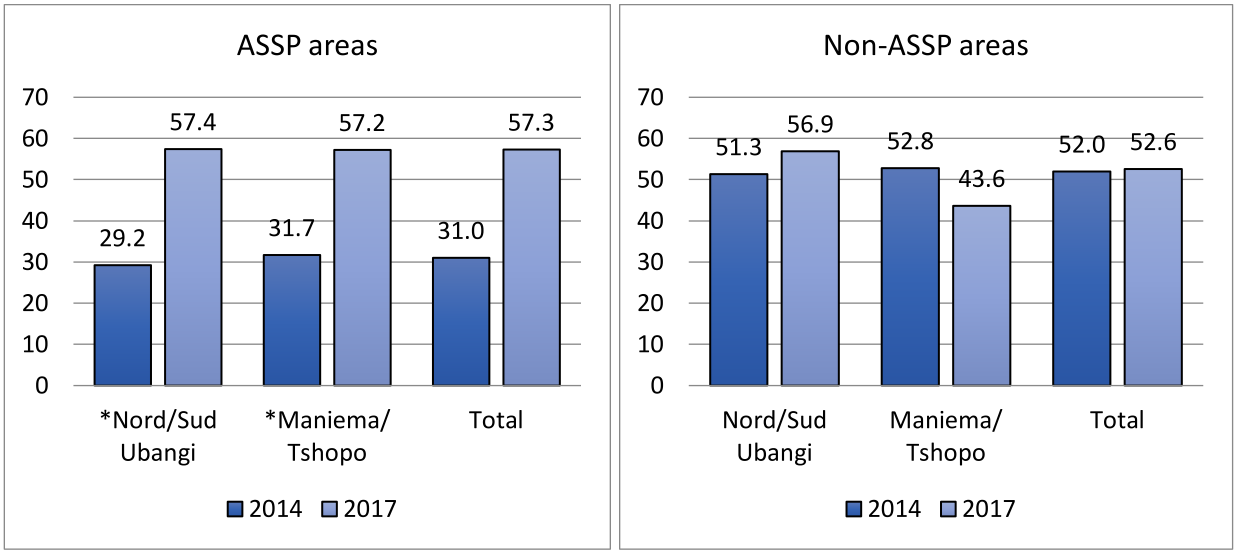
*Difference between 2014 and 2017 levels is statistically significant at p<0.05

Figure 8.9. Percentage of clients who report availability of drugs was good or excellent in ASSP and non-ASSP areas by year.



*Difference between 2014 and 2017 levels is statistically significant at p<0.05

Figure 8.10. Percentage of clients who report the cleanliness of the facility was good or excellent in ASSP and non-ASSP areas by year.



*Difference between 2014 and 2017 levels is statistically significant at $p<0.05$.

iii. Limitations

Several potential limitations should be considered when interpreting the findings.

Timing of baseline survey: The baseline survey was administered after ASSP project activities had begun, which could potentially bias the estimates of the impact of the project on utilization rates. As described earlier in this chapter, ASSP-supported activities during Year 1 included the procurement and distribution of drugs and equipment in all ASSP health zones, and the phasing out of primes to health workers in Maniema. According to ASSP's quarterly reports, routine data collected by the project shows that utilization rates declined in Maniema over the course of Year 1, but increased in Nord Ubangi. The decline in Maniema is noteworthy and may partially reflect the effects of decreased health worker motivation caused by the withdrawal of health worker primes, a premise that is consistent with the results of an operations research study on health worker motivation (Maini et al. 2016). If utilization did in fact decrease in Maniema and increase in Nord Ubangi, as indicated by ASSP's routine data, this suggests that estimates of impact is overstated in Maniema and understated in Nord Ubangi. The direction of the bias in the overall estimates of impact on outpatient health service utilization is unclear.

Seasonality: Patterns in the reporting of illnesses are seasonal, with malaria being more common in the rainy season, and some raspatory illnesses being more common in the dry season. Moreover, seasonality may affect the likelihood that households took advantage of facility-based health services if traveling to health facilities was more difficult in the rainy season. Seasonality may also be associated with temporal variations in household income, and as a result, the ability to pay for services. To explore these issues, we compared the percentage of individuals reporting illnesses and utilizing services in northern Maniema, which was rainy at endline, and with those of southern Maniema, which was dry. We found that the reporting of illnesses and percentage utilizing services was higher in southern

Maniema than in northern Maniema. This provides an indication that administering the endline survey in the dry season in southern Maniema may have resulted in understating the estimated impact of the project on the prevalence of illnesses and injuries while overstating the estimated impact on outpatient health service utilization.

Service interruptions: The fact that the endline survey was conducted during a period when ASSP was experiencing implantation disruptions could have potentially biased the evaluation findings if the disruptions led to a decrease in health service utilization rates. To explore this issue, we conducted a review of quarterly service statistics for outpatient health service utilization from January-March 2016 to October-December 2017 and did not find any evidence that the number of services provided dipped during the period of the disruptions. While this finding does not lend support to the premise that project interruptions resulted in drops in utilization rates, we cannot rule out this possibility.

Power to detect differences in outcomes: As described in Chapter 2, the study was powered (80 percent) to detect statistically significant differences of 10 percent or lower for a series of population-based interventions and health outcomes. For other indicators, such as the percentage of children with fever, diarrhea, and suspected pneumonia who received treatment (between 12 and 20 percentage points), the study has less power. However, the analyses of outpatient health service utilization are based on a much bigger sample size, the sample of de facto household members of all ages, which would increase the power of the analysis. It should be pointed out that the study was not powered to detect differences by province, or within subgroups, which may help explain the insignificance of subgroup program effects (although a number of these effects did emerge as statistically significant).

iv. Discussion

This chapter focuses on the impact of the ASSP project on several dimensions of outpatient health service utilization among all individuals who reported an illness or injury in the one-month period prior to the survey.

Regarding the use of outpatient services, the results of the DID models do not provide empirical evidence that ASSP had a program effect on the utilization of outpatient services, as the estimated impact of ASSP was statistically insignificant. In fact, in ASSP areas, the percent of those ill or injured who report using outpatient utilization services was found to have declined from 2014 to 2017 (although declines were also found in non-ASSP areas as well). In addition, when the model was restricted to various population subgroups – defined by province, wealth groups, and sex – the results were also insignificant. It should also be noted that an operations research study on the demand for health services based on data collected from the baseline survey found few statistically significant differences in care-seeking behaviors for recent illnesses across genders, levels of education, wealth, and geographic areas (Hutchinson 2016). In none of the age groups are men and women in ASSP areas statistically different in their care-seeking behaviors, and while differences were evident for wealth quintile but in no cases are these differences statistically significant.

That ASSP was not found to have had a significant impact on utilization rates appears to be inconsistent with the results that the ASSP project had a significant impact on improving financial protection and on the quality of services in ASSP areas (the latter results are presented in the service utilization chapter). For example, the results of the outpatient health care expenditure models suggest that the ASSP program decreased the probability of paying for outpatient consultations compared to non-ASSP areas. This is likely due to the introduction of user fee guidelines in ASSP areas, one of the health financing strategies of the ASSP project. In addition, as reported in the next chapter, several dimensions of service quality were found to have improved in ASSP areas. These include the percentage of facilities with malaria diagnostic capabilities, adequate equipment, an adequate drug supply, and the minimum package of curative services. Perceptions of quality of care among clients also improved between 2014 and 2017, as the results of the DID models suggest that the ASSP project had a significant impact on improved perceptions of both equipment availability and the cleanliness of the facility, after controlling for other factors. However, the project impact on perceptions of improved drug availability was not found to be statistically significant.

However, there are a number of possible explanations for why ASSP did not have an impact on the use of outpatient services. First, findings from an operations research study conducted as part of the ASSP project found that job satisfaction of health workers and other factors related to health worker motivation decreased in ASSP areas that had been exposed to the DFID project that preceded ASSP, the Access to Healthcare Program (Maini et al., 2016). These areas include all the ASSP health zones in Maniema. This dampening effect of health worker motivation, which may have adversely affected the quality of services, was likely due to ASSP withdrawing the primes and performance-based payments that health workers had received under the Access to Healthcare program. However, the withdrawal of payments occurred prior to the baseline survey in 2014, so this factor does not seem to be a plausible explanation for why outpatient health service utilization declined over the study period.

A second potential reason for why ASSP was not found to have had an impact concerns the timing of the baseline and endline surveys. The baseline survey occurred almost one year after the project had started, and as a result, some increases in utilization rates due to the ASSP project may have already occurred prior to the baseline survey. Moreover, the endline survey occurred during a time when the ASSP project areas were experiencing disruptions in the support received by ASSP, as described in the background chapter. While these disruptions could have reduced health service utilization, an analysis of quarterly data in ASSP areas did not yield any evidence that utilization rates dropped during the period of interruptions.

Other possible explanations for why the project did not have an impact on outpatient health service utilization rates include the fact that the implementation of the CHE intervention, which was one of the key elements of ASSP's strategy, was not found to be working as planned to mobilize community financing and further protect households from out-of-pocket health payments, as reported by Blum, Hotchkiss, et al. (2015), and the persistence of various forms of demand-side barriers to health service utilization, as supported by the results of the qualitative analysis that focused on treatment of childhood illnesses.

Finally, it should also be noted that, although information was collected on self-reported symptoms of illnesses and injuries, clinical diagnoses were not made, and as a result, we were unable to quantify individuals' need for health services.

To explore how the measure of outpatient care compares with the results of other household surveys in the DRC, we compared our baseline data with the 2013/14 DHS, which included a question for all *de facto* household members on whether, in the four weeks preceding the interview, the person had been treated by a health care provider, a pharmacist or a traditional without being hospitalized, that is to say, outpatient care. This involved recalculating our measure of outpatient care to reflect the number of persons who used services relative to the entire population, rather than the population who were reported to be sick or injured. The results of the two surveys were somewhat similar. In Nord Ubangi, the percent of the population that used health services was 9.3 for the ASSP baseline survey vs. 18.1 in the DHS, and in Maniema, the percent was 12.2 for the ASSP baseline survey vs. 13.1 for the DHS. It should be noted that DHS indicator included health care visits that were in addition to consultations treat illnesses and injuries, including maternal health care and preventive care.

As mentioned above, the ASSP project tracked a different indicator of outpatient health service utilization as part of the project's internal project monitoring system. The indicator measures the annual number of services new consultations provided per capita, and as reported in Figure 8.1, the routine data shows that service provision in ASSP areas increased, which conflicts with the finding that utilization decreased. It should be noted that the indicators are very different – the indicator based on routine data counts services and not individuals, is measured over one year and not one month, and is based on the entire population, not the more restricted population of those reporting illnesses and injuries. Moreover, the quality of sources both the service statistics and the population estimates used to calculate the indicator is unknown, as the DHIS2 is relatively new in the DRC and has not been subject to a data quality audit. These issues make it difficult to make careful comparisons between the two sources of information that would be needed to explain the discrepancy in the findings.

References

Blum, Lauren, David Hotchkiss, Anicet Yemwini, Celé Manianga, Paul Lusamba, Ann Marie Yongho, Janna Wisniewski, and Travis Porter. 2015. Assessment of the ASSP Project's Community Health Endowment Strategy in the Democratic Republic of Congo. ASSP ORIE Operations Research Study.

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Table 8.1. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness or injury during the past four weeks among all individuals (n=36,996)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.070	0.848	0.934
Year	-0.430	0.662	0.516
ASSP vs. non-ASSP	-1.184	1.308	0.365
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	4.459	0.423	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-2.227	0.662	**0.001**
Wealth quintile			
Low	[ref]		
Low middle	-0.025	0.583	0.965
Middle	2.025	0.611	**0.001**
High middle	0.340	0.605	0.574
High	1.819	0.604	**0.003**
Age range			
5--14	-11.578	0.547	**<0.001**
15-24	-11.951	0.618	**<0.001**
25-34	-9.681	0.682	**<0.001**
35-44	-8.965	0.774	**<0.001**
45-54	-5.824	0.886	**<0.001**
55 and older	-2.681	0.927	**0.004**
Sex			
Female	[ref]		
Male	-1.795	0.359	**<0.001**
World Bank program			
No support	[ref]		
Cash only	2.104	0.891	**0.018**
Performance-based financing	-0.881	0.774	0.255

Note: Statistical significance is considered at p<0.05.

Table 8.2. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness or injury during the past four weeks, restricted to females (n=18,624)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.319	1.220	0.794
Year	-0.002	0.952	0.998
ASSP vs. Non-ASSP	-1.729	1.890	0.360

Note: Statistical significance is considered at p<0.05.

Table 8.3. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness or injury during the past four weeks, restricted to males (n=18,372)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-0.236	1.175	0.841
Year	-0.793	0.919	0.388
ASSP vs. Non-ASSP	-0.604	1.806	0.738

Note: Statistical significance is considered at p<0.05.

Table 8.4. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness or injury during the past four weeks, restricted to Nord/Sud Ubangi (n=18,316)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-0.473	1.133	0.677
Year	0.663	0.885	0.454
ASSP vs. Non-ASSP	-0.003	1.755	0.999

Note: Statistical significance is considered at p<0.05.

Table 8.5. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness or injury during the past four weeks, restricted to Maniema/Tshopo (n=18,680)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.556	1.126	0.621
Year	-1.536	0.815	0.059
ASSP vs. Non-ASSP	-2.909	1.853	0.116

Note: Statistical significance is considered at p<0.05.

Table 8.6. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness or injury during the past four weeks, restricted to low and low-middle wealth quintiles (n=13,796)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-0.431	1.412	0.760
Year	0.043	1.147	0.970
ASSP vs. Non-ASSP	0.784	2.038	0.700

Note: Statistical significance is considered at p<0.05.

Table 8.7. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness or injury during the past four weeks, restricted to middle, high-middle, and high wealth quintiles (n=23,200)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.797	1.081	0.461
Year	-1.239	0.828	0.135
ASSP vs. Non-ASSP	-3.280	1.711	0.055

Note: Statistical significance is considered at p<0.05.

Table 8.8. Percentage of all individuals that were reported to have been ill or injured during the past four weeks, by selected characteristics, study sample, and year

	ASSP				Non-ASSP			
	2014 (n=7,104)	**2017 (n=11,000)**	**Absolute change**	**p-value**	**2014 (n=6,541)**	**2017 (n=12,000)**	**Absolute change**	**p-value**
Ill or injured in the past four weeks	16.0	12.3	-3.6	0.052	16.1	13.9	-2.3	0.535
Sampling domain								
Nord/Sud Ubangi	12.7	12.2	-0.5	0.822	11.9	13.8	1.9	0.227
Maniema/Tshopo	17.6	12.3	-5.4	0.067	28.5	14.0	-14.4	0.050
Setting								
Peri-urban	13.0	18.6	5.5	0.095	16.5	22.4	5.9	**0.006**
Rural	16.5	11.3	-5.2	**0.013**	16.1	13.3	-2.8	0.452
Wealth quintile								
Low	16.0	11.1	-5.0	0.075	13.6	15.3	1.6	0.509
Low middle	13.2	11.9	-1.3	0.060	13.6	13.3	-0.3	0.906
Middle	20.0	11.1	-8.9	**<0.001**	11.0	14.6	3.7	0.079
High middle	12.8	13.1	0.2	0.931	12.1	12.9	0.8	0.812
High	17.3	13.8	-3.5	0.329	23.7	13.7	-10.1	0.170

Notes: Percentages are weighted. Statistical significance is considered at $p<0.05$.

Table 8.9. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on using outpatient care among all individuals sick or injured (n=5,247)

Characteristic	**Marginal Effect**	**Standard Error**	**p-value**
Interaction (Year*ASSP)	-2.116	3.081	0.492
Year	-10.107	2.337	**<0.001**
ASSP vs. non-ASSP	2.392	4.839	0.621
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-5.421	1.576	**0.001**
Setting			
Peri-urban	[ref]		
Rural	6.155	2.237	**0.006**
Wealth quintile			
Low	[ref]		
Low middle	3.046	2.357	0.196
Middle	3.590	2.316	0.121
High middle	6.797	2.395	**0.005**
High	6.551	2.302	**0.004**
Age range			
5--14	-11.189	1.788	**<0.001**
15-24	-8.930	2.330	**<0.001**
25-34	-10.035	2.373	**<0.001**
35-44	-7.427	2.681	**0.006**
45-54	-9.179	2.706	**0.001**
55 and older	-14.319	2.531	**<0.001**
Sex			
Female	[ref]		
Male	-0.718	1.324	0.588
World Bank program			
No support	[ref]		
Cash only	-8.235	3.034	**0.007**
Performance-based financing	-4.427	3.014	0.142

Note: Statistical significance is considered at p<0.05.

Table 8.10. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on using outpatient care among all individuals sick or injured, restricted to Nord Ubangi (n=2,165)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-3.584	4.872	0.462
Year	-13.339	3.734	**<0.001**
ASSP vs. Non-ASSP	6.569	7.715	0.394

Note: Statistical significance is considered at p<0.05.

Table 8.11. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on using outpatient care among all individuals sick or injured, restricted to Maniema/Tshopo (n=3,082)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	1.518	3.664	0.679
Year	-10.246	2.590	**<0.001**
ASSP vs. Non-ASSP	-2.616	6.031	0.664

Note: Statistical significance is considered at p<0.05.

Table 8.12. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on using outpatient care among all individuals sick or injured, restricted to low and low-middle wealth quintiles (n=1,727)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-7.338	5.793	0.205
Year	-3.490	4.638	0.452
ASSP vs. Non-ASSP	6.165	8.445	0.465

Note: Statistical significance is considered at p<0.05.

Table 8.13. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on using outpatient care among all individuals sick or injured, restricted to middle, high-middle, and high wealth quintiles (n=3,520)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-0.680	3.690	0.854
Year	-12.157	2.729	**<0.001**
ASSP vs. Non-ASSP	1.558	5.944	0.793

Note: Statistical significance is considered at p<0.05.

Table 8.14. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on using outpatient care among all individuals sick or injured, restricted to females (n=2,801)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-6.225	4.178	0.136
Year	-7.110	3.165	**0.025**
ASSP vs. Non-ASSP	7.936	6.603	0.229

Note: Statistical significance is considered at p<0.05.

Table 8.15. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on using outpatient care among all individuals sick or injured, restricted to males (n=2,446)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	2.556	4.539	0.573
Year	-13.121	3.449	**<0.001**
ASSP vs. Non-ASSP	-4.009	7.076	0.571

Note: Statistical significance is considered at $p<0.05$.

Table 8.16. Percentage of individuals that reported using outpatient care among all individuals sick or injured by selected characteristics, study sample, and year

	ASSP				Non-ASSP			
	2014 (n=999)	**2017 (n=1,430)**	**Absolute change**	**p-value**	**2014 (n=957)**	**2017 (n=1,703)**	**Absolute change**	**p-value**
Use of outpatient care	69.9	55.3	-14.5	**0.001**	67.0	55.4	-11.7	**0.007**
Sampling domain								
Nord/Sud Ubangi	74.9	53.5	-21.4	**<0.001**	66.2	55.9	-10.3	0.096
Maniema/Tshopo	68.0	56.8	-11.2	0.080	68.1	54.3	-13.8	**0.019**
Setting								
Peri-urban	77.7	49.9	-27.8	**0.023**	63.6	40.2	-23.5	**0.040**
Rural	69.0	56.6	-12.4	**0.014**	67.1	57.0	-10.2	**0.025**
Wealth quintile								
Low	68.9	54.6	-14.3	**0.032**	58.2	58.6	0.4	0.953
Low middle	69.8	58.4	-11.5	0.210	69.4	54.9	-14.5	0.117
Middle	65.3	53.7	-11.7	0.142	61.3	61.6	0.3	0.973
High middle	61.3	61.6	0.3	0.976	83.4	55.6	-27.8	**0.017**
High	77.6	50.6	-27.0	**<0.001**	66.5	49.1	-17.4	**0.011**

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Table 8.17. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for outpatient health services among all individuals who used care (n=3,286)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-4.912	2.248	**0.029**
Year	3.867	1.732	**0.026**
ASSP vs. matched comparison	8.904	3.375	**0.008**
Domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-1.615	1.155	0.162
Setting			
Peri-urban	[ref]		
Rural	8.196	2.266	**<0.001**
Wealth quintile			
Low	[ref]		
Low middle	0.719	1.961	0.714
Middle	2.246	1.880	0.232
High middle	1.342	1.954	0.492
High	3.158	1.831	0.085
Age range			
5--14	-2.495	1.354	0.065
15-24	-0.195	1.612	0.904
25-34	-1.786	1.759	0.310
35-44	-3.400	2.090	0.104
45-54	-4.931	2.258	**0.029**
55 and older	-7.352	2.311	**0.001**
Sex			
Female	[ref]		
Male	-0.772	1.011	0.445
World Bank program			
No support	[ref]		
Cash only	5.651	1.693	**0.001**
Performance-based financing	1.524	2.345	0.516

Note: Statistical significance is considered at $p<0.05$.

Table 8.18. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for outpatient health services among all individuals who used care, restricted to Nord/Sud Ubangi (n=1,391)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-7.911	3.565	**0.026**
Year	10.824	2.969	**<0.001**
ASSP vs. Non-ASSP	12.461	4.834	**0.010**

Note: Statistical significance is considered at $p<0.05$.

Table 8.19. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for outpatient health services among all individuals who used care, restricted to Maniema/Tshopo (n=1,895)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-5.429	2.908	0.062
Year	1.644	2.086	0.431
ASSP vs. Non-ASSP	7.975	4.696	0.089

Note: Statistical significance is considered at $p<0.05$.

Table 8.20. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for outpatient health services among all individuals who used care, restricted to low and low-middle wealth quintiles (n=994)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.235	4.330	0.957
Year	5.700	3.364	0.090
ASSP vs. Non-ASSP	3.764	5.914	0.524

Note: Statistical significance is considered at $p<0.05$.

Table 8.21. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for outpatient health services among all individuals who used care, restricted to middle, high-middle, and high wealth quintiles (n=2,210)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-6.333	2.730	**0.020**
Year	2.020	2.072	0.330
ASSP vs. Non-ASSP	9.937	4.264	**0.020**

Note: Statistical significance is considered at $p<0.05$.

Table 8.22. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for outpatient health services among all individuals who used care, restricted to females (n=1,759)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-3.649	2.947	0.216
Year	2.533	2.247	0.260
ASSP vs. Non-ASSP	6.420	4.518	0.155

Note: Statistical significance is considered at $p<0.05$.

Table 8.23. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for outpatient health services among all individuals who used care, restricted to males (n=1,527)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-6.655	3.468	0.055
Year	5.767	2.716	**0.034**
ASSP vs. Non-ASSP	11.962	5.080	**0.019**

Note: Statistical significance is considered at p<0.05.

Table 8.24. Percentage of all individuals that reported paying anything for outpatient health services among all individuals who used care by selected characteristics, study sample, and year

	ASSP				Non-ASSP			
	2014 (n=697)	**2017 (n=837)**	**Absolute change**	**p-value**	**2014 (n=661)**	**2017 (n=971)**	**Absolute change**	**p-value**
Paid anything for healthcare	92.5	88.5	-4.0	0.143	89.3	96.7	7.3	**0.007**
Sampling domain								
Nord/Sud Ubangi	89.6	93.1	3.5	0.141	83.2	97.7	14.6	**<0.001**
Maniema/Tshopo	93.6	84.9	-8.7	**0.025**	96.6	94.4	-2.2	0.496
Setting								
Peri-urban	88.2	84.2	-4.0	0.571	76.4	85.1	8.7	0.157
Rural	93.0	89.4	-3.6	0.213	89.7	97.5	7.8	**0.001**
Wealth quintile								
Low	91.2	92.7	1.6	0.802	78.8	98.6	19.8	**<0.001**
Low middle	89.9	92.3	2.4	0.633	86.4	98.8	12.4	**0.002**
Middle	96.9	89.5	-7.4	**0.038**	92.1	97.8	5.7	**0.046**
High middle	95.1	79.4	-15.7	**0.018**	90.3	96.1	5.8	0.209
High	90.9	88.8	-2.1	0.545	92.8	93.4	0.6	0.895
Type of care								
Public hospitals	94.7	90.1	-4.6	0.475	76.5	93.1	16.6	0.349
Public health center/Post	94.6	92.6	-2.0	0.382	91.0	98.0	7.1	**0.001**
Other	88.8	76.7	-12.1	0.062	84.0	89.4	5.4	0.434

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Table 8.25. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for consultations for outpatient care among all individuals who used care (n=3,286)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-17.121	3.798	**<0.001**
Year	33.905	2.827	**<0.001**
ASSP vs. non-ASSP	34.992	5.633	**<0.001**
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	3.940	1.977	**0.046**
Setting			
Peri-urban	[ref]		
Rural	12.898	2.831	**<0.001**
Wealth quintile			
Low	[ref]		
Low middle	4.612	2.941	0.117
Middle	0.738	2.899	0.799
High middle	7.553	2.980	**0.011**
High	7.248	2.867	**0.011**
Age range			
5--14	-7.750	2.265	**0.001**
15-24	-2.314	2.929	0.429
25-34	-2.739	2.980	0.358
35-44	-8.172	3.388	**0.016**
45-54	-1.799	3.385	0.595
55 and older	-11.537	3.288	**<0.001**
Sex			
Female	[ref]		
Male	-2.439	1.674	0.145
World Bank program			
No support	[ref]		
Cash only	-3.476	3.925	0.376
Performance-based financing	-12.694	3.789	**0.001**

Note: Statistical significance is considered at p<0.05.

Table 8.26. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for consultations for outpatient care among all individuals who used care, restricted to Nord/Sud Ubangi (n=1,391)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-11.307	5.701	**0.047**
Year	33.125	4.237	**<0.001**
ASSP vs. Non-ASSP	45.278	8.458	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 8.27. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for consultations for outpatient care among all individuals who used care, restricted to Maniema/Tshopo (n=1,895)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-12.208	4.506	**0.007**
Year	24.482	3.127	**<0.001**
ASSP vs. Non-ASSP	17.438	7.130	**0.014**

Note: Statistical significance is considered at p<0.05.

Table 8.28. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for consultations for outpatient care among all individuals who used care, restricted to low and low-middle wealth quintiles (n=1,076)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-24.668	6.997	**<0.001**
Year	39.264	5.421	**<0.001**
ASSP vs. Non-ASSP	51.177	9.734	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 8.29. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for consultations for outpatient care among all individuals who used care, restricted to middle, high-middle, and high wealth quintiles (n=2,210)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-11.955	4.557	**0.009**
Year	29.878	3.335	**<0.001**
ASSP vs. Non-ASSP	24.202	6.910	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 8.30. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for consultations for outpatient care among all individuals who used care, restricted to females (n=1,759)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-20.105	5.047	**<0.001**
Year	36.870	3.714	**<0.001**
ASSP vs. Non-ASSP	40.735	7.503	**<0.001**

Note: Statistical significance is considered at $p<0.05$.

Table 8.31. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on paying anything for consultations for outpatient care among all individuals who used care, restricted to males (n=1,527)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-13.451	5.731	**0.019**
Year	29.720	4.328	**<0.001**
ASSP vs. Non-ASSP	28.028	8.478	**0.001**

Note: Statistical significance is considered at $p<0.05$.

Table 8.32. Percentage of all individuals that reported paying anything for consultations for outpatient care among all individuals who used care by selected characteristics, study sample, and year

	ASSP				Non-ASSP			
	2014 (n=697)	**2017 (n=837)**	**Absolute change**	**p-value**	**2014 (n=661)**	**2017 (n=971)**	**Absolute change**	**p-value**
Paid anything for consultation	55.0	67.9	12.8	**0.007**	24.4	69.8	45.4	**<0.001**
Sampling domain								
Nord/Sud Ubangi	56.3	75.1	18.9	**0.029**	9.5	66.2	56.7	**<0.001**
Maniema/Tshopo	54.5	62.2	7.7	0.170	42.0	77.2	35.2	**<0.001**
Setting								
Peri-urban	57.1	61.3	4.2	0.606	18.1	67.8	49.7	**0.001**
Rural	54.8	69.2	14.5	**0.008**	24.5	69.9	45.4	**<0.001**
Wealth quintile								
Low	67.4	61.6	-5.7	0.601	7.3	64.6	57.4	**<0.001**
Low middle	51.3	73.5	22.2	**0.013**	28.0	75.6	47.7	**0.001**
Middle	49.8	68.4	18.7	**0.041**	12.8	69.7	56.9	**<0.001**
High middle	43.5	67.9	24.5	**0.030**	38.6	77.9	39.3	**0.006**
High	57.2	67.7	10.5	0.101	26.3	64.3	38.0	**<0.001**
Type of care								
Public hospitals	90.4	80.9	-9.5	0.204	48.1	75.2	27.1	0.273
Public health center/Post	71.9	80.0	8.1	0.164	25.9	74.6	48.7	**<0.001**
Other	21.1	29.5	8.4	0.352	15.1	36.8	21.7	**<0.001**

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Table 8.33. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on the total out of pocket expenditure per outpatient visit among all individuals who used care (n=3,227)

Characteristic	**Marginal Effect**	**Standard Error**	**p-value**
Year	-2.935	1.275	**0.021**
ASSP vs. non-ASSP	-3.188	2.205	0.148
Interaction (Year*ASSP)	2.626	1.361	0.054
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	6.877	0.802	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-4.264	1.552	**0.006**
Wealth quintile			
Low	[ref]		
Low middle	-1.557	1.271	0.221
Middle	-0.292	1.323	0.825
High middle	-0.520	1.367	0.704
High	-0.107	1.323	0.935
Age range			
5--14	1.019	0.778	0.191
15-24	1.703	0.991	0.086
25-34	3.068	1.333	**0.021**
35-44	5.577	2.295	**0.015**
45-54	5.672	2.702	**0.036**
55 and older	0.777	1.128	0.491
Sex			
Female	[ref]		
Male	0.490	0.696	0.481
World Bank program			
No support	[ref]		
Cash only	12.221	3.846	**0.001**
Performance-based financing	1.753	1.536	0.254

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Table 8.34. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on the total out of pocket expenditure per visit among all individuals who used care, restricted to Nord/Sud Ubangi (n=1,390)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-1.285	0.582	**0.027**
Year	-1.052	1.113	0.345
ASSP vs. Non-ASSP	0.654	0.741	0.378

Note: Statistical significance is considered at p<0.05.

Table 8.35. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on the total out of pocket expenditure per visit among all individuals who used care, restricted to Maniema/Tshopo (n=1,887)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-1.988	0.854	**0.020**
Year	-2.200	1.900	0.247
ASSP vs. Non-ASSP	3.572	1.216	**0.003**

Note: Statistical significance is considered at p<0.05.

Table 8.36. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on the total out of pocket expenditure per visit among all individuals who used care, restricted to low and low-middle wealth quintiles (n=1,704)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-2.263	0.833	**0.007**
Year	0.099	1.422	0.944
ASSP vs. Non-ASSP	1.084	1.016	0.286

Note: Statistical significance is considered at p<0.05.

Table 8.37. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on the total out of pocket expenditure per visit among all individuals who used care, restricted to middle, high-middle, and high wealth quintiles (n=2,203)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-2.654	0.844	**0.002**
Year	-4.710	1.676	**0.005**
ASSP vs. Non-ASSP	4.262	1.102	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 8.38. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on the total out of pocket expenditure per visit among all individuals who used care, restricted to females (n=1,753)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-2.460	0.780	**0.002**
Year	-2.875	1.513	0.057
ASSP vs. Non-ASSP	2.629	1.003	**0.009**

Note: Statistical significance is considered at $p<0.05$.

Table 8.39. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on the total out of pocket expenditure per visit among all individuals who used care, restricted to males (n=1,524)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-2.302	1.013	**0.023**
Year	-1.215	1.898	0.522
ASSP vs. Non-ASSP	2.697	1.284	**0.036**

Note: Statistical significance is considered at $p<0.05$.

Table 8.40. Total out of pocket expenditure per visit among all individuals who used care among individuals who used outpatient care by selected characteristics, study sample, and year

	ASSP				Non-ASSP			
	2014 (n=785)	**2017 (n=971)**	**Absolute change**	**T-test**	**2014 (n=696)**	**2017 (n=841)**	**Absolute change**	**T-test**
Total out of pocket expenditure per visit	8.5	8.2	-0.4	-0.360	6.9	6.8	-0.2	-0.150
Sampling domain								
Nord/Sud Ubangi	3.8	3.9	0.1	0.140	4.5	6.3	1.8	1.860
Maniema/Tshopo	10.4	11.5	1.1	0.620	9.8	7.7	-2.1	-1.210
Setting								
Peri-urban	9.1	18.4	9.3	2.400	4.8	8.5	3.6	1.550
Rural	8.5	6.1	-2.4	-2.560	7.0	6.6	-0.3	-0.330
Wealth quintile								
Low	8.3	3.4	-4.9	-2.610	2.9	4.8	1.8	2.200
Low middle	6.8	4.8	-2.0	-1.260	5.1	8.0	2.9	1.190
Middle	9.1	6.3	-2.7	-1.110	5.0	5.9	1.0	1.070
High middle	8.2	7.5	-0.6	-0.210	9.4	8.3	-1.1	-0.350
High	9.5	16.3	6.8	2.440	8.4	6.8	-1.6	-0.880
Type of care								
Public hospitals	21.2	13.9	-7.3	-1.340	23.7	7.3	-16.4	-2.440
Public health center/Post	8.2	6.7	-1.5	-1.490	5.1	6.5	1.4	1.990
Other	5.9	9.8	3.9	1.610	12.6	8.6	-4.0	-0.980

Notes: Percentages are weighted. Statistical significance is considered at $p<0.05$.

Table 8.41. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on total out of pocket expenditure for consultation fees among all individuals who used care (n=3,145)

Characteristic	**Marginal Effect**	**Standard Error**	**p-value**
Year	1.679	0.358	**<0.001**
ASSP vs. non-ASSP	3.312	0.751	**<0.001**
Interaction (Year*ASSP)	-1.715	0.408	**<0.001**
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-0.524	0.185	**0.005**
Setting			
Peri-urban	[ref]		
Rural	-0.520	0.308	0.091
Wealth quintile			
Low	[ref]		
Low middle	-0.254	0.231	0.272
Middle	-0.285	0.212	0.178
High middle	0.106	0.285	0.709
High	0.134	0.269	0.619
Age range			
5--14	-0.016	0.163	0.923
15-24	0.237	0.238	0.321
25-34	0.162	0.193	0.402
35-44	0.264	0.321	0.411
45-54	0.958	0.404	**0.018**
55 and older	0.125	0.290	0.668
Sex			
Female	[ref]		
Male	-0.117	0.143	0.415
World Bank program			
No support	[ref]		
Cash only	0.722	0.535	0.177
Performance-based financing	-0.610	0.138	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 8.42. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on total out of pocket expenditure fee per visit among all individuals who used care, restricted to Nord/Sud Ubangi (n=1,386)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.257	0.293	0.379
Year	2.091	0.599	0.000
ASSP vs. Non-ASSP	0.762	0.378	0.044

Note: Statistical significance is considered at p<0.05.

Table 8.43. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on total out of pocket expenditure fee per visit among all individuals who used care, restricted to Maniema/Tshopo (n=1,882)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.252	0.191	0.187
Year	0.104	0.420	0.805
ASSP vs. Non-ASSP	0.147	0.265	0.580

Note: Statistical significance is considered at p<0.05.

Table 8.44. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on total out of pocket expenditure fee per visit among all individuals who used care, restricted to low and low-middle wealth quintiles (n=1,071)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.175	0.303	0.564
Year	1.801	0.583	**0.002**
ASSP vs. Non-ASSP	0.627	0.386	0.104

Note: Statistical significance is considered at p<0.05.

Table 8.45. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on total out of pocket expenditure fee per visit among all individuals who used care, restricted to middle, high-middle, and high wealth quintiles (n=2,197)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.374	0.232	0.107
Year	0.464	0.459	0.312
ASSP vs. Non-ASSP	0.023	0.296	0.939

Note: Statistical significance is considered at p<0.05.

Table 8.46. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on total out of pocket expenditure fee per visit among all individuals who used care, restricted to females (n=1,748)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.684	0.253	**0.007**
Year	1.364	0.501	**0.006**
ASSP vs. Non-ASSP	0.498	0.322	0.122

Note: Statistical significance is considered at $p<0.05$.

Table 8.47. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on total out of pocket expenditure fee per visit among all individuals who used care, restricted to males (n=1,520)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.142	0.268	0.597
Year	0.753	0.522	0.149
ASSP vs. Non-ASSP	0.176	0.340	0.603

Note: Statistical significance is considered at $p<0.05$.

Table 8.48. Total out of pocket expenditure fee per visit by selected characteristics, study sample, and year among individuals who used outpatient care.

	ASSP				Non-ASSP			
	2014 (n=785)	2017 (n=968)	Absolute change	T-test	2014 (n=697)	2017 (n=834)	Absolute change	T-test
Total out of pocket expenditure fee per visit	1.3	1.4	0.1	0.460	0.4	2.0	1.6	3.820
Sampling domain								
Nord/Sud Ubangi	2.0	1.3	-0.8	-2.410	0.3	2.4	2.1	3.540
Maniema/Tshopo	1.0	1.5	0.4	2.260	0.5	1.1	0.5	2.800
Setting								
Peri-urban	1.8	2.1	0.3	0.450	0.4	2.2	1.7	3.950
Rural	1.3	1.2	0.0	-0.180	0.4	2.0	1.6	3.530
Wealth quintile								
Low	1.7	1.2	-0.5	-1.740	0.2	1.1	1.0	3.550
Low middle	1.0	1.0	0.1	0.200	0.6	4.2	3.6	1.590
Middle	1.2	1.0	-0.2	-0.690	0.3	1.3	1.0	4.320
High middle	1.2	1.5	0.4	0.900	0.4	2.1	1.8	3.030
High	1.4	2.0	0.6	1.440	0.5	1.6	1.1	3.910
Type of care								
Public hospitals	2.8	2.6	-0.2	-0.75	0.8	1.3	0.5	3.57
Public health center/Post	1.5	1.4	-0.2	-1.82	0.8	1.4	0.7	3.53
Other	0.6	1.3	0.7	1.66	0.6	0.9	0.2	1.52

Notes: Percentages are weighted. Statistical significance is considered at $p<0.05$.

Table 8.49. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of equipment among all individuals (n=3,258)

Characteristic	**Marginal Effect**	**Standard Error**	**p-value**
Interaction (Year*ASSP)	13.671	3.634	**<0.001**
Year	-3.866	2.842	0.174
ASSP vs. non-ASSP	-26.113	5.506	**<0.001**
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-17.262	1.840	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-1.641	2.777	0.554
Wealth quintile			
Low	[ref]		
Low middle	3.576	2.982	0.230
Middle	8.197	2.895	**0.005**
High middle	8.169	2.986	**0.006**
High	13.952	2.827	**<0.001**
Age range			
5--14	-6.139	2.208	**0.005**
15-24	-3.400	2.845	0.232
25-34	-5.721	2.932	0.051
35-44	-4.174	3.310	0.207
45-54	-6.986	3.342	**0.037**
55 and older	-11.307	3.291	**0.001**
Sex			
Female	[ref]		
Male	0.150	1.633	0.927
World Bank program			
No support	[ref]		
Cash only	-8.739	3.965	**0.028**
Performance-based financing	1.093	3.691	0.767

Note: Statistical significance is considered at p<0.05.

Table 8.50. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of equipment, restricted to Nord/Sud Ubangi (n=1,381)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	9.968	5.759	0.083
Year	6.645	4.827	0.169
ASSP vs. Non-ASSP	-32.804	8.193	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 8.51. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of equipment, restricted to Maniema/Tshopo (n=1,877)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	6.637	4.577	0.147
Year	-2.578	3.281	0.432
ASSP vs. Non-ASSP	-10.851	7.317	0.138

Note: Statistical significance is considered at p<0.05.

Table 8.52. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of equipment, restricted to low and low-middle wealth quintiles (n=1,071)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	29.242	6.616	**<0.001**
Year	-11.761	5.425	**0.030**
ASSP vs. Non-ASSP	-47.134	9.449	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 8.53. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of equipment, restricted to middle, high-middle, and high wealth quintiles (n=2,187)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	7.941	4.347	0.068
Year	-2.413	3.325	0.468
ASSP vs. Non-ASSP	-17.988	6.722	**0.007**

Note: Statistical significance is considered at p<0.05.

Table 8.54. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of equipment restricted to females (n=1,746)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	16.832	4.948	**0.001**
Year	-4.478	3.891	0.250
ASSP vs. Non-ASSP	-31.401	7.525	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 8.55. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of equipment, restricted to males (n=1,512)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	10.196	5.336	0.056
Year	-3.744	4.151	0.367
ASSP vs. Non-ASSP	-20.340	8.055	**0.012**

Note: Statistical significance is considered at p<0.05.

Table 8.56. Percentage of all individuals with a perception of equipment by selected characteristics, study sample, and year

	ASSP				Non-ASSP			
	2014 (n=694)	**2017 (n=832)**	**Absolute change**	**p-value**	**2014 (n=646)**	**2017 (n=968)**	**Absolute change**	**p-value**
Perception of equipment among those who used healthcare	53.1	69.6	16.5	**0.001**	79.1	68.7	-10.4	**0.004**
Sampling domain								
Nord/Sud Ubangi	52.5	71.9	19.5	**0.038**	79.3	73.6	-5.7	0.143
Maniema/Tshopo	53.3	67.8	14.5	**0.011**	78.7	58.5	-20.3	**0.006**
Setting								
Peri-urban	67.7	69.5	1.7	0.796	54.1	78.1	23.9	**0.037**
Rural	51.3	69.6	18.3	**<0.001**	79.7	68.0	-11.7	**0.002**
Wealth quintile								
Low	43.3	69.8	26.5	**<0.001**	66.9	63.4	-3.5	0.749
Low middle	49.1	69.3	20.1	0.075	80.0	67.6	-12.4	0.250
Middle	54.9	63.3	8.4	0.394	80.0	72.3	-7.7	0.492
High middle	49.2	68.8	19.6	0.092	59.5	68.7	9.2	0.419
High	58.9	74.4	15.6	0.099	90.2	69.1	-21.1	**0.002**
Type of care								
Public hospitals	91.8	93.0	1.2	0.811	52.5	85.9	33.4	0.145
Public health center/Post	59.8	74.6	14.8	**0.049**	86.4	68.7	-17.7	**0.001**
Other	33.4	45.5	12.1	0.154	52.1	61.8	9.7	0.177

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Table 8.57. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of drugs among all individuals (n=3,083)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-3.481	3.844	0.365
Year	3.094	2.945	0.293
ASSP vs. non-ASSP	-6.635	5.974	0.267
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-37.960	1.923	**<0.001**
Setting			
Peri-urban	[ref]		
Rural	-10.495	2.782	**<0.001**
Wealth quintile			
Low	[ref]		
Low middle	1.122	2.985	0.707
Middle	1.486	2.957	0.615
High middle	-1.485	3.059	0.627
High	-5.070	2.963	0.087
Age range			
5--14	-2.143	2.278	0.347
15-24	-2.983	2.963	0.314
25-34	-2.420	3.030	0.424
35-44	-3.420	3.418	0.317
45-54	-8.985	3.449	**0.009**
55 and older	-5.124	3.344	0.125
Sex			
Female	[ref]		
Male	2.351	1.691	0.164
World Bank program			
No support	[ref]		
Cash only	-16.224	3.434	**<0.001**
Performance-based financing	-4.154	3.708	0.263

Note: Statistical significance is considered at p<0.05.

Table 8.58. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of drugs, restricted to Nord/Sud Ubangi (n=1,331)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-2.797	6.009	0.642
Year	2.848	4.740	0.548
ASSP vs. Non-ASSP	-4.205	9.069	0.643

Note: Statistical significance is considered at $p<0.05$.

Table 8.59. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of drugs, restricted to Maniema/Tshopo (n=1,752)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-1.742	4.660	0.708
Year	1.352	3.330	0.685
ASSP vs. Non-ASSP	-10.264	7.636	0.179

Note: Statistical significance is considered at $p<0.05$.

Table 8.60. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of drugs, restricted to low and low-middle wealth quintiles (n=1,003)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	17.683	7.144	**0.013**
Year	-10.630	5.717	0.063
ASSP vs. Non-ASSP	-31.254	10.468	**0.003**

Note: Statistical significance is considered at $p<0.05$.

Table 8.61. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of drugs, restricted to middle, high-middle, and high wealth quintiles (n=2,080)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-12.325	4.534	**0.007**
Year	8.732	3.410	**0.010**
ASSP vs. Non-ASSP	5.592	7.193	0.437

Note: Statistical significance is considered at $p<0.05$.

Table 8.62. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of drugs restricted to females (n=1,656)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	2.311	5.256	0.660
Year	-0.636	4.037	0.875
ASSP vs. Non-ASSP	-10.893	8.184	0.183

Note: Statistical significance is considered at $p<0.05$.

Table 8.63. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of drugs, restricted to males (n=1,427)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-10.534	5.596	0.060
Year	7.352	4.283	0.086
ASSP vs. Non-ASSP	-1.279	8.696	0.883

Note: Statistical significance is considered at p<0.05.

Table 8.64. Among those who used healthcare, percentage of all individuals with a perception drugs by selected characteristics, study sample, and year

	ASSP				Non-ASSP			
	2014 (n=612)	**2017 (n=830)**	**Absolute change**	**p-value**	**2014 (n=574)**	**2017 (n=969)**	**Absolute change**	**p-value**
Perception of drugs among those who used health care	38.1	45.0	6.8	0.248	49.7	54.1	4.4	0.736
Sampling domain								
Nord/Sud Ubangi	65.0	62.7	-2.3	0.777	74.8	66.1	-8.7	0.129
Maniema/Tshopo	28.6	31.1	2.5	0.661	17.9	29.4	11.4	0.167
Setting								
Peri-urban	47.7	32.4	-15.3	**0.047**	69.5	59.2	-10.3	0.497
Rural	37.0	47.6	10.6	0.102	49.3	53.7	4.4	0.743
Wealth quintile								
Low	43.7	62.8	19.1	0.074	N/A	N/A	N/A	N/A
Low middle	34.2	51.7	17.4	0.266	65.7	52.6	-13.0	0.266
Middle	37.7	47.1	9.4	0.378	72.9	54.0	-18.9	0.159
High middle	54.7	32.6	-22.1	**0.031**	64.2	51.4	-12.7	0.239
High	30.6	34.3	3.7	0.622	31.0	51.6	20.6	0.217
Type of care								
Public hospitals	46.9	59.0	12.1	0.296	42.6	84.8	42.2	0.066
Public health center/Post	31.8	44.5	12.7	0.099	47.9	50.6	2.6	0.826
Other	48.2	40.1	-8.1	0.489	61.5	64.6	3.0	0.888

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Table 8.65. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of cleanliness among all individuals (n=3,014)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	29.597	4.077	**<0.001**
Year	-10.850	3.211	**0.001**
ASSP vs. non-ASSP	-46.720	6.345	**<0.001**
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-6.385	2.153	**0.003**
Setting			
Peri-urban	[ref]		
Rural	-11.499	3.133	**<0.001**
Wealth quintile			
Low	[ref]		
Low middle	0.052	3.180	0.987
Middle	-0.412	3.142	0.896
High middle	-0.219	3.247	0.946
High	2.712	3.152	0.390
Age range			
5--14	-6.063	2.436	**0.013**
15-24	-5.306	3.175	0.095
25-34	-4.151	3.279	0.205
35-44	-3.355	3.640	0.357
45-54	0.268	3.688	0.942
55 and older	-5.975	3.563	0.094
Sex			
Female	[ref]		
Male	1.108	1.813	0.541
World Bank program			
No support	[ref]		
Cash only	8.125	4.038	**0.044**
Performance-based financing	12.304	3.894	**0.002**

Note: Statistical significance is considered at $p<0.05$.

Table 8.66. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of cleanliness, restricted to Nord/Sud Ubangi (n=1,317)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	19.950	6.372	**0.002**
Year	0.786	4.919	0.873
ASSP vs. Non-ASSP	-39.324	9.716	**<0.001**

Note: Statistical significance is considered at $p<0.05$.

Table 8.67. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of cleanliness, restricted to Maniema/Tshopo (n=1,697)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	29.120	4.827	**<0.001**
Year	-11.701	3.546	**0.001**
ASSP vs. Non-ASSP	-46.346	8.030	**<0.001**

Note: Statistical significance is considered at $p<0.05$.

Table 8.68. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of cleanliness, restricted to low and low-middle wealth quintiles (n=981)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	28.143	7.690	**<0.001**
Year	-7.617	6.233	0.222
ASSP vs. Non-ASSP	-43.069	11.291	**<0.001**

Note: Statistical significance is considered at $p<0.05$.

Table 8.69. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of cleanliness, restricted to middle, high-middle, and high wealth quintiles (n=2,033)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	30.427	4.832	**<0.001**
Year	-13.222	3.739	**<0.001**
ASSP vs. Non-ASSP	-49.629	7.664	**<0.001**

Note: Statistical significance is considered at $p<0.05$.

Table 8.70. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of cleanliness restricted to females (n=1,617)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	27.920	5.561	**<0.001**
Year	-9.624	4.378	**0.028**
ASSP vs. Non-ASSP	-42.504	8.720	**<0.001**

Note: Statistical significance is considered at $p<0.05$.

Table 8.71. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on perception of cleanliness, restricted to males (n=1,397)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	31.562	6.011	**<0.001**
Year	-12.439	4.737	**0.009**
ASSP vs. Non-ASSP	-51.831	9.276	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 8.72. Percentage of all individuals with a perception of cleanliness by selected characteristics, study sample, and year

	ASSP				Non-ASSP			
	2014 (n=565)	**2017 (n=837)**	**Absolute change**	**p-value**	**2014 (n=544)**	**2017 (n=971)**	**Absolute change**	**p-value**
Perception of cleanliness among those who used health care	31.0	57.3	26.3	**<0.001**	52.0	52.6	0.6	0.915
Sampling domain								
Nord/Sud Ubangi	29.2	57.4	28.2	**<0.001**	51.3	56.9	5.6	0.509
Maniema/Tshopo	31.7	57.2	25.5	**<0.001**	52.8	43.6	-9.2	0.180
Setting								
Peri-urban	47.3	63.6	16.3	0.190	57.6	66.8	9.2	0.652
Rural	29.3	56.0	26.7	**<0.001**	51.9	51.5	-0.4	0.948
Wealth quintile								
Low	22.8	58.7	35.9	**0.004**	N/A	N/A	N/A	N/A
Low middle	28.8	57.0	28.2	**0.001**	40.9	52.8	11.9	0.389
Middle	24.8	58.5	33.8	**0.005**	46.3	49.7	3.4	0.739
High middle	30.4	50.8	20.5	0.079	73.8	49.1	-24.7	0.068
High	39.3	60.9	21.5	**0.003**	49.7	57.4	7.6	0.255
Type of care								
Public hospitals	45.2	72.6	27.4	**0.017**	93.4	56.1	-37.3	**0.015**
Public health center/Post	31.9	61.3	29.3	**<0.001**	49.3	51.1	1.9	0.762
Other	23.1	40.0	16.9	0.087	62.4	60.3	-2.1	0.911

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Chapter 9
Service Quality

Acronyms

ASSP	Access to Primary Health Care (Project)
CODESA	*Comité de développement de l'aire de santé* (Health area development committee)
DHIS2	District Health Information System 2
DID	Difference-in-differences
JICA	Japan International Cooperation Agency
USAID	United States Agency for International Development

i. Overview of the ASSP approach

One of Access to Primary Health Care Project's (ASSP's) strategies for improving child nutrition and maternal and child health is to enhance service delivery and quality at supported health facilities. In this evaluation, this improvement is measured by the availability of medical equipment and supplies, increase in the services offered, and improvement in the diagnostic capabilities within the health facilities. The ASSP project was designed to strengthen the medicine and equipment supply chains in several ways. Information systems, including the District Health Information System 2 (DHIS2), were implemented to support resource allocation and stock management; trainings on these topics were held at regional drug distribution centers and health zone offices. Further, data quality assurance procedures were instituted. Purchasing strategies such as gap purchases, expanded drug offering, and expedited delivery times were employed to decrease the incidence of stock-outs in health facilities. ASSP also supported the construction of new health facilities as well as the renovation of existing facilities. As a result, increases in the facilities' capabilities to offer services were intended. At the time of the 2017 endline survey, 202 health facilities had been either renovated or constructed.

Community participation and satisfaction with health services are also important components of quality. The ASSP project sought to increase these indicators through *Comité de développement de l'aire de santé* (Health area development committee, CODESA) revitalization, the Community Health Endowment, and the Simplified Community Scorecard. CODESAs serve as liaisons between health centers and the community. While CODESAs have a long history in the DRC, many had become inactive by the start of ASSP in 2014. ASSP sought to revitalize the CODESAs through recruitment, training, and support. An active CODESA brings community needs and concerns to the health facility and carries messages from the health facility out to residents.

The Community Health Endowment was an arrangement in which community members were encouraged to raise revenue, either through farming, other income-generating activities, or cash contributions, which was given in support of the health facility. Those who participated were to benefit from reduced user fees. Participants were expected to increase their sense of ownership of their health services, among other outcomes.

The Simplified Community Scorecard was an intervention in which community members came together to rate their health center on a series of service quality indicators. At the same time, the health workers rated their facility on the same set of indicators. The groups then came together to discuss the results and make an action plan to improve service quality in their community. This was also designed to improve communication between the health facility and the community and foster a sense of community ownership.

Finally, ASSP's activities, aimed at improving service quality as well as the health financing interventions described elsewhere, may also have an impact on health worker satisfaction, which can have a synergistic relationship with service quality and patient satisfaction.

ASSP's activities prior to the baseline survey. To improve health services delivery and management, ASSP's quarterly reports stated that trainings and continuing education were provided to health care providers and managers throughout the first year of the ASSP project. Subject matter themes included

(1) management of primary health care; (2) finance and essential drug management; (3) family planning, care and treatment of sexual and gender-based violence survivors; (4) post-abortion care; (5) essential and emergency obstetrical care, assisted births, essential and emergency care for newborns; (6) vaccination campaigns (reach every zone); (7) treatment protocols (including training for prescribing drugs); (8) laboratory technical training on blood security, malaria and TB diagnostics; and (9) antenatal care and nutrition. Implementing partners conducted joint supervision missions, focusing mainly on drug supply and financial management, while health zone management teams conducted integrated supervision missions to health centers, with an aim to improve the delivery of the minimum package of activities in all assisted health centers.

Preparatory workshops were initiated at the national level, culminating in the training of 33 people as national trainers, and followed-up with onsite trainings in reproductive health and family planning in different clusters. Furthermore, the human resource information system and computerized health information system (i.e. District Health Information Software or DHIS2) components of the program continued to evolve positively with the major activities concentrated on the consolidation of information, harmonization of stakeholder priorities, and organization of frequent training sessions and multi-stakeholder workshops (USAID, JICA, Ministry of Finance and Planning, Ministry of Health, and others).

Contracts for the rehabilitation of six health facilities were awarded and, in preparation for launching the construction work, IMA received 10 manual brick presses. While waiting for rehabilitation and construction, all functioning health facilities received the first batch of basic equipment, composed of operating tables and mini-kits (including stethoscopes, fetal stethoscopes, scales for babies, young children and adults, sphygmomanometers, thermometers, forceps, and other small supplies). In addition, IMA received 28 Land Cruiser pickups to improve drug availability in health facilities, facilitate field supervisions, and help move construction materials throughout the health zones. Finally, a study was undertaken during Year 1 to analyze the health centers in the project area to determine the level of construction intervention needed per building. By the end of Year 1, there were three new construction sites underway, with another five active major renovation projects underway.

ASSP routine data. To track the availability of drugs in health facilities, ASSP reported the “average quarterly number and percentage of health facilities reporting stock-outs of one day or more of any of the following 5 drugs within the quarter: Depo Provera, Oxytocin, SP, Zinc, Amoxicillin 250.” The time of the endline, the quarterly report indicated that overall, 61 percent of facilities reported such stock-outs.

Equipment was not explicitly tracked, but the number of health facilities with functional cold chain and solar lighting was reported. ASSP also reported that at the time of the endline survey, 202 health facilities had been rehabilitated or constructed in project areas, which included Kasai.

Health worker compensation was tracked through an indicator of the “number of health zones in which at least 80 percent of health personnel have had their pay (salaries, *prime de risque* and *prime locale*) captured in the human resources information system.” Health worker and community satisfaction were not tracked.

ii. Quantitative findings

This section presents findings from the baseline and endline health facility surveys on service quality including basic infrastructure, equipment, drug supply, availability of a minimum package of preventive and curative services, malaria diagnostic capabilities, and job satisfaction among health workers. Findings from the household survey related to the degree to which communities are informed about health services and satisfaction with involvement in health service decision-making are also presented. The sample size of the health facility survey was lower than others in this report; therefore, significance in analyses of facility-level data is considered at p<0.10.

Basic infrastructure

As described in Chapter 3, basic infrastructure improved in ASSP-supported facilities. The percentage of ASSP facilities with functional electricity on the day of the survey increased from 17.4 to 26.4 percent. Water and sanitation infrastructure at ASSP health facilities also improved between baseline and endline. The percentage of facilities with drinking water from an improved source increased from 3.8 to 19.5 percent, and the percentage with sanitary toilets increased from 59.4 to 77.0 percent.

Health facility service readiness

Figure 9.1 displays the impact of ASSP on measures of health facility service readiness both overall and within sampling domains. For all measures assessed, ASSP either improved or had no impact; in no areas did ASSP have a negative impact.

Figure 9.1. Direction of impact of ASSP on service readiness overall and by subpopulations based on sampling domain.

	Equipment	Drugs	Preventive services	Curative services	Malaria diagnosis
Overall DID results	No impact	No impact	Increased	No impact	Increased
Sampling domain					
Nord/Sud Ubangi	No impact	Increased	Increased	No impact	No impact
Maniema/Tshopo	No impact	No impact	No impact	No impact	No impact

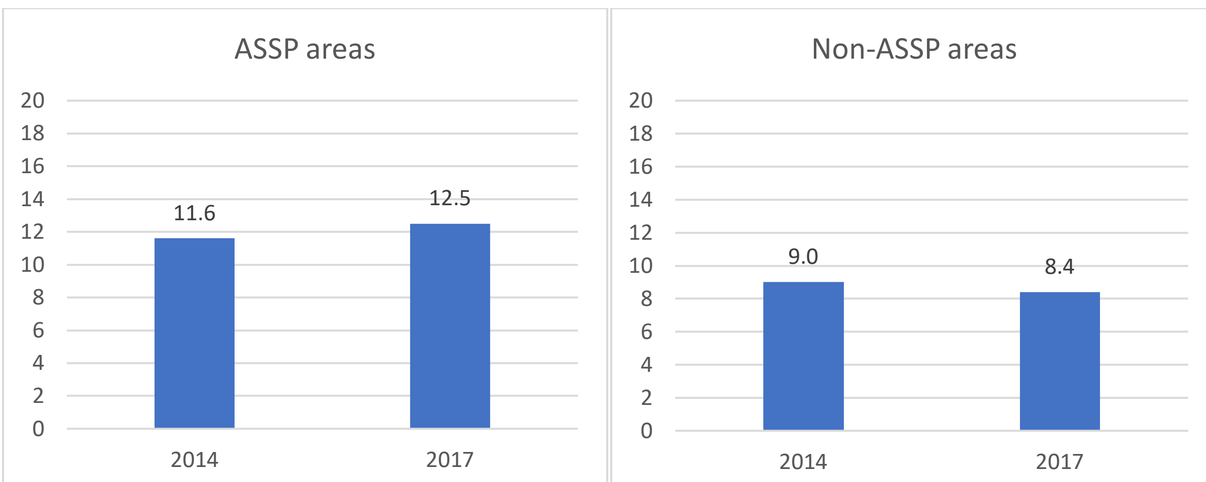
Notes: Each line represents a fully-adjusted DID probit model. Impact is determined by statistical significance (p<0.05). Green shading indicates that the impact was in the desired direction, and orange shading indicates that the impact was in the undesired direction. White shading indicates that no impact was detected.

Adequate equipment

Representatives from health facilities were asked whether the facility had pieces of basic equipment and if so how many were in working order. Using this information, the percentage of the recommended equipment (defined as having all six pieces of basic equipment [thermometers, stethoscopes, blood pressure cuffs, adult scales, pediatric scales, and timers] in working order and in the minimum recommended quantities) present on the day of the survey were calculated for each health facility (Kaur & Hall, 2001). Health facilities were considered to have "adequate equipment" if they had at least 75 percent of this equipment.

No significant ASSP program impact on adequacy of equipment was detected in the difference-in-difference (DID) model either overall (Table 9.1) or within Nord/Sud Ubangi (Table 9.2) or Maniema/Tshopo (Table 9.3). Overall, within each domain and survey wave, no more than 13 percent of health facilities had adequate equipment (Table 9.4 and Figure 9.2)

Figure 9.2. Percentage of facilities with adequate equipment on the day of the survey in ASSP and non-ASSP areas, by year.



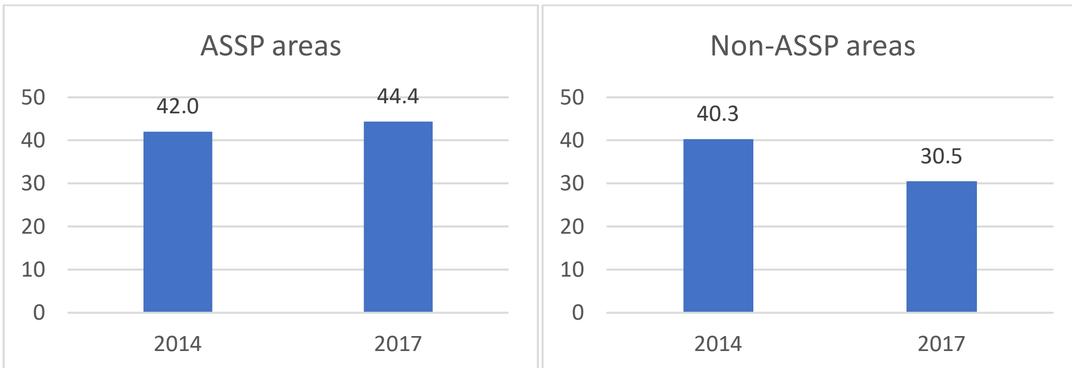
*Difference between 2014 and 2017 levels is statistically significant at $p<0.05$.

Adequate drug supply

Respondents were asked to report whether specific drugs were in stock on the day of the survey. Three of ASSP's designated tracer drugs were assessed; these tracer drugs are Oxytocin, Sulfadoxine-pyrimethamine, and Amoxicillin. The number of drugs (out of three) that were in stock was tabulated for each facility. Facilities were characterized as having an adequate drug supply if all three drugs were in stock on the day of the survey.

Overall, no ASSP program impact on adequacy of the drug supply was detected (Table 9.5). However, the ASSP project had a significant and positive impact on the drug supply in Nord Ubangi (Table 9.6). No such impact was found in Maniema/Tshopo (Table 9.7). Table 9.8 and Figure 9.3 show the percentage of facilities with adequate drug supply in ASSP and non-ASSP areas. In 2017, 44.4 percent of ASSP-supported health facilities had an adequate drug supply. Overall, there was no significant change between 2014 and 2017 in either ASSP or non-ASSP areas.

Figure 9.3. Percentage of health facilities with all three tracer drugs on the day of the survey in ASSP and non-ASSP areas, by year.



*Difference between 2014 and 2017 levels is statistically significant at *p*<0.05.

Minimum package of preventive services

Respondents reported whether their facility was currently offering a range of services. The percentage of facilities offering all preventive services as defined by the DRC's essential package of services was calculated (Wright, 2015). These preventive services are antenatal care, family planning consultations, postnatal care, vaccination, and growth monitoring.

The DID model found that the ASSP project had a significant impact on the prevalence of the minimum package of preventive services relative to non-ASSP areas (Table 9.9). Facilities in Maniema/Tshopo, peri-urban areas, and those that were reference health centers were significantly more likely to offer the minimum package of preventive services. The ASSP project had a significant positive impact on the availability of preventive services in Nord Ubangi (Table 9.10.)

Key Points

- The ASSP project improved the availability of preventive services and malaria diagnostic capabilities.
- ASSP did not have an impact on adequacy of equipment, drug supply, curative services, or community participation.
- Overall, community participation and timeliness of health worker salary payments increased significantly in ASSP areas.

Between baseline and endline, the percentage of ASSP facilities offering all preventive services increased significantly, from 63.8 percent of facilities in 2014 to 95.0 percent in 2017 (p<0.001) (Figure 9.4). This majority of this increase was due to the addition of family planning services (results not shown), particularly in Nord/Sud Ubangi (Table 9.5). There was no significant change in preventive services in non-ASSP areas.

Minimum package of curative services

The percentage of facilities offering the minimum package of curative services was also calculated (Wright, 2015). The definition of “curative services” includes treatment for tuberculosis, treatment of sexually-transmitted infections, minor surgery, and skilled birth attendance. Nutritional rehabilitation and curative services are also included in the definition; however, the survey did not contain these items and they are not included in the analysis.

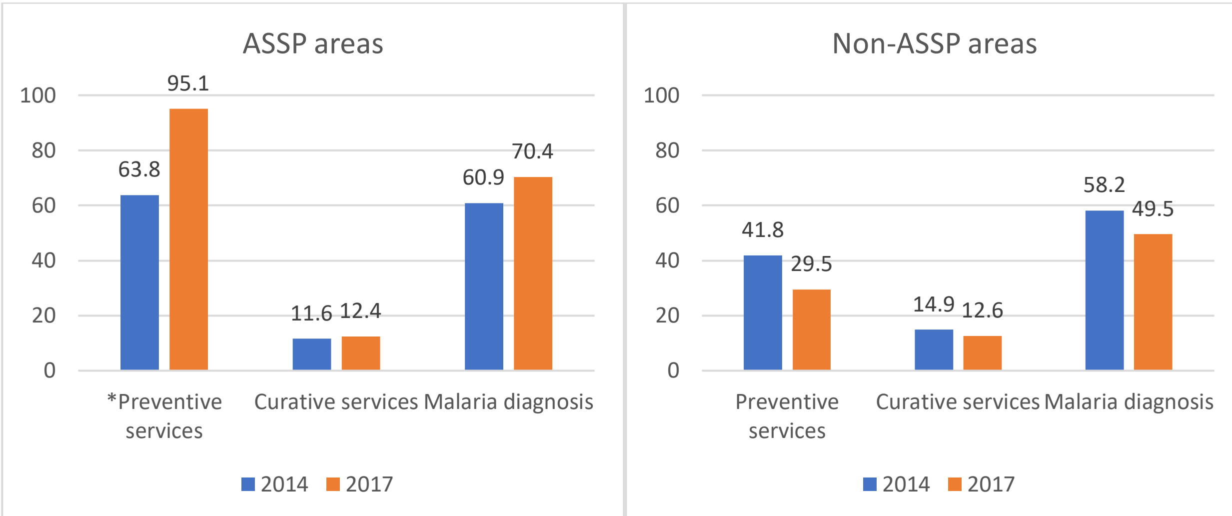
No program impact on the minimum package of services was detected overall (Table 9.13) or within survey domains (Tables 9.14 and 9.15). Facilities located in Maniema/Tshopo, in peri-urban areas, and those that were reference health centers were significantly more likely to offer the minimum package of curative services. The percentages of facilities offering the minimum package of curative services are shown in Figure 9.4. In 2017, 12.5 percent of facilities in both ASSP and non-ASSP areas offered the minimum package of curative services. This percentage did not change significantly between baseline and endline (Table 9.16).

Malaria diagnostic capabilities

Respondents reported whether the facility had the capability of diagnosing malaria on the day of the survey. ASSP had a significant positive impact on rates of malaria diagnostic capabilities (Table 9.10). Facilities in peri-urban areas, reference health centers, and facilities with four or more beds were significantly more likely to be able to diagnose malaria (Table 9.17). This impact was not detected within individual sampling domains (Table 9.18 and 9.19).

Figure 9.4 shows the percentages of facilities with these capacities. The percentage of ASSP-supported facilities with malaria diagnostic capabilities increased from 60.9 percent to 70.0 percent, although this increase was not statistically significant. Facilities in non-ASSP areas decreased from 58.2 percent to 50.0; again, this change was not statistically significant (Table 9.20).

Figure 9.4. Percentage of health facilities with the minimum package of preventive services and curative services, and malaria diagnosis capabilities in ASSP and non-ASSP areas, by year.



*Difference between 2014 and 2017 levels is statistically significant at p<0.10.

<u>Robustness check</u>

Seasonality may have an impact on the availability of medicines and supplies, as wet conditions make transportation more difficult. Therefore, comparisons of the availability of tracer drugs in the northern (i.e. rainy) and the southern (i.e. dry) regions of Maniema at endline were made. Findings indicate that dry regions were significantly more likely to have tracer drugs in stock. Forty-six percent of facilities in dry regions had all tracer drugs in stock, compared with 21 percent of facilities in rainy regions (p=0.051).

Community participation

Figure 9.5 displays the impact of ASSP on measures of community participation in health services, both overall and within sampling domains. Overall and within subgroups based on the sex of the head of household, ASSP had no significant impact. ASSP significantly worsened satisfaction with community participation in health services in Nord Ubangi and significantly improved it in Maniema/Tshopo.

Figure 9.5. Direction of impact of ASSP on community participation overall and by subpopulations based on sex of the head of the household and sampling domain.

	Informed about health services	Satisfaction with participation
Overall DID results	No impact	No impact
Sex		
Female	No impact	No impact
Male	No impact	No impact
Sampling domain		
Nord/Sud Ubangi	No impact	Decreased
Maniema/Tshopo	No impact	Increased

Notes: Each line represents a fully-adjusted DID probit model. Impact is determined by statistical significance ($p<0.05$). Green shading indicates that the impact was in the desired direction, and orange shading indicates that the impact was in the undesired direction. White shading indicates that no impact was detected.

Information about health services offered in the community

During the household survey, heads of households were asked whether they agreed that communities are informed about the availability of health services offered in the community. Overall, the ASSP project had no impact on whether heads of households agreed that they were informed (Table 9.21); there was also no project impact found within sampling domains and sexes (Tables 9.22- 9.25).

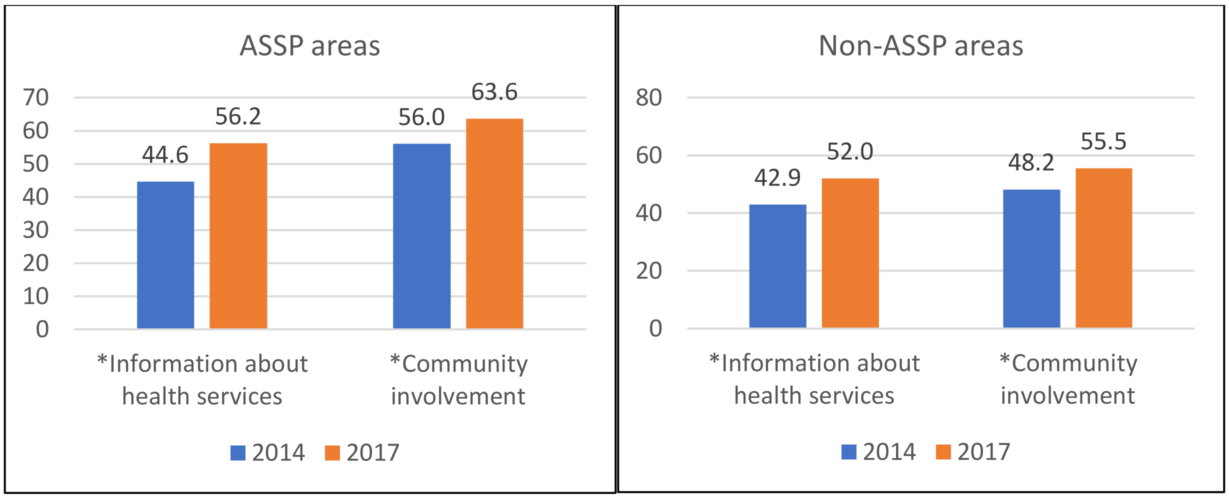
Figure 9.6 shows the percentages who agreed in ASSP and non-ASSP areas. The percentage who agreed that they were informed increased significantly in both ASSP and non-ASSP areas; this increase was particularly prominent in Nord/Sud Ubangi (Table 9.26). Again, these increases were not found to be associated with the ASSP project as non-ASSP areas experienced similar improvements.

Satisfaction with community involvement in decision-making about health services

Heads of households were also asked whether they were satisfied with community involvement in decision-making about health services. Overall, the ASSP project had no impact on satisfaction with community involvement (Table 9.27). There was also no project impact found within sampling domains (Tables 9.28 & 9.29). ASSP had a negative impact on the satisfaction of female heads-of-household (Table 9.30) and a positive impact on male heads-of-household (Table 9.31).

Again, the percentage who were satisfied (defined as either “very satisfied” or “satisfied”) increased significantly in both ASSP and non-ASSP areas (Figure 9.6). In 2017, over half of respondents were satisfied. ASSP areas in Maniema/Tshopo saw significant increases, as did non-ASSP areas in Nord/Sud Ubangi (Table 9.32).

Figure 9.6. Heads of households’ assessments about whether communities are informed about health services, and satisfaction with community involvement in decision-making about health services in ASSP and non-ASSP areas, by year.



*Difference between 2014 and 2017 levels is statistically significant at $p<0.05$.

Health worker satisfaction and salary payment

Figure 9.6 shows the impact of ASSP on health worker satisfaction and timeliness of salary payment, both overall and within sampling domains. Overall, ASSP had no significant impact on either measure but did significantly improve satisfaction within the subgroup in Nord Ubangi.

Figure 9.6. Direction of impact of ASSP on health worker satisfaction and timeliness of salary payment overall and by subpopulations based on sampling domain.

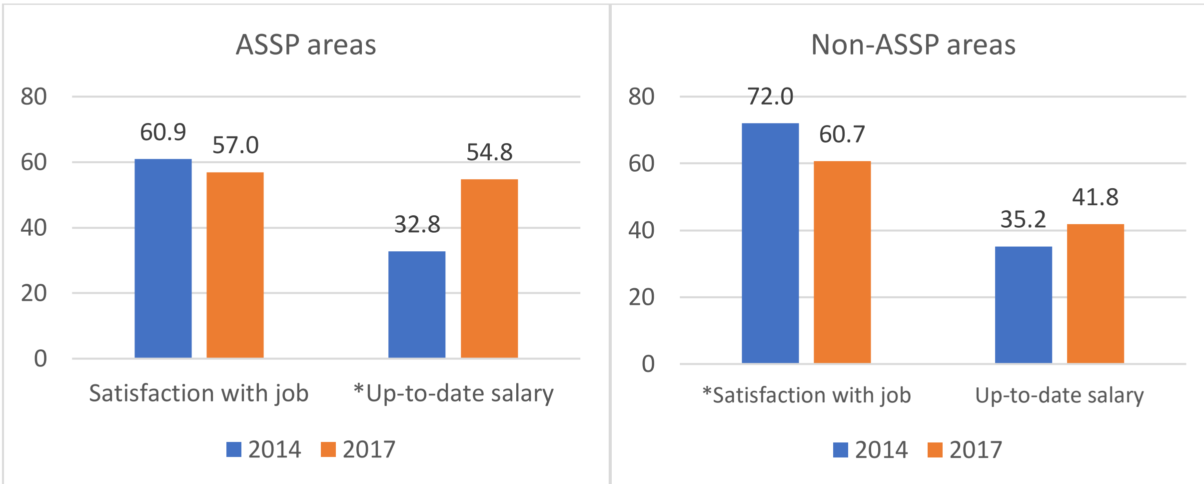
	Overall job satisfaction	Up-to-date salary
Overall DID results	No impact	No impact
Sampling domain		
Nord/Sud Ubangi	Increased	No impact
Maniema/Tshopo	No impact	No impact

Notes: Each line represents a fully-adjusted DID probit model. Impact is determined by statistical significance ($p<0.05$). Green shading indicates that the impact was in the desired direction, and orange shading indicates that the impact was in the undesired direction. White shading indicates that no impact was detected.

Health workers, defined as those workers at surveyed health facilities who provide direct patient care, were asked to indicate their level of overall job satisfaction. No program impact was detected (Table 9.33). The percentage of health workers who reported being either satisfied or very satisfied was calculated (Figure 9.7). Levels of health worker satisfaction did not change significantly in ASSP areas overall, although it declined in the subsets of health workers in Maniema/Tshopo, in reference health centers, and in facilities with four or more beds (Table 9.36).

Health workers were also asked to report whether their salary payments were up-to-date on the day of the survey (Figure 9.7). No program impacts were detected overall (Table 9.37), although the ASSP project had a significant positive impact on the subset of respondents in Nord Ubangi (Table 9.38). Health workers in Maniema/Tshopo and at facilities with observation beds were significantly less likely to have an up-to-date salary than health workers in other settings, while working in a rural setting was positively associated with having an up-to-date salary. The percentage of health workers in ASSP areas who reported that their salaries were up-to-date increased significantly from 32.8 percent to 52.8 percent ($p<0.001$) (Table 9.40). Non-ASSP areas also experienced increases, but they were not statistically significant.

Figure 9.7. Health workers' overall satisfaction with their jobs and reports of timeliness of salary payments in ASSP and non-ASSP areas, by year.



*Difference between 2014 and 2017 levels is statistically significant at p<0.05.

iii. Limitations

Timing of baseline: At the time the baseline survey was conducted, the ASSP project had just completed its first delivery of equipment and supplies to supported facilities, and supportive supervision had begun to occur. This may cause ASSP's impact on equipment and supplies to be understated.

Seasonality: The implication of the seasonality analysis is that the impact of ASSP on drug supply in the Maniema/Tshopo domain may be slightly overestimated, as part of that region was experiencing a dry season at endline. The dry season was found to be correlated with availability of drugs.

Service interruptions: ASSP was experiencing service interruptions during the endline survey, which may have impacted the flow of supplies and drugs to the facilities. This may have indirectly impacted health worker satisfaction, as they were on the front lines of the interruptions. Again, this would result in an understatement of the project's overall impact.

Power to detect differences: The analysis was not powered to detect differences at the health facility or health worker level. Therefore, it is plausible that impacts occurred that could not be detected in the DID model. The p-value considered statistically significant has been adjusted to $p<0.10$ in the health facility analyses to compensate for the lower sample size.

iv. Discussion

This chapter describes indicators of service quality in ASSP and non-ASSP areas in 2014 and 2017, as well as impacts of the ASSP project on these outcomes. The DID analysis found that the ASSP project had a positive impact on the percentage of health facilities offering the minimum package of preventive services. All things equal, the probability that a facility in an ASSP area offered the minimum package of preventive services at endline was 41.1 percent higher because of the ASSP project. This program impact was driven by Nord Ubangi, where the probability was 73.8 percent higher. The improvement is largely attributable to the increase in family planning services facilitated by ASSP and described in Chapter 7. In Nord Ubangi, facilities in ASSP and non-ASSP areas had similarly low levels of coverage of preventive services at baseline; by endline, facilities in ASSP areas had improved while those in non-ASSP areas had worsened. As there had been no predecessor project in Nord or Sud Ubangi, this region had a lot of potential to improve when a project was implemented. In contrast, levels of coverage in the Maniema/Tshopo region, which has historically received more donor attention, were quite high at baseline and remained high throughout the project.

ASSP areas experienced increases in the percentage of facilities with adequate equipment, while similar trends were not observed in non-ASSP areas. The improvements in ASSP-supported facilities were not statistically significant, which may be due in part to the relatively low number of facilities in the sample. Facilities that were newly-constructed through the ASSP project were not surveyed. Therefore, endline estimates of the prevalence of equipment may be understated. Further, at the time of the baseline survey, the ASSP project had just completed its first delivery of equipment and supplies to supported facilities while at the time of the endline survey the ASSP project was experiencing service interruptions. Overall, though, the positive direction of the trend in ASSP areas is promising.

ASSP-supported facilities also saw improvements in the drug supply. These changes were not statistically significant which may be due to the timing of the baseline and the service interruptions occurring during the endline survey. The sub-analyses by domain show that while the ASSP project was not found to have a significant impact in Maniema/Tshopo, the project's impact in Nord Ubangi was strong. This may indicate that the ASSP project maintained the service levels of the predecessor project in Maniema/Tshopo while making gains in Nord Ubangi, where no project had been operating. While progress has been made, the availability of drugs is still low, with 45 percent of facilities or less having all three tracer drugs in stock on the day of the survey. The ASSP project did not improve the percentage of patients satisfied with the drug supply at the facility (Chapter 8). Data from interviews conducted for an evaluation of ASSP's Simplified Community Scorecard approach found frustration on the part of health workers and community members regarding the availability of drugs in the facility; patients reported being required to purchase drugs elsewhere at added cost. However, there was evidence that changes to the system could have an impact; one health facility had arranged to receive larger shipments of drugs (three months' worth as opposed to one month), which had alleviated the stock-out issue. Continued emphasis on supply chain improvements, strengthening physical and information infrastructure, and the use of data-driven procurement systems for both equipment and the drug supply may result in significant change in time.

In terms of community satisfaction and participation, there were positive and significant trends in both ASSP and non-ASSP areas. Again, while no ASSP impact was detected overall, the trends are encouraging; the subgroup analysis found that ASSP increased satisfaction with community participation in Maniema/Tshopo. The impact of ASSP on community empowerment and participation is explored in two separate operations research reports focused on the Community Health Endowment and Simplified Community Scorecard. Incorporating more community education and outreach into ASSP's activities (in conjunction with a behavior change communication strategy) could further strengthen community satisfaction and participation.

Employees' satisfaction with their jobs has the potential to impact service quality and patient satisfaction. Overall, ASSP did not have an impact on job satisfaction among health workers; this measure declined slightly in ASSP areas and greatly in non-ASSP areas. An ASSP project impact was detected in Nord/Sud Ubangi. This may be related to the finding that a larger proportion of health worker salaries are being paid on time in ASSP areas compared with non-ASSP areas, particularly in Nord/Sud Ubangi. In general, satisfaction remains rather low at 57 percent in ASSP areas.

The ASSP project consists of a range of interventions that may have differing impacts on health worker satisfaction. For example, ASSP's efforts to improve the punctuality of salary payments likely improved job satisfaction. Job training also typically improves job satisfaction, as employees feel valued by their employer and more competent in their work. On the other hand, an operations research study of the impact of ASSP's removal of performance-based-financing payments found that the project may also worsen job satisfaction by adding tasks for which there is no additional compensation. The study also found that perceived unfairness in the process by which health workers were selected for training could worsen job satisfaction as well.

It seems clear that improving the timely payment of health worker salaries is a key strategy for improving job satisfaction. As limited research into determinants of job satisfaction among Congolese health workers has been conducted, more evidence should be generated and used to inform interventions specifically focused on improving health worker satisfaction in this setting. Further, any complex health project should include monitoring for interventions' unintended negative impacts on health worker job satisfaction.

References

Wright, J. (2015). Essential package of health services country snapshot: The Democratic Republic of the Congo. Bethesda, MD: Abt Associates, Inc.

Table 9.1. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on adequate equipment on the day of the survey (n=264)

	Marginal Effect	Standard Error	p-value
Interaction (ASSP*Year)	5.652	10.320	0.584
ASSP vs Non-ASSP	2.892	5.987	0.629
Year	-2.190	8.417	0.795
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-1.791	2.220	0.420
Setting			
Rural	[ref]		
Peri-urban	-5.380	7.321	0.462
Facility type			
Health center/post	[ref]		
Reference health center	-2.646	5.573	0.635
Number of beds			
0	[ref]		
1-3	-5.489	5.681	0.334
4+	-2.772	5.848	0.635
World Bank			
No intervention	[ref]		
Cash	4.589	11.623	0.693
Interaction (ASSP*Year)	5.652	10.320	0.584

Note: Statistical significance is considered at p<0.10.
"Adequate equipment" is defined as having at least 75 percent of the six pieces of basic equipment (thermometer, stethoscope, blood pressure cuff, adult scale, pediatric scale, timer) in working order and in the quantities recommended by the WHO, on the day of the survey.

Table 9.2. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness adequacy of equipment, restricted to Nord/Sud Ubangi (n=117)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	11.424	17.219	0.507
Year	-6.605	13.510	0.625
ASSP vs. Non-ASSP	4.003	10.126	0.693

Note: Statistical significance is considered at p<0.10.

Table 9.3. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness adequacy of equipment, restricted to Maniema/Tshopo (n=139)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	6.729	10.419	0.518
Year	-0.809	8.151	0.921
ASSP vs. Non-ASSP	1.238	7.375	0.867

Note: Statistical significance is considered at p<0.10.

Table 9.4. Percent of health facilities with adequate equipment on the day of the survey, by selected characteristics, study sample & year (n=312)

	ASSP				Non-ASSP			
	2014 (*n=69*)	**2017 (*n=81*)**	**Absolute change**	***p-value***	**2014 (*n=67*)**	**2017 (*n=95*)**	**Absolute change**	***p-value***
Adequate equipment	11.6	12.5	0.9	0.888	9.0	8.4	-0.5	0.905
Sampling domain								
Nord/Sud Ubangi	11.8	17.1	5.3	0.518	12.1	10.9	-1.3	0.863
Maniema/Tshopo	11.4	12.5	1.1	0.887	5.9	6.1	0.2	5.880
Setting								
Rural	13.6	15.2	1.6	0.833	7.9	7.9	-0.1	0.987
Peri-urban	0.0	0.0	0.0	N/A	25.0	16.7	-8.3	0.747
Facility type								
Health center/post	11.7	12.1	0.4	0.948	9.3	8.4	-0.8	0.867
Reference health center	11.1	14.3	3.2	0.849	7.7	8.3	0.6	0.953
Number of beds								
0	20.0	33.3	13.3	0.612	17.7	0.0	-17.7	**0.098**
1-3	0.0	7.7	7.7	0.219	11.8	14.3	2.5	0.803
4+	19.1	17.7	-1.4	0.912	4.0	7.9	3.9	0.535

Note: Percentages are weighted. Statistical significance is considered at p<0.10.
"Adequate equipment" is defined as having at least 75 percent of the six pieces of basic equipment (thermometer, stethoscope, blood pressure cuff, adult scale, pediatric scale, timer) in working order and in the quantities recommended by the WHO, on the day of the survey.

Table 9.5. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on having all three tracer drugs in stock on the day of the survey (n=264)

	Marginal Effect	Standard Error	p-value
Interaction (ASSP*Year)	14.558	14.524	0.316
ASSP vs Non-ASSP	4.997	9.141	0.585
Year	-7.139	11.200	0.524
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-1.454	3.527	0.680
Setting			
Rural	[ref]		
Peri-urban	8.374	10.059	0.405
Facility type			
Health center/post	[ref]		
Reference health center	10.789	8.156	0.186
Number of beds			
0	[ref]		
1-3	3.871	8.631	0.654
4+	4.372	8.460	0.605
World Bank			
No intervention	[ref]		
Cash	10.047	14.417	0.486
Performance-based financing	-7.401	13.784	0.591

Note: Statistical significance is considered at p<0.10.
"Tracer drugs" are Oxytocin, Sulfadoxine-pyrimethamine, and Amoxicillin.

Table 9.6. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness availability of drugs, restricted to Nord/Sud Ubangi (n=123)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	41.178	21.934	**0.060**
Year	-1.331	13.803	0.923
ASSP vs. Non-ASSP	-37.749	16.969	**0.026**

Note: Statistical significance is considered at $p<0.10$.

Table 9.7. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness availability of drugs, restricted to Maniema/Tshopo (n=141)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	9.845	17.151	0.566
Year	11.291	12.236	0.356
ASSP vs. Non-ASSP	1.196	12.399	0.923

Note: Statistical significance is considered at $p<0.10$.

Table 9.8. Percentage of facilities with all three tracer drugs in stock on the day of the survey, by selected characteristics, study sample & year (n=312)

	ASSP				Non-ASSP			
	2014 (*n=69*)	**2017 (*n=81*)**	**Absolute change**	***p-value***	**2014 (*n=67)***	**2017 (*n=95*)**	**Absolute change**	***p-value***
Adequate drug supply	42.0	44.4	2.4	0.766	40.3	30.5	-9.8	0.198
Sampling domain								
Nord/Sud Ubangi	41.2	43.9	2.7	0.812	48.5	30.4	-18.1	0.103
Maniema/Tshopo	42.9	45.0	2.1	0.852	32.4	30.6	-1.7	0.866
Setting								
Rural	44.1	43.7	-0.4	0.963	36.5	30.3	-6.2	0.425
Peri-urban	30.0	50.0	20.0	0.361	100.0	33.3	-66.7	**0.035**
Facility type								
Health center/post	41.7	40.9	-0.8	0.924	42.6	27.7	-14.9	**0.071**
Reference health center	44.4	70.0	25.6	0.260	30.8	50.0	19.2	0.327
Number of beds								
0	53.3	50.0	-3.3	0.890	35.3	14.3	-21.0	0.183
1-3	36.8	57.1	20.3	0.172	29.4	37.1	7.7	0.583
4+	42.9	48.3	5.4	0.704	48.0	36.8	-11.2	0.379

Notes: Percentages are weighted. Statistical significance is considered at p<0.10.
“Tracer drugs” are Oxytocin, Sulfadoxine-pyrimethamine, and Amoxicillin.

Table 9.9. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on offering all preventive services on the day of the survey (n=264)

	Marginal Effect	Standard Error	p-value
Interaction (ASSP*Year)	44.730	12.174	**<0.001**
ASSP vs Non-ASSP	18.941	6.380	**0.003**
Year	-14.567	7.705	**0.059**
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	11.012	2.702	**<0.001**
Setting			
Rural	[ref]		
Peri-urban	24.062	11.328	**0.034**
Facility type			
Health center/post	[ref]		
Reference health center	14.437	6.351	**0.023**
Number of beds			
0	[ref]		
1-3	2.620	6.810	0.700
4+	1.411	6.659	0.832
World Bank			
No intervention	[ref]		
Cash	0.347	11.070	0.975
Performance-based financing	12.674	7.916	0.109

Note: Statistical significance is considered at $p<0.10$.
“Preventive services” are prenatal consults, family planning consults, postnatal care, vaccination, and growth monitoring.

Table 9.10. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness availability of preventive services, restricted to Nord/Sud Ubangi (n=109)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	73.819	10.254	**<0.001**
Year	-27.601	8.743	**0.002**
ASSP vs. Non-ASSP	1.061	8.169	0.897

Note: Statistical significance is considered at p<0.10.

Table 9.11. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness availability of preventive services, restricted to Maniema/Tshopo (n=139)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	7.831	13.862	0.572
Year	-5.129	7.654	0.503
ASSP vs. Non-ASSP	36.463	8.291	**<0.001**

Note: Statistical significance is considered at p<0.10.

Table 9.12. Percent of health facilities offering all preventive services on the day of the survey, by selected characteristics, study sample & year (n=312)

	ASSP				Non-ASSP			
	2014 (*n=69*)	2017 (*n=81*)	Absolute change	*p-value*	2014 (*n=67*)	2017 (*n=95*)	Absolute change	*p-value*
Percent with all preventive services*	63.8	95.1	31.3	**<0.001**	41.8	29.5	-12.3	0.105
Sampling domain								
Nord/Sud Ubangi	35.3	95.1	59.8	**<0.001**	36.4	4.4	-32.0	**<0.001**
Maniema/Tshopo	91.4	95.0	3.6	0.536	47.1	53.1	6.0	0.591
Setting								
Rural	59.3	95.8	36.5	**<0.001**	39.7	25.8	-13.8	**0.071**
Peri-urban	90.0	90.0	0.0	1.000	75.0	83.3	8.3	0.747
Facility type								
Health center/post	60.0	94.4	34.4	**<0.001**	35.2	28.9	-6.3	0.440
Reference health center	88.9	100.0	11.1	0.279	69.2	33.3	-35.9	**0.073**
Number of beds								
0	46.7	100.0	53.3	**0.023**	35.3	28.6	-6.7	0.690
1-3	68.4	96.4	28.0	**0.008**	41.2	28.6	-12.6	0.363
4+	90.5	93.1	2.6	0.735	52.0	31.6	-20.4	0.105

Notes: Percentages are weighted. Statistical significance is considered at p<0.10.
"Preventive services" are prenatal consults, family planning consults, postnatal care, vaccination, and growth monitoring.

Table 9.13. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on offering all curative services on the day of the survey

	Marginal Effect	Standard Error	p-value
Interaction (ASSP*Year)	1.492	7.521	0.843
ASSP vs Non-ASSP	3.200	4.946	0.518
Year	-2.188	6.126	0.721
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	4.664	1.948	**0.017**
Setting			
Rural	[ref]		
Peri-urban	-14.768	5.952	**0.013**
Facility type			
Health center/post	[ref]		
Reference health center	25.433	2.743	**<0.001**
Number of beds			
0	[ref]		
1-3	-4.929	4.351	0.257
4+	0.757	4.958	0.879
World Bank			
No intervention	[ref]		
Cash	-3.353	7.355	0.648
Performance-based financing	10.945	10.559	0.300

Note: Statistical significance is considered at p<0.10.
"Curative services" are treatment for tuberculosis, treatment of sexually-transmitted infections, minor surgery, and skilled birth assistance.

Table 9.14. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness availability of curative services, restricted to Nord/Sud Ubangi (n=117)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	4.273	9.844	0.664
Year	-4.015	7.781	0.606
ASSP vs. Non-ASSP	-2.980	5.150	0.563

Note: Statistical significance is considered at $p<0.10$.

Table 9.15. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness availability of curative services, restricted to Maniema/Tshopo (n=139)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-1.093	11.699	0.926
Year	-0.870	8.815	0.921
ASSP vs. Non-ASSP	9.032	8.442	0.285

Note: Statistical significance is considered at $p<0.10$.

Table 9.16. Percent of health facilities offering all curative services on the day of the survey, by selected characteristics, study sample & year (n=312)

	ASSP				Non-ASSP			
	2014 (*n=69*)	**2017 (*n=81*)**	**Absolute change**	***p-value***	**2014 (*n=67)***	**2017 (*n=95*)**	**Absolute change**	***p-value***
Percent with all curative services	11.6	12.4	0.8	0.888	14.9	12.6	-2.3	0.675
Sampling domain								
Nord/Sud Ubangi	5.9	4.9	-1.0	0.847	9.1	4.4	-4.7	0.393
Maniema/Tshopo	17.1	20.0	2.9	0.751	20.6	20.4	-0.2	0.984
Setting								
Peri-urban	11.9	14.1	2.2	0.709	15.9	13.5	-2.4	0.680
Rural	10.0	0.0	-10.0	0.305	0.0	0.0	0.0	1.000
Facility type								
Health center/post	5.0	2.8	-2.2	0.516	3.7	8.4	4.7	0.275
Reference health center	55.6	80.0	24.4	0.252	61.5	41.7	-19.9	0.320
Number of beds								
0	6.7	16.7	10.0	0.481	11.8	21.4	9.7	0.467
1-3	15.8	7.1	-8.7	0.345	11.8	5.7	-6.1	0.442
4+	19.1	20.7	1.6	0.886	24.0	15.8	-8.2	0.417

Notes: Percentages are weighted. Statistical significance is considered at $p<0.10$.
"Curative services" are treatment for tuberculosis, treatment of sexually-transmitted infections, minor surgery, and skilled birth assistance.

Table 9.17. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on having malaria diagnostic capabilities on the day of the survey

	Marginal Effect	Standard Error	p-value
Interaction (ASSP*Year)	26.083	12.749	**0.041**
ASSP vs Non-ASSP	5.790	8.544	0.498
Year	-25.225	9.433	**0.007**
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-3.141	3.122	0.314
Setting			
Rural	[ref]		
Peri-urban	47.310	12.937	**<0.001**
Facility type			
Health center/post	[ref]		
Reference health center	35.831	8.170	**<0.001**
Number of beds			
0	[ref]		
1-3	10.509	7.830	0.180
4+	17.867	8.003	**0.026**
World Bank			
No intervention	[ref]		
Cash	21.109	9.783	**0.031**
Performance-based financing	34.611	6.683	**<0.001**

Note: Statistical significance is considered at $p<0.10$.

Table 9.18. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness rates of malaria diagnostic capabilities, restricted to Nord/Sud Ubangi (n=110)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-10.224	22.564	0.650
Year	5.155	16.659	0.757
ASSP vs. Non-ASSP	29.620	14.273	**0.038**

Note: Statistical significance is considered at p<0.10.

Table 9.19. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness rates of malaria diagnostic capabilities, restricted to Maniema/Tshopo (n=141)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	15.939	15.323	0.298
Year	-11.468	10.372	0.269
ASSP vs. Non-ASSP	-7.821	11.485	0.496

Note: Statistical significance is considered at p<0.10.

Table 9.20. Percent of health facilities with malaria diagnostic capabilities on the day of the survey, by selected characteristics, study sample & year (n=312)

	ASSP				Non-ASSP			
	2014 (*n=69*)	**2017 (*n=81*)**	**Absolute change**	***p-value***	**2014 (*n=67*)**	**2017 (*n=95*)**	**Absolute change**	***p-value***
Malaria diagnostic capabilities	60.9	70.4	9.5	0.221	58.2	49.5	-8.7	0.273
Sampling domain								
Nord/Sud Ubangi	61.8	75.6	13.9	0.196	51.5	50.0	-1.5	0.894
Maniema/Tshopo	60.0	65.0	5.0	0.655	64.7	49.0	-15.7	0.156
Setting								
Peri-urban	57.6	66.2	8.6	0.315	57.1	46.1	-11.1	0.178
Rural	80.0	100.0	20.0	0.136	75.0	100.0	25.0	0.197
Facility type								
Health center/post	60.0	67.6	7.6	0.366	48.2	45.8	-2.4	0.786
Reference health center	66.7	90.0	23.3	0.213	100.0	75.0	-25.0	**0.055**
Number of beds								
0	53.3	83.3	30.0	0.201	47.1	21.4	-25.6	0.138
1-3	63.2	50.0	-13.2	0.373	58.8	54.3	-4.5	0.757
4+	76.2	82.8	6.6	0.567	68.0	63.2	-4.8	0.693

Notes: Percentages are weighted. Statistical significance is considered at $p<0.10$.

Table 9.21. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on reporting that the community is informed about health services (n=6,850)

	Marginal Effect	Standard Error	p-value
Interaction (ASSP*Year)	-0.112	2.871	0.969
ASSP vs Non-ASSP	-10.719	4.303	**0.013**
Year	12.654	2.328	**<0.001**
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-9.800	1.335	**<0.001**
Setting			
Rural	[ref]		
Peri-urban	-2.667	2.063	0.196
Sex of head of household			
Female	[ref]		
Male	0.505	1.785	0.777
Education level of head of household			
None	[ref]		
Some primary	4.175	2.098	**0.047**
Completed primary	5.643	1.967	**0.004**
Completed secondary	15.179	2.609	**<0.001**
World Bank			
No intervention	[ref]		
Cash	-6.583	2.866	**0.022**
Performance-based financing	-5.563	2.868	0.052

Note: Statistical significance is considered at $p<0.05$.

Table 9.22. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness reporting that the community is informed about health services, restricted to females (n=1,059)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-10.966	7.159	0.126
Year	9.960	11.359	0.381
ASSP vs. Non-ASSP	20.286	5.810	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 9.23. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness of reporting that the community is informed about health services, restricted to males (n=5,791)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	1.709	3.141	0.586
Year	-14.147	4.657	**0.002**
ASSP vs. Non-ASSP	11.261	2.543	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 9.24. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness reporting that the community is informed about health services, restricted to Nord/Sud Ubangi (n=3,456)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-7.283	3.991	0.068
Year	2.619	5.984	0.662
ASSP vs. Non-ASSP	19.576	3.208	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 9.25. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness reporting that the community is informed about health services, restricted to Maniema/Tshopo (n=3,394)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	6.059	3.547	0.088
Year	-23.434	5.762	**<0.001**
ASSP vs. Non-ASSP	6.443	2.622	**0.014**

Note: Statistical significance is considered at p<0.05.

Table 9.26. Percent of heads of household who reported that the community is informed about health services, by selected characteristics, study sample & year (n=6,917)

	ASSP				Non-ASSP			
	2014 (*n=1,392*)	**2017 (*n=2,114*)**	**Absolute change**	***p-value***	**2014 (*n=1,374)***	**2017 (*n=2,037)***	**Absolute change**	***p-value***
Informed about health services	44.6	56.2	11.6	**<0.001**	56.0	63.6	7.7	**<0.001**
Sampling domain								
Nord/Sud Ubangi	45.5	62.4	16.9	**0.002**	52.3	66.6	14.4	**<0.001**
Maniema/Tshopo	32.7	42.6	9.9	0.130	52.0	55.6	3.7	0.409
Setting								
Peri-urban	44.8	57.6	12.8	0.124	46.8	59.0	12.2	0.310
Rural	36.3	48.8	12.4	**0.013**	52.4	64.2	11.9	**<0.001**
Sex of head of household								
Female	33.2	37.4	4.2	0.484	44.9	63.3	18.4	**0.009**
Male	37.4	53.0	15.6	**0.005**	53.4	64.1	10.7	**<0.001**
Education level of head of household								
None	40.8	42.3	1.5	0.794	44.0	62.1	18.0	**0.020**
Some primary	28.9	53.3	24.4	**<0.001**	52.1	65.9	13.8	**0.014**
Completed primary	40.3	48.5	8.2	0.166	52.9	62.3	9.4	**0.018**
Completed secondary	34.1	53.4	19.3	0.228	55.4	79.1	23.7	**0.001**

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Table 9.27. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on satisfaction with community involvement in decision-making about health services (n=6,818)

	Marginal Effect	Standard Error	p-value
Interaction (ASSP*Year)	0.975	2.889	0.736
ASSP vs Non-ASSP	-6.106	4.348	0.160
Year	8.189	2.343	**<0.001**
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-16.063	1.355	**<0.001**
Setting (peri-urban)			
Rural	[ref]		
Peri-urban	<0.001	2.077	1.000
Sex of head of household			
Female	[ref]		
Male	2.451	1.801	0.174
Education level of head of household			
None	[ref]		
Some primary	2.452	2.096	0.242
Completed primary	2.700	1.965	0.169
Completed secondary	4.738	2.713	0.081
World Bank			
No intervention	[ref]		
Cash	-1.842	2.878	0.522
Performance-based financing	0.426	2.879	0.882

Note: Statistical significance is considered at $p<0.05$.

Table 9.28. Impact of ASSP satisfaction with community involvement, restricted to females (n=1,054)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-5.096	7.220	0.480
Year	10.376	11.462	0.365
ASSP vs. Non-ASSP	13.190	5.916	**0.026**

Note: Statistical significance is considered at $p<0.05$.

Table 9.29. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness satisfaction with community involvement, restricted to males (n=5,764)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	1.595	3.162	0.614
Year	-8.301	4.711	0.078
ASSP vs. Non-ASSP	7.540	2.555	**0.003**

Note: Statistical significance is considered at $p<0.05$.

Table 9.30. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness satisfaction with community involvement, restricted to Nord/Sud Ubangi (n=3,441)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-10.032	4.017	**0.013**
Year	11.583	6.075	0.057
ASSP vs. Non-ASSP	14.692	3.226	**<0.001**

Note: Statistical significance is considered at $p<0.05$.

Table 9.31. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness satisfaction with community involvement, restricted to Maniema/Tshopo (n=3,377)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	9.046	3.556	**0.011**
Year	-20.992	5.819	**<0.001**
ASSP vs. Non-ASSP	4.705	2.607	0.071

Note: Statistical significance is considered at $p<0.05$.

Table 9.32. Percent of heads of household who were satisfied with community involvement in decision-making about health services, by selected characteristics, study sample & year (n=6,882)

	ASSP				Non-ASSP			
	2014 (*n=1,391*)	**2017 (*n=2,095*)**	**Absolute change**	***p-value***	**2014 (*n=1,375)***	**2017 (*n=2,021*)**	**Absolute change**	***p-value***
Satisfaction with community involvement	42.9	52.0	9.1	**<0.001**	48.2	55.5	7.4	**<0.001**
Sampling domain								
Nord/Sud Ubangi	56.2	59.7	3.5	0.659	52.4	61.2	8.8	**0.018**
Maniema/Tshopo	22.4	36.6	14.2	**0.043**	40.3	47.4	7.1	0.217
Setting								
Peri-urban	45.2	53.5	8.4	0.408	39.0	40.9	2.0	0.707
Rural	32.4	43.8	11.4	**0.047**	49.3	58.8	9.5	**0.002**
Sex of head of household								
Female	31.7	36.5	4.8	0.418	43.5	53.9	10.4	0.150
Male	33.4	46.8	13.4	**0.032**	49.8	58.6	8.8	**0.003**
Education level of head of household								
None	42.5	46.4	3.9	0.680	42.2	56.6	14.5	0.050
Some primary	32.2	50.0	17.9	**0.008**	52.7	59.9	7.3	0.118
Completed primary	34.1	41.0	6.8	0.245	48.6	56.8	8.2	**0.027**
Completed secondary	25.0	34.8	9.8	0.326	49.9	69.3	19.4	0.058

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Table 9.33. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on reporting overall satisfaction with one's job

	Marginal Effect	**Standard Error**	**p-value**
Interaction (ASSP*Year)	5.259	7.564	0.487
ASSP vs Non-ASSP	-34.117	13.078	**0.009**
Year	-10.860	5.546	0.050
Sampling domain			
Nord/Sud Ubangi	[ref		
Maniema/Tshopo	-15.780	4.324	**<0.001**
Setting			
Peri-urban	[ref		
Rural	12.369	5.256	**0.019**
Facility type			
Health center/post	[ref		
Reference health center	3.402	4.643	0.464
Number of beds			
0	[ref		
1-3	-10.050	5.731	0.079
4+	-10.887	5.601	0.052
World Bank			
No support	[ref		
Cash	-37.596	6.370	**<0.001**
Performance-based financing	-37.148	5.778	**<0.001**

Note: Statistical significance is considered at $p<0.05$.

Table 9.34. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness reporting overall satisfaction with one's job, restricted to Nord/Sud Ubangi (n=227)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	36.820	12.571	**0.003**
Year	-19.268	9.063	**0.034**
ASSP vs. Non-ASSP	-65.222	22.334	**0.003**

Note: Statistical significance is considered at p<0.05.

Table 9.35. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness reporting overall satisfaction with one's job, restricted to Maniema/Tshopo (n=425)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-4.199	9.066	0.643
Year	-8.326	6.882	0.226
ASSP vs. Non-ASSP	-15.347	15.349	0.317

Note: Statistical significance is considered at p<0.05.

Table 9.36. Percent health workers who report overall satisfaction in their jobs, by selected characteristics, study sample & year

	ASSP				Non-ASSP			
	2014 (*n=174*)	2017 (*n=230*)	Absolute change	*p-value*	2014 (*n=125)*	2017 (*n=239*)	Absolute change	*p-value*
Job satisfaction	60.9	57.0	-4.0	0.423	72.0	60.7	-11.3	**0.032**
Sampling domain								
Nord/Sud Ubangi	56.4	70.4	14.1	0.080	79.6	53.9	-25.7	**0.003**
Maniema/Tshopo	63.0	47.0	-16.1	**0.011**	67.1	64.9	-2.3	0.738
Setting								
Peri-urban	65.8	71.4	5.6	0.604	78.6	92.0	13.4	0.229
Rural	59.6	54.4	-5.2	0.348	71.2	57.0	-14.2	**0.013**
Facility type								
Health center/post	57.3	59.8	2.4	0.665	76.7	59.5	-17.3	**0.005**
Reference health center	80.0	40.9	-39.1	**0.001**	57.1	65.9	8.8	0.425
Number of beds								
0	56.7	57.1	0.5	0.976	84.0	89.7	5.7	0.537
1-3	47.1	66.7	19.6	**0.025**	65.7	55.1	-10.7	0.279
4+	77.6	50.0	-27.6	**<0.001**	68.5	54.3	-14.2	0.084

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Table 9.37. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on up-to-date salary

	Marginal Effect	**Standard Error**	**p-value**
Interaction (ASSP*Year)	9.185	7.623	0.228
ASSP vs Non-ASSP	-13.659	13.181	0.300
Year	7.369	5.433	0.175
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-14.169	4.812	**0.003**
Setting			
Peri-urban	[ref		
Rural	22.997	5.604	**<0.001**
Facility type			
Health center/post	[ref		
Reference health center	9.038	4.772	0.058
Number of beds			
0	[ref		
1-3	-25.253	5.976	**<0.001**
4+	-12.267	5.957	**0.039**
World Bank			
No support	[ref		
Cash	-2.679	7.318	0.714
Performance-based financing	-2.989	6.625	0.652

Note: Statistical significance is considered at $p<0.05$.

Table 9.38. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness up-to-date salary, restricted to Nord/Sud Ubangi (n=96)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-92.357	6,759.819	0.989
Year	-78.990	6,759.871	0.991
ASSP vs. Non-ASSP	79.898	6,759.826	0.991

Note: Statistical significance is considered at p<0.05.

Table 9.39. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on illness up-to-date salary, restricted to Maniema/Tshopo (133)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-101.191	6,546.659	0.988
Year	-30.177	9.559	**0.002**
ASSP vs. Non-ASSP	177.824	13,093.320	0.989

Note: Statistical significance is considered at p<0.05.

Table 9.40. Percent health workers who report that their salary is up-to-date, by selected characteristics, study sample & year

	ASSP				Non-ASSP			
	2014 (*n=174*)	**2017 (*n=230*)**	**Absolute change**	***p-value***	**2014 (*n=125*)**	**2017 (*n=239*)**	**Absolute change**	***p-value***
Salary is up-to-date	32.8	54.8	22.0	**<0.001**	35.2	41.8	6.6	0.219
Sampling domain								
Nord/Sud Ubangi	52.7	73.5	20.7	**0.009**	28.6	31.9	3.3	0.687
Maniema/Tshopo	23.5	40.9	17.4	**0.003**	39.5	48.0	8.5	0.226
Setting								
Peri-urban	36.8	71.4	34.6	**0.003**	35.7	60.0	24.3	0.146
Rural	31.6	51.8	20.2	**<0.001**	35.1	39.7	4.6	0.420
Facility type								
Health center/post	34.3	54.4	20.2	**<0.001**	30.2	40.5	10.3	0.101
Reference health center	26.7	52.3	25.6	**0.028**	48.6	47.7	-0.8	0.941
Number of beds								
0	46.7	71.4	24.8	0.124	32.0	72.4	40.4	**0.003**
1-3	23.5	38.1	14.6	0.080	34.3	22.5	-11.8	0.176
4+	32.8	54.6	21.7	**0.007**	38.9	46.7	7.8	0.349

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Chapter 10
Environmental Health

Acronyms

AMCOW	African Ministers' Council on Water
ASSP	Access to Primary Health Care
BCC	Behavior Change Communication
CAP	Community Action Plan
CMO	Chief Medical Officer
DID	Difference-in-Differences
DHS	Demographic and Health Survey
DRC	Democratic Republic of Congo
JMP	Joint Monitoring Program for Water Supply, Sanitation and Hygiene
KAP	Knowledge, Attitudes, and Practices
OD	Open Defecation
SDG	Sustainable Development Goal
SES	Socioeconomic Status
UN	United Nations
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization
WSS	Water and Sanitation Sector
VA2	*Village Assaini* (Healthy Village) Phase 2

i. Overview of the ASSP approach

As part of the strategy to improve health outcomes in the DRC, the Access to Primary Health Care Project (ASSP) project incorporated a community-level WASH intervention to complement its health systems strengthening approach. The intervention was intended to provide access to safe drinking water through several mechanisms including spring protection, well drilling, cistern installation, and distribution of household- and community-level water filtration devices, as well as, increase use of improved sanitation through the installation of hygienic household latrines and household waste pits. The intervention also included WASH education, BCC activities, and strengthening community capacity through the development of WASH volunteer committees and community action plans. WASH education and BCC activities focused on handwashing, proper feces and waste disposal, and other identified areas of need. The exact activities undertaken in each village varied depending on the needs and availability of resources.

ASSP's WASH program consisted of two intervention models, the *Village Assaini* (Healthy Village) Phase 2 (VA2) model (which is the National approach) and the Hybrid model, with the primary contrasts being the allocation of greater responsibility and leadership of WASH activities onto communities in the Hybrid model, as well as, the construction of cisterns and distribution of life straws. The Hybrid model was primarily implemented in Kasai, which is not included in this analysis. A small number of villages in Maniema/Tshopo participated in the Hybrid model; however, none of these were selected in the survey.

The VA2 intervention consists of a series of 10 steps known as Pas à Pas (Step-by-Step) that form a uniform process of getting a village certified by the Health Zones as a "healthy village." However, these steps may vary in how they are implemented from village to village depending on local input and water and sanitation risk assessments. The process for VA2 consists of the following:

- **Step 0: Community decision** - to participate is made between villages and health zones.
- **Step 1: Mutual engagement** - Awareness raising at the community level and signing of a memorandum of understanding between Zonal Chief Medical Officer (CMO), Zonal WASH supervisors, and the community to participate in the VA2 program.
- **Step 2: Initial evaluation** - Implementing an initial Knowledge, Attitudes, and Practices (KAP) survey by the local WASH supervisor and a community representative.
- **Step 3: Participatory analyses -** Completing a participatory analysis of current WASH conditions in the village.
- **Step 4: Local governance -** Establishing a local (village level) WASH volunteer committee.
- **Step 5: Community planning -** Developing a community action plan (CAP) including the selection of interventions, which can be implemented to alleviate the identified problems.
- **Step 6: Community action**- Implementing the CAP, including strengthening of community capacity, the construction of appropriate water and sanitation infrastructure, and delivery of BCC interventions. BCC focuses on handwashing, proper faeces and waste disposal, and other identified areas of need. The exact activities to be taken, including infrastructure, vary from village to village depending on the needs and available resources in the village. In general, VA2

provides a community water source, household latrines, and household waste pits in each village.

- **Step 7: Final evaluation** - Conducting a final KAP survey to determine changes in WASH infrastructure, behavior, and practices in the village. At this step, the community also elaborates maintenance and local contingency plans.
- **Step 8: Certification** - Conducting a final visit by a Zonal CMO to determine if VA2 program standards have been achieved and certification of the village as a "Healthy Village."
- **Post-Certification** - Follow up on the progress of the village every 12 months and evaluate whether the village still meets the healthy village criteria.

ASSP activities prior to the baseline survey: In the first year of the ASSP program, ASSP quarterly reports detailed efforts to start-up the WASH component that focused mainly on coordination with other national, regional, and provincial authorities rather than direct program activities. This included planning field activities with different stakeholders, hosting several meetings and consultations, procuring necessary equipment for field activities, monitoring and scale-up, and developing a training and post-training plan in collaboration with key partners.

To support the planned launch of WASH activities in April 2014, IMA World Health completed the following preparation activities: (1) a site visit to Gbadolite, Nord Ubangi to initiate planning, mapping, and validation discussions of local activities; (2) participation in a workshop for the validation of the tools and new surveys in the Pas à Pas training curriculum; (3) organization of a briefing workshop on the WASH program for new field personnel recruited to manage the ASSP activities; and (4) launch of a training series, including training of trainers for the Pas à Pas surveys.

ASSP routine environmental health data: ASSP's quarterly report showed that at the time of the endline survey, 88 of the 1,360 villages in Nord Ubangi and 152 of the 2,454 villages in Maniema/Tshopo had initiated the VA2 approach. Of these, 32 in Nord Ubangi and 66 in Maniema/Tshopo had achieved Healthy Village certification.

i. Quantitative findings

This section presents findings from the baseline and endline surveys on WASH outcomes including use of improved water sources, use of improved sanitation, and handwashing, specifically, the percentage of heads of households who reported that they wash their hands after using the toilet. The results presented are limited to responses provided by the head of household, which totaled 6,841 responses. Figure 10.1 displays the degree of ASSP impact on use of improved water sources, improved sanitation, and on prevalence of handwashing after using the toilet, as determined by difference-in-difference (DID) models. Results are shown overall and for subsets of the population based on sampling domain and wealth. Overall, and for each sub-group examined, with the exception of Nord/Sud Ubangi the ASSP project significantly improved use of improved sources of household drinking water.

Sources of household drinking water

The WHO/UNICEF Joint Monitoring Program for Water Supply, Sanitation and Hygiene (JMP) categorizes sources of drinking water into improved and unimproved categories. Improved water sources include piped water systems into an individual's home, yard, or plot, public taps, tubewells and boreholes, protected springs, protected wells, and collected rainwater (WHO, 2017). Unimproved water sources include surface water, unprotected springs, unprotected wells, water from tanks on carts, water from tanker trucks, and bottled water. The JMP also defines a 30-minute standard for the maximum amount of time it should take, for a roundtrip, to collect water (WHO, 2017).

Figure 10.1. Direction of the impact of ASSP on water and sanitation outcomes overall and within subpopulations based on wealth and sampling domain.

	Access to improved water source	Access to improved sanitation facility	Reported handwashing after using toilet
Overall	Increased	Increased	No impact
Sampling Domain			
Nord/Sud Ubangi	No impact	Increased	No impact
Maniema/Tshopo	Increased	Increased	No impact
Wealth quintile			
Low and Low middle	Increased	No impact	No impact
Middle, High-middle, and High	Increased	Increased	No impact

Notes: Each line represents a fully-adjusted DID probit model. Impact is determined by statistical significance ($p<0.05$). Green shading indicates that the impact was in the desired direction, and orange shading indicates that the impact was in the undesired direction. White shading indicates that no impact was detected.

Results from the fully adjusted difference-in-difference model (Table 10.1) show that the probability of households in ASSP areas having an improved water source was 10.295 percent higher than households in non-ASSP areas, indicating a statistically significant positive ASSP project impact. Model results indicate that households located in Maniema/Tshopo had a significantly higher probability of use of an improved water source, as did households in peri-urban areas and female-headed households. Household wealth was also strongly and significantly associated with using an improved water source and the magnitude of association strengthened with each successive wealth quintile.

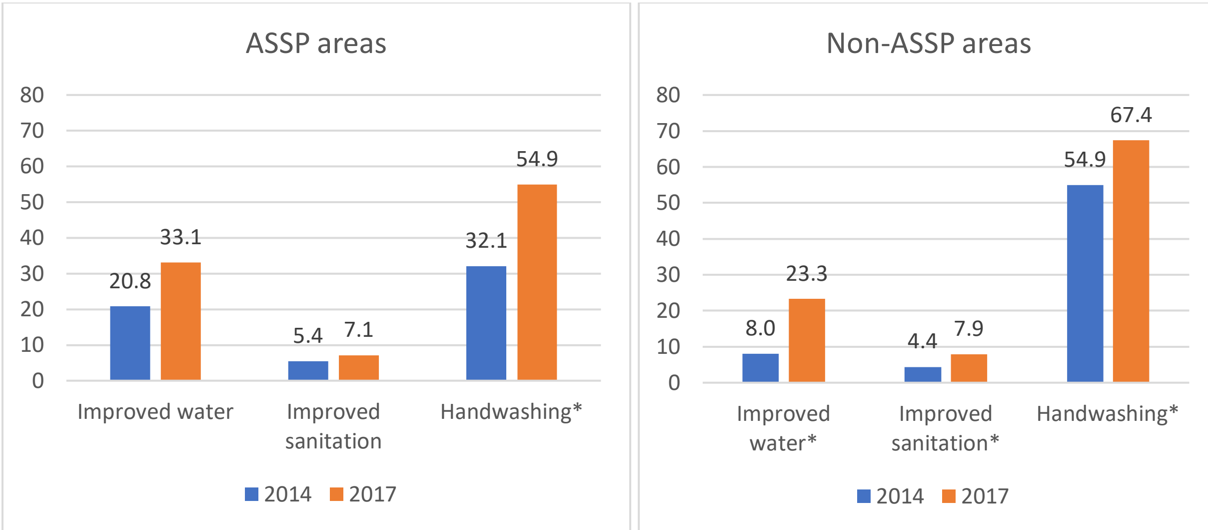
Key Points

- The ASSP project had a significant positive impact on use of improved water sources and improved sanitation facilities.
- WASH infrastructure was consistently better in Maniema/Tshopo compared with Nord/Sud Ubangi.
- Though improvements were observed, use of improved water and sanitation remains low.
- No impact on handwashing was found.

Results from the sub-group analyses indicate that the ASSP project had a significant impact on use of improved water sources in Maniema/Tshopo (Table 10.3), but not in Nord/Sud Ubangi (Tables 10.2 and 10.3). ASSP also had a significant impact on both wealth groups, although the impact was larger for those in the low and low-middle wealth quintiles (Tables 10.4 and 10.5).

Table 10.6 displays changes in the use of improved water sources by selected characteristics at baseline and endline within ASSP and non-ASSP areas. Overall, use of improved water sources increased in ASSP and non-ASSP areas; however, neither change was statistically significant. At baseline in ASSP areas, the proportion of households with use of an improved water source in Maniema/Tshopo was more than double that in Nord/Sud Ubangi. Although use of improved water sources increased in both sampling domains and was statistically significant in Nord/Sud Ubangi, the proportion of households using improved water sources remained higher in Maniema/Tshopo than Nord/Sud Ubangi at endline in ASSP areas. In non-ASSP areas, use of improved water sources increased significantly in Nord/Sud Ubangi but did not change significantly in Maniema/Tshopo.

Figure 10.2: Percentage of households using improved water sources, improved sanitation facilities, and whose head of household reported handwashing after using the toilet, in ASSP and non-ASSP areas by year.



*Difference between 2014 and 2017 levels is statistically significant at *p*<0.05.

Sanitation

The JMP categorizes sanitation facilities into improved and unimproved categories. Improved sanitation includes flush/pour flush latrines to a piped sewer system, septic tanks or pit, pit latrines with slabs, ventilated improved pit latrines, and composting toilets, none of which should be shared among different households (WHO, 2017). Unimproved sanitation includes any public or shared latrine, flush or pour/flush latrines to elsewhere (not to a pit, septic tank, or sewer), pit latrines without slabs, bucket latrines, hanging latrines, and open defecation (OD) (WHO, 2017).

Figure 10.1 summarizes the impact of ASSP on use of improved sanitation facilities overall and for subsets of the population based on sampling domain and wealth. Overall, the ASSP project significantly increased use of improved sanitation facilities. Results from the sub-analyses show that the ASSP project had a significant positive impact in Nord/Sud Ubangi and in Maniema/Tshopo, as well as the higher wealth group. There was no impact in the lower wealth group (low and low-middle wealth quintiles).

Results from the fully adjusted difference-in-difference model (Table 10.7) show the probability that household in ASSP areas used improved sanitation facilities was 5.359 percent higher than households in non-ASSP areas; this difference was attributable to the ASSP project.

As with use of improved water sources, model results indicated that households located in Maniema/Tshopo had a significantly higher probability of having use of an improved sanitation facility. Position in the highest wealth quintile, being in a peri-urban setting, and having a head of household who had completed secondary education were also significantly associated with use of improved sanitation.

Sub-group analyses showed while there was an ASSP program impact within both sampling domains, the impact was much stronger in Maniema/Tshopo compared with Nord/Sud Ubangi (ME= 15.180 versus 2.453) (Tables 10.8 and 10.9). The sub-group analysis also indicated that the ASSP project had a significant impact within the top three wealth quintiles, but no impact in the bottom two quintiles (Tables 10.10 and 10.11).

Table 10.12 displays changes in the use of improved sanitation facilities by selected characteristics at baseline and endline within ASSP and non-ASSP areas. Overall, the proportion of households with use of improved sanitation was low at baseline and endline in ASSP and non-ASSP areas; less than 8 percent of households had use of an improved sanitation facility. Overall, use of improved sanitation increased in both ASSP and non-ASSP areas; however, neither increase was statistically significant. Within ASSP areas, access decreased significantly among households in the low wealth quintile and increased among those with a head of household who had completed secondary education.

Handwashing

Table 10.13 shows the impact of ASSP on the prevalence of handwashing after using the toilet. No project impact was detected. Respondents in Nord/Sud Ubangi and those in peri-urban settings were more likely to report washing their hands. Wealth and education were also positively correlated with handwashing. The sub-analyses did not detect an ASSP project impact within sampling domains or wealth groups (Tables 10.14 through 10.17).

Changes in handwashing behavior over time are shown in Table 10.18. Handwashing increased in all of the categories examined, and in most cases, these increases were statistically significant. Nord/Sud Ubangi and Maniema/Tshopo both experienced significant increases, as did rural areas, all wealth quintiles except for the highest, both male- and female-headed households, and households headed by someone with primary education or higher.

Robustness checks

The impacts of seasonality on use of improved water sources and sanitation facilities and on handwashing were tested by comparing these outcomes in northern and southern Maniema at endline. There were no significant differences by season.

It is plausible that households closer to health facilities had better access to improved water and sanitation, as households nearby to facilities may have gone to rehabilitated facilities for these needs. The difference-in-difference models were run with a variable for the mean distance between households and the health facility within the village. There was no change in the direction or significance of the ASSP impact, and very little change in the magnitude of the effect.

iii. Limitations

Timing of baseline: Although the baseline survey was conducted after the start of ASSP, the activities related to WASH that occurred before the baseline were limited to preparation and training. No community-level intervention had occurred, and so this limitation is not expected to impact the results of the environmental health analysis.

Seasonality: It is plausible that households' sources of water and the amount of time it takes them to access their water vary by season. For example, the use of rainwater and improved sources may occur during the rainy season but not the dry. The use of sanitation facilities may vary as well; for example, someone may be willing to walk further to use an improved facility during the dry season. Handwashing may be less prevalent during seasons in which water is scarcer. Statistical tests did not find significant differences by season. However, the possibility that seasonality confounded the results cannot be ruled out, and it is difficult to ascertain the direction of the potential bias.

Service interruptions: Access to improved water and sanitation and handwashing behaviors are relatively stable indicators. Therefore, they are not expected to have fluctuated with interruptions to ASSP's funding.

Power to detect differences in outcomes: The analysis was powered to detect household-level differences within the overall sample. It was not powered to detect differences in sub-groups such as sampling domains and wealth groups; nevertheless, significant differences were found in some of the sub-analyses.

iv. Discussion

This chapter describes the performance of the ASSP project relative to its goals of increasing use of improved water sources and improved sanitation and promoting handwashing.

Overall, the ASSP project increased use of improved water sources. While use of improved water sources increased in both Nord/Sud Ubangi and Maniema/Tshopo, the proportion of households using an improved water source was consistently higher in the latter in ASSP areas at baseline and endline. This may be explained by results from the sub-analyses, which found a project impact in Maniema/Tshopo but not in Nord/Sud Ubangi. Further, in comparison to rural settings, use of improved water sources was substantially greater in peri-urban locations for both ASSP and non-ASSP areas. Finally, use of improved water sources was also associated with household wealth; access increased significantly across all wealth quintiles and the likelihood of having use of improved water increased with ascending wealth. These contrasts are commonly observed throughout the developing world and are consistent with other countries with developing WASH infrastructure.

Based on reports from implementing partners, increasing use of improved water sources was accomplished primarily through drilling boreholes equipped with man-powered or solar-powered pumps and developing natural water resources such as springs. The rehabilitation of pre-existing wells was also performed but to a lesser extent. These methods likely represent some of the most effective ways to increase use of improved sources of household drinking water in the DRC as it is estimated that groundwater makes up 47 percent of the DRC's internal water renewable resources (Partow, 2011). Protection of natural springs is particularly important in rural locations given that the majority of rural populations in the DRC use springs as their main source of drinking water.

In addition to increasing use of improved water sources, ASSP had a positive impact on use of improved sanitation facilities. This appears attributable to Maniema/Tshopo, as use of improved sanitation in ASSP areas significantly increased in Maniema/Tshopo but remained stable in Nord/Sub Ubangi. Additionally, the sub-analyses found a strong project impact in Maniema/Tshopo (ME=15.180) but a small impact in Nord/Sud Ubangi (ME=2.453). In comparison to the associations observed between household wealth and use of improved water sources, use of improved sanitation in ASSP areas significantly increased for those in the highest wealth quintile only.

ASSP's approach to increasing use of improved sanitation was to construct hygienic household latrines with household-, community-, and program-level support. This was manifested by household and community-level contributions of labor and locally supplied materials for the latrine superstructure, and manufacturing of sanitation platform slabs, which cover defecation pits, with direct project financing. Through this method, each household latrine was constructed utilizing a combination of household inputs, and "as-needed" community and program-based support, showcasing a potentially sustainable framework for future sanitation interventions.

In contrast to use of improved water and sanitation, ASSP did not appear to have an impact on the prevalence of handwashing. However, handwashing behaviors increased significantly in both ASSP and non-ASSP areas. The effectiveness of this indicator to measure the impact of ASSP's BCC activities is limited in that it relies on the self-report of one member of each household, represents only one occasion in which handwashing is recommended, and does not indicate whether handwashing was properly conducted. Other indicators from the survey were considered but not used due to gender specificity (handwashing before breastfeeding or cooking) or due to low response rates (observation of handwashing demonstration). Qualitative data on handwashing may be more useful for assessing this behavior; however, this was not collected.

Levels of use of improved water and sanitation remain low throughout the study areas. However, ASSP's WASH program was found to have had a positive impact on these measures (no impact on handwashing was detected.) This seems to indicate that the approach was effective and that future investment would yield more gains in the WASH sector. Focus on Nord/Sud Ubangi, which lagged behind Maniema/Tshopo in terms of coverage of improved water and sanitation in both ASSP and non-ASSP areas is warranted. Further, considerable disparities in improved sanitation were observed between peri-urban and rural settings. Developing strategies specifically aimed at reducing this gap would not only improve WASH coverage in the DRC but also throughout other developing countries.

The VA2 approach was implemented by other organizations in a sub-set of health zones in non-ASSP areas. As a robustness check, the impact of the VA2 model, agnostic to the implementing organization, was calculated (results not shown). The models showed that the VA2 model had no impact in non-ASSP areas (i.e. when implemented by other organizations), but a significant positive impact in ASSP areas (i.e. when implemented by ASSP). An understanding of the differences in ASSP's implementation that led to its differential success could inform improvements to the National guidelines for VA2. The fact that these impacts were observed despite the relatively low penetration of the WASH intervention in ASSP areas may give some insight. ASSP's broad health system approach included improvement to health facilities' sources of water and sanitation (Chapter 3), training of community health workers and health facility staff, and community empowerment initiatives. This approach in addition to the targeted WASH intervention may have led to significant improvements where a WASH intervention alone did not.

References

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Table 10.1. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on use of an improved water source† (n=6,841)

Characteristic	**Marginal Effect**	**Standard Error**	**p-value**
Interaction (Year*ASSP)	10.295	2.000	**<0.001**
Year	-2.458	1.472	0.095
ASSP vs. non-ASSP	2.212	1.574	0.160
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	4.101	0.510	**<0.001**
Setting			
Rural	[ref]		
Peri-urban	16.313	1.601	**<0.001**
Wealth quintile			
Low	[ref]		
Low middle	6.734	1.366	**<0.001**
Middle	13.302	1.524	**<0.001**
High middle	18.466	1.634	**<0.001**
High	25.020	1.711	**<0.001**
Head of household sex			
Male	[ref]		
Female	-4.545	1.442	**0.002**
Head of household education			
No education	[ref]		
Some primary	-0.938	1.761	0.594
Completed primary	0.636	1.676	0.704
Competed secondary	0.079	2.235	0.972

Note: Significance is considered at $p<0.05$. † Improved water sources are defined as piped water systems into an individual's home or yard, public taps, tubewells and boreholes, protected springs, protected wells and collected rainwater, that are within 30 minutes round-trip from the household.

Table 10.2. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on use of an improved water source restricted to Nord/Sud Ubangi (n=3,470)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-1.247	2.659	0.639
Year	8.356	2.068	**<0.001**
ASSP vs. non-ASSP	13.019	2.199	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 10.3 Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on use of an improved water source restricted to Maniema/Tshopo (n=3,371)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	20.292	3.028	**<0.001**
Year	-12.897	2.202	**<0.001**
ASSP vs. non-ASSP	-7.993	2.379	**0.001**

Note: Statistical significance is considered at p<0.05.

Table 10.4 Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on use of an improved water source restricted to the low and low-middle wealth quintiles (n=2,798)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	14.810	2.623	**<0.001**
Year	-2.012	1.852	0.277
ASSP vs. non-ASSP	-5.500	2.088	**0.008**

Note: Statistical significance is considered at p<0.05.

Table 10.5. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on use of an improved water source restricted to the middle, high-middle, and high wealth quintiles (n=4,043)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	7.319	2.904	**0.012**
Year	-3.371	2.146	0.116
ASSP vs. non-ASSP	5.914	2.287	**0.010**

Note: Statistical significance is considered at p<0.05.

Table 10.6. Percent of households with use of an improved water source† by selected characteristics, study sample and year

Characteristic	ASSP Areas				Non-ASSP Areas			
	2014 *(n=1,394)*	**2017** *(n=2,069)*	**Absolute Change**	***p-value***	**2014** *(n=1,380)*	**2017** *(n=2,085)*	**Absolute Change**	***p- value***
Overall	20.8	33.1	12.3	0.103	8.0	23.3	15.3	**<0.001**
Sampling domain								
Nord/Sud Ubangi	11.6	24.8	13.3	**0.021**	4.3	20.5	16.1	**0.001**
Maniema/Tshopo	25.2	40.2	15.0	0.208	19.7	28.8	9.1	0.505
Setting								
Rural	19.3	30.2	11.0	0.158	47.6	58.4	10.8	0.292
Peri-urban	6.4	21.0	14.6	**<0.001**	75.1	70.9	-4.2	0.629
Wealth quintile								
Low	4.0	18.9	15.0	**0.005**	1.5	14.7	13.1	**<0.001**
Low middle	8.2	21.7	13.5	**0.035**	6.1	12.4	6.3	0.255
Middle	21.6	28.7	7.1	0.593	6.8	17.6	10.8	**0.025**
High middle	16.1	43.6	27.5	**0.047**	7.2	19.2	12.0	**0.025**
High	57.2	55.1	-2.1	0.781	15.9	44.2	28.3	**0.002**
Head of household sex								
Male	20.9	31.7	10.8	0.326	6.7	30.3	23.7	**<0.001**
Female	20.9	33.5	12.6	0.076	8.2	22.2	14.0	**<0.001**
Head of household education								
No education	15.3	22.8	7.4	0.362	9.2	11.3	2.0	0.670
Some primary	12.2	26.4	14.3	**0.029**	6.7	15.1	8.4	0.075
Completed primary	19.4	37.2	17.8	**0.027**	7.3	25.0	17.7	**<0.001**
Competed secondary	38.4	53.7	15.3	0.190	10.1	43.4	33.3	**<0.001**

Notes: Percentages are weighted. Statistical significance is considered at $p<0.05$. † Improved water sources are defined as piped water systems into an individual's home or yard, public taps, tubewells and boreholes, protected springs, protected wells and collected rainwater, that are within 30 minutes round-trip from the household.

Table 10.7. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on use of an improved sanitation facility† (n=6,841)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	5.359	1.250	**<0.001**
Year	-4.837	0.867	**<0.001**
ASSP vs. non-ASSP	-4.442	0.932	**<0.001**
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	3.188	0.345	**<0.001**
Setting			
Rural	[ref]		
Peri-urban	3.065	0.976	**0.002**
Wealth quintile			
Low	[ref]		
Low middle	0.294	0.986	0.766
Middle	1.036	1.045	0.321
High middle	0.411	1.033	0.691
High	2.688	1.084	**0.013**
Head of household sex			
Male	[ref]		
Female	0.074	0.211	0.726
Head of household education			
No education	[ref]		
Some primary	-0.175	1.061	0.869
Completed primary	0.605	0.966	0.531
Competed secondary	4.452	1.465	**0.002**

Note: Statistical significance is considered at $p<0.05$. † Improved sanitation is defined as flush/pour flush latrines to a piped sewer system, septic tank or pit latrine, pit latrines with slabs, ventilated improved pit latrines and composting toilets that are not shared with other households.

Table 10.8. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on use of an improved sanitation facility restricted to Nord/Sud Ubangi (n=3,470)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	2.453	0.978	**0.012**
Year	2.384	1.069	**0.026**
ASSP vs. non-ASSP	2.453	0.978	**0.012**

Note: Statistical significance is considered at p<0.05.

Table 10.9. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on use of an improved sanitation facility restricted to Maniema/Tshopo (n=3,371)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	15.180	2.176	**<0.001**
Year	-12.247	1.514	**<0.001**
ASSP vs. non-ASSP	-10.653	1.605	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 10.10. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on use of an improved sanitation facility restricted to the low and low-middle wealth quintiles (n=2,769)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	0.930	1.729	0.591
Year	-4.844	1.063	**<0.001**
ASSP vs. non-ASSP	-4.012	1.104	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 10.11. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on use of an improved sanitation facility restricted to the middle, high-middle, and high wealth quintiles (n=4,043)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	6.541	1.808	**<0.001**
Year	-3.514	1.294	**0.007**
ASSP vs. non-ASSP	-3.626	1.407	**0.010**

Note: Statistical significance is considered at p<0.05.

Table 10.12. Percent of households with use of an improved sanitation facility† by selected characteristics, study sample and year

Characteristic	ASSP Areas				Non-ASSP Areas			
	2014 *(n=1,394)*	2017 *(n=2,069)*	Absolute Change	*p-value*	2014 *(n=1,380)*	2017 *(n=2,085)*	Absolute Change	*p-value*
Overall	5.4	7.1	1.7	0.500	4.4	7.9	3.5	**0.047**
Sampling domain								
Nord/Sud Ubangi	3.5	3.0	-0.5	0.776	1.9	3.6	1.7	0.271
Maniema/Tshopo	6.2	10.6	4.4	0.272	12.4	16.5	4.1	0.510
Setting								
Rural	4.9	6.0	1.1	0.664	4.1	8.2	4.1	**0.023**
Peri-urban	13.5	16.4	2.9	0.701	16.4	2.9	-13.5	**0.041**
Wealth quintile								
Low	4.2	1.2	-3.0	**0.036**	3.0	1.8	-1.2	0.496
Low middle	4.1	1.3	-2.8	0.128	2.8	10.0	7.2	**0.028**
Middle	5.1	7.1	2.1	0.594	3.8	5.5	1.7	0.571
High middle	5.6	9.5	3.9	0.417	2.1	5.5	3.4	0.224
High	8.1	17.2	9.0	**0.039**	8.2	13.6	5.5	0.156
Head of household sex								
Male	2.9	4.5	1.6	0.416	2.0	4.6	2.6	0.124
Female	5.7	7.8	2.1	0.458	4.8	8.4	3.7	0.061
Head of household education								
No education	6.5	3.6	-2.8	0.405	3.0	5.9	2.9	0.333
Some primary	3.2	4.3	1.0	0.640	5.1	6.7	1.6	0.637
Completed primary	5.9	8.8	2.9	0.433	3.9	7.2	3.3	0.070
Competed secondary	5.7	17.2	11.5	**0.009**	5.7	19.6	13.9	**0.006**

Notes: Percentages are weighted. Statistical significance is considered at $p<0.05$. † Improved sanitation is defined as flush/pour flush latrines to a piped sewer system, septic tank or pit latrine, pit latrines with slabs, ventilated improved pit latrines and composting toilets that are not shared with other households.

Table 10.13. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on handwashing after using the toilet (n=6,841)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-0.523	2.259	0.817
Year	16.722	1.589	**<0.001**
ASSP vs. non-ASSP	-6.037	1.731	**<0.001**
Sampling domain			
Nord/Sud Ubangi	[ref]		
Maniema/Tshopo	-15.745	0.511	**<0.001**
Setting			
Rural	[ref]		
Peri-urban	16.574	2.115	**<0.001**
Wealth quintile			
Low	[ref]		
Low middle	8.007	1.763	**<0.001**
Middle	10.306	1.852	**<0.001**
High middle	11.628	1.891	**<0.001**
High	17.161	1.891	**<0.001**
Head of household sex			
Male	[ref]		
Female	0.533	0.473	0.260
Head of household education			
No education	[ref]		
Some primary	5.594	1.919	**0.004**
Completed primary	7.541	1.753	**<0.001**
Competed secondary	16.774	2.418	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 10.14. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on handwashing after using the toile restricted to Nord/Sud Ubangi (n=3,470)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	2.298	3.011	0.445
Year	18.208	2.110	**<0.001**
ASSP vs. non-ASSP	-4.235	2.276	0.063

Note: Statistical significance is considered at p<0.05.

Table 10.15. Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on handwashing after using the toilet restricted to Maniema/Tshopo (n=3,371)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-3.990	3.375	0.237
Year	14.974	2.370	**<0.001**
ASSP vs. non-ASSP	-6.869	2.644	**0.009**

Note: Statistical significance is considered at p<0.05.

Table 10.16 Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on handwashing after using the toile restricted to the low and low-middle wealth quintiles (n=2,798)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	-5.980	3.557	0.093
Year	22.755	2.459	**<0.001**
ASSP vs. matched comparison	-3.641	2.675	0.174

Note: Statistical significance is considered at p<0.05.

Table 10.17 Results of a fully-adjusted difference-in-difference probit model of the impact of the ASSP project on handwashing after using the toile restricted to the middle, high-middle, and high wealth quintiles (n=4,043)

Characteristic	Marginal Effect	Standard Error	p-value
Interaction (Year*ASSP)	3.256	2.938	0.268
Year	12.627	2.085	**<0.001**
ASSP vs. matched comparison	-8.464	2.285	**<0.001**

Note: Statistical significance is considered at p<0.05.

Table 10.18. Percent of heads of households who report handwashing after using the toilet by selected characteristics, study sample and year

Characteristic	ASSP Areas				Non-ASSP Areas			
	2014 *(n=1,394)*	**2017** *(n=2,069)*	**Absolute Change**	***p-value***	**2014** *(n=1,380)*	**2017** *(n=2,085)*	**Absolute Change**	***p-value***
Overall	32.1	54.9	22.8	**<0.001**	59.9	67.4	7.5	**0.011**
Sampling domain								
Nord/Sud Ubangi	48.7	70.7	22.0	**<0.001**	57.4	79.0	21.6	**<0.001**
Maniema/Tshopo	24.3	41.3	17.0	**0.024**	47.1	44.7	-2.4	0.665
Setting								
Rural	30.4	52.7	22.3	**0.001**	54.8	66.6	11.7	**0.020**
Peri-urban	60.6	74.3	13.7	0.064	59.0	85.5	26.6	**<0.001**
Wealth quintile								
Low	36.9	52.1	15.2	**0.013**	36.7	63.6	26.8	**<0.001**
Low middle	30.8	49.3	18.4	**0.004**	58.2	67.4	9.2	0.312
Middle	24.3	59.4	35.1	**<0.001**	59.6	72.0	12.5	0.149
High middle	23.7	55.1	31.4	**0.017**	57.1	66.8	9.8	0.149
High	47.0	59.4	12.4	0.085	64.9	66.4	1.5	0.785
Head of household sex								
Male	31.8	48.7	16.9	**0.041**	32.0	56.6	24.6	**<0.001**
Female	45.4	71.2	25.8	**0.001**	56.5	66.9	10.4	**0.035**
Head of household education								
No education	31.2	44.6	13.3	0.075	46.1	62.1	16.0	0.083
Some primary	27.6	57.9	30.3	**<0.001**	55.6	67.7	12.1	0.102
Completed primary	31.6	56.4	24.7	**<0.001**	55.3	67.0	11.8	**0.023**
Competed secondary	38.9	74.6	35.6	**0.001**	58.1	75.3	17.1	**0.021**

Notes: Percentages are weighted. Statistical significance is considered at p<0.05.

Chapter 11
Summary and Discussion

Purpose:

This section presents a summary and discussion of the key findings of the evaluation, limitations, as well as lessons learned that might be considered in the design of future health system programs in the DRC.

Interpretation of findings:

The following are the key findings of the empirical and qualitative analysis.

Service quality and community participation

- The ASSP project was found to have had a significant impact on improved the availability of preventive services and malaria diagnostic capabilities in health centers/posts.
- However, ASSP was not found to have had an impact on adequacy of equipment (thermometers, stethoscopes, blood pressure cuffs, adult scales, pediatric scales, and timers), drug supply (Oxytocin, Sulfadoxine-pyrimethamine, and Amoxicillin), the availability of curative services, or community participation in health centers/posts.

Maternal health care utilization

- The ASSP project was found to have had a negative and significant effect on the receipt of at least four ANC visits (the number of visits recommended by the World Health Organization) among women who gave birth in the previous two years. This is largely due to the drop in the percentage of women in Maniema/Tshopo who received four or more ANC visits, from 37.9 percent in 2014 to 27.1 percent in 2017. There was no ASSP project impact on receipt of the first ANC visit within the first trimester of pregnancy, also largely explained by the drop in the percentage of women who received ANC care during the first trimester.
- The ASSP project had a significant and positive effect on the probability of delivering in a health care facility.
- The results of the qualitative analysis suggest that improving access to and uptake of maternal health services in ASSP health zones was challenged by perceived shortages of supplies, an insufficient number of trained and female community health workers assigned to maternal health, and a lack of formal behavioral change strategies to address cultural practices and social norms related to pregnancy and childbirth (taboos about sharing the pregnancy during the first trimester, disposal of the placenta, unwillingness to deliver with a male attendant, inappropriate clothing to attend the health center). While fees for childbirth were officially reduced, the qualitative research highlights failure to follow the official fee schedule, with findings showing the health providers often increase fees for delivery care substantially

Child illnesses

- The ASSP project was found to have had a positive and significant effect on reducing the prevalence of symptoms of ARI and fever among children under five years of age.
- There was no ASSP project impact on diarrhea prevalence on children under five years of age, malaria parasite prevalence or on anemia prevalence among children 6 to 59 months of age.

Treatment of child illnesses

- There was no ASSP project impact on treatment of three common symptoms of childhood illnesses – diarrhea, symptoms of ARI, and fever.
- The ASSP project had a negative and significant effect on the likelihood of seeking care at a health facility or from a health care provider for children with symptoms of ARI and/or fever.
- The results of the qualitative analysis (in-depth interviews and focus group discussions) indicate that the effectiveness of ASSP's approach was affected by the lack of formal behavior change strategies and limited community outreach, drug stockouts, perceived unavailability and cost of medications, failure of health centers to adhere to listed user fees, long distances to the hospital and challenges navigating hard-to-travel routes, as well as cultural practices which favored traditional remedies and/or religious healing.

Immunization

- The study results suggest that there was no ASSP project impact on vaccination coverage among children 12 to 23 months.
- The results of the qualitative analysis suggest that home visits to promote uptake of child health services were infrequent, shortages of essential supplies such as vaccines and syringes were regular, and limited availability and/or sharing of solar power or refrigerators necessitated reliance on other centers for vaccines.

Child nutrition

- Stunting among children under five years of age increased more significantly in ASSP areas compared with non-ASSP areas, while wasting and underweight among children did not change significantly in ASSP areas compared to non-ASSP areas.
- Findings from the qualitative analysis suggest that there were difficulties in implementing ASSP's nutrition approach, including: time constraints and lack of availability of caregivers, who spend their days in agricultural fields, which limited the uptake of the strategies to encourage the preparation of enriched porridge and the home gardening strategy; lack of consideration of local practices such as planting vegetable gardens in agricultural fields; the stigma associated with having a malnourished child, which also affected home gardening uptake; and the limited ability to implement behavioral change strategies as designed in the ASSP approach. In addition, respondents reported that RECO's struggled to understand trainings that were conducted in French, exhibited high levels of attrition, and were undermotivated due to the lack of

supervision, compensation, and supplies. Limited training was provided to facility-based health workers, who generally lacked motivation to get involved in providing nutrition services.

Use of insecticide-treated nets (ITNs)

- There were no ASSP project impacts detected on the use of ITNs among pregnant women or household ownership of at least one ITN.
- Qualitative data suggest that ITNs were not distributed in Maniema while summaries from quarterly reports highlight challenges with net condition and utilization among residents, as well as organizational challenges that potentially disrupted the availability of malaria commodities and shifted the focus of implementation activities to other regions (e.g. from Maniema to Kasai).

Modern contraceptive use

- Overall, no ASSP project impact on the use of modern contraceptive methods among women of reproductive age was detected.
- The overall result masks the significant program impact in Nord Ubangi that was not found in Maniema/Tshopo.

Outpatient health care utilization

- The ASSP project was not found to have had an impact on the utilization of outpatient services among individuals of all ages.
- The ASSP project was found to have had a statistically significant impact on increasing the likelihood of receiving outpatient consultations free of charge.
- The ASSP project was found to have had a significant impact on improved perceptions of both equipment availability and the cleanliness of the facility, but not on improved drug availability.

Water, sanitation, and hygiene

- The ASSP project was found to have had an impact on increasing access to both improved water sources and improved sanitation.
- The ASSP project was not found to have had an impact on reported handwashing technique.

Limitations:

In interpreting the results of the study, several potential limitations should be noted, some of which were explored by conducting additional analysis of the baseline and endline data and the DHIS2 data made available by the ASSP project.

First, a “gold standard” randomized control trial was not feasible for this evaluation because the target health zones were selected non-randomly. A step-wedge design was considered but was determined to be not appropriate due to IMA World Health’s approach to introduce and scale up the interventions as rapidly as possible. While the quasi-experimental design allows for the plausible attribution of the outcomes to the project, it does not allow for observed changes (impact) to be definitively attributed to ASSP interventions only. Indeed, other projects and initiatives might also explain changes in the observed value of indicators. Although the model controls for the presence of a World Bank-supported project in the control areas, as described below, there may have been other projects in the control areas that we are not aware of that were not taken into account.

Second, the limited availability of health information system data at the time the study was designed meant that the matching of comparison groups could only be done on four characteristics. The limited number of matching variables may have hindered the comparability of the invention areas and matched comparisons groups. To account for this, descriptive comparisons of demographic and community characteristics were assessed which helped ensure all covariates are appropriately controlled for in the difference-in-difference analysis.

Third, due to unforeseen delays in obtaining DFID approval of the research protocol, data collection for the baseline phase was delayed by almost by ten months after launching of the ASSP project, which meant that the results of the difference-in-differences approach for some outcomes, such as maternal and child health care utilization, outpatient health care utilization, and use of modern contraception services, may be biased towards the null hypothesis. However, it should be noted that this issue is not a concern for the evaluation of the impacts on child nutrition and WASH outcomes, as ASSP had not yet implemented community-based activities by the time the baseline survey was administered.

Further, the surveys were not conducted in the same months (April-May 2014 and July-September 2017), which may have potentially biased the analyses on outcomes that fluctuate seasonally. Nord/Sud Ubangi was experiencing the rainy season during both the baseline and endline surveys, as were the regions of northern Maniema/Tshopo close to the equator (i.e. north of Kindu). Southern Maniema was experiencing the dry season at endline. Key outcomes in north versus south Maniema at endline were compared to test for seasonal differences; these results are discussed in the report as appropriate.

Fourth, while the study was powered to detect overall differences between intervention and matched comparison at the household- and individual-levels, it was not powered to detect differences according to population sub-groups (i.e. wealth groups and provinces). Nor was the analysis powered to detect differences in facility-level characteristics. Nevertheless, population sub-group DID models and facility-level DID model were estimated and presented in order to aid in the interpretation of the study findings, and in some instances, the DID results of these models were found to be statistically significant.

Fifth, in interpreting the results, it should be noted that the analysis excluded Kasai/Kasai Central, the provinces where ASSP had the highest level of activity, the greatest number of health zones, and according to ASSP routine program data, the most active uptake of some services. For example, contraception, based on routine service statistics converted to couple-years of protection (CYP, the most widely used measure of outputs in international family planning programs) was higher in Kasai/Kasai Central than in the other sampling domains. However, because of political unrest in Kasai/Kasai Central, it was not possible to collect endline data in this domain.

Sixth, programmatic disruptions in the months leading up to the endline survey in the two domains may have affected the results. Specifically, an audit of the management of the project's operations in Maniema led to a drastic reduction of ASSP funded activities during several months, and in Nord Ubangi, World Vision, the ASSP Implementation Partner in this province, ended collaboration with IMA World Health. To explore the importance of this issue, we analyzed DHIS2 quarterly data from eight quarters, from January-March 2016 to October-December 2017, for several types of service maternal and child health care services but did not detect any dips in service statistics that were associated with the ASSP disruptions.

Seventh, an assumption of the DID model is that the only systematic difference between the ASSP and non-ASSP groups relates to the exposure to the ASSP project. As mentioned above, this assumption may not have been met, as the World Bank introduced its new project *Projet de Développement du Secteur de Santé,* which focused on performance-based financing to improve the delivery of health and family planning services, in some of the non-ASSP health zones. Although statistical controls were used to account for this possible bias, it must nonetheless be considered a potential limitation.

Finally, it should be noted that there were differences between the ASSP areas in Maniema/Tshopo and their matched comparison areas, as all the ASSP areas had been exposed to the predecessor project to ASSP, the Access to Healthcare Program, while the matched comparison areas had not. Ideally, we would have included matched comparison areas that had been exposed to this project, but this was not possible, as all the DFID supported health zones in Maniema/Tshopo transitioned into the ASSP project. Whether this factor biased the results, and the direction of the bias, are unclear.

Interpretation of findings:

In each of the chapters that present the results, the empirical findings are discussed with respect to many of the limitations described above, as well as to a number of other factors, including the variable power of tests of indicators at different nested levels (i.e. household-, individual-, and facility-levels), the variable quality of indicators in terms of their relationship to impact, the consistency between indicators that are expected to be conceptually linked, and the absolute changes in ASSP and matched comparison areas over time as context for the DID results. Below is a summary of some of the key issues that emerged from these assessments.

- Consistency with other programmatic area findings. For many of the programmatic areas investigated, such as maternal health care and child health care, the DID results appear to be consistent within the programmatic area. For example, the ASSP project was found not to have had an impact on any of the indicators of antenatal care, on any of the indicators of ITN use, or on any of the indicators of treatment of childhood illnesses. The insignificant findings on service utilization were also consistent with limited changes over the study period in the availability of equipment and drugs but were inconsistent with the impacts on other facility-level factors that can influence the quality of care. For example, the ASSP Project was found to have had an impact on improved availability of equipment and the cleanliness at the health center level.

- Consistency with other sources of data. When possible, the population-based survey results were compared with DHIS2 data available from the DRC's health management information system. For many types of services, there were inconsistencies. For example, the DHIS2 data indicated higher levels of individuals served (i.e. for the proportion of women receiving antenatal care during the first trimester of the pregnancy) and higher levels of child vaccinations than the population-based service results. However, for many of the outcome indicators, the differences in the two data sources make many of the comparisons problematic. For example, for vaccinations, the DHIS2 provides data on the percentage of 1-year old children vaccinated against measles, while the ASSP surveys provide data on children who received all basic vaccinations, and for child nutrition, the DHIS2 presents data on the number of child nutrition screenings, while the ASSP data provide measurements of child anthropometry.

  In terms of the comparisons with the 2013/14 DHS, the 2014 baseline point estimates for the indicators of maternal health care, child health care, outpatient service utilization based on the ASSP baseline survey are in close alignment with the DHS estimates, supporting the validity of the ASSP survey data.

- Consistency with qualitative findings. For the three programmatic areas in which the evaluation included a qualitative research component – maternal health care, treatment of childhood illnesses, and child nutrition – the quantitative and qualitative results are, for the most part, in alignment. For example, for maternal health care, the qualitative findings that suggested that efforts to improve access to and update of maternal health care services were constrained by drug and supply shortage are consistent the results on the insignificance of ASSP in influencing the use of antenatal care, and for child nutrition, the qualitative findings that indicated problems in the implementation of the home gardening approach align with the fact that the ASSP project was not found to have had a positive impact on child anthropometry. On the other hand, the qualitative findings on persistent barriers to increasing the percentage of women that deliver in health care facilities were inconsistent with the quantitative finding that the ASSP project was found to have had an impact on the proportion of women who had facility-based deliveries in the two years prior to the survey.

Of particular concern are the findings that the ASSP project was found to have had a negative impact on some outcomes, including stunting, the use of antenatal care, and the treatment of childhood illnesses. The results on stunting were primarily due to the increased prevalence in Maniema, from 42.0 percent in 2014 to 57.0 percent in 2017, a statistically significant increase that did not occur in Nord Ubangi. Similarly, the decreased proportion of pregnant women who received at least four antenatal care visits was also primarily due to drops in Maniema, from 37.9 percent in 2014 to 27.1 percent in 2017, as comparable percentages in Nord Ubangi were relatively stable over the study period. One possible explanation for these findings concerns DFID's predecessor project, which operated in Maniema, but not in Nord Ubangi. However, as far as we know, the Access to Healthcare Project did not include nutrition programming, so the presence of this project does not appear to be a plausible explanation for increased levels of malnutrition in Maniema. However, the predecessor project did support the delivery of antenatal care services until the program ended in 2012. The effects of the processor program may help explain the higher levels of antenatal care in Maniema, as the utilization of antenatal care was measured over a two-year recall period in the ASSP household surveys. Another possible explanation is regression to the mean, in which the worsening of some indicators observed over the study period, such as stunting, may be due to selecting an extreme group in the first measurement, and the second measurement being closer to the mean for all subjects. However, these are explanations are speculative, and we have no corroborating evidence that would explain why ASSP would have had a damaging impact on any of the outcomes investigated in this evaluation.

Below are some possible general explanations for the findings of the impact evaluation.

- Design and scale of interventions. A key premise of the ASSP project was that the DRC was ready to shift away from a humanitarian development approach to a broader health systems approach that would be sustainable in the long run. The ASSP approach included a number of experimental interventions that relied heavily on local buy-in and assumptions about how local health systems and communities would respond. Examples include the Community Health Endowment Strategy, a pilot intervention that aimed to mobilize community health financing, and the home gardening intervention, which aimed to combat child malnutrition by improving the availability of locally-produced foods high in nutritional value. However, many of the interventions were not accompanied by formative research to better understand underlying social and contextual factors that could potentially affect the uptake of the interventions supported by the project. Nor did the project pilot the interventions to test their effectiveness and costs.

  Moreover, due to limited resources, many of the community-based interventions supported by the project, such as the WASH, nutrition, and ITN interventions, were implemented unevenly across ASSP health zones. This limited the likelihood of finding significant impacts of the ASSP project. Nevertheless, ASSP was found to have had significant impacts on increasing the percentage of households with improved water and sanitation. In the case of child nutrition, the limited coverage and the nature of the intervention could not have plausibly influenced population-based indicators such as stunting, and as a result, the results for this indicator should be viewed with caution.

- Management and coordination. IMA World Health and its partners faced a number of formidable challenges in the management and coordination of the ASSP project, including the remoteness of the project areas as well as the limited transportation and communications infrastructure available in the DRC. The lack of banking systems was a major problem that affected the financial management of the project. While monitoring procedures were in place, these challenges affected the ability to provide support to health zone staff to both identify and then respond to problems in the field.

- Human resources for health. In the cases in which the interventions were not as effective as anticipated, one weak link that has been identified through the qualitative findings were challenges in health worker motivation. For example, the results of the qualitative research on nutrition indicate that there were weaknesses in the ability and willingness of outreach workers to carry out their job responsibilities, due to limited incentives and assumptions about remuneration, leading to constant turnover. In the case of facility-based health workers, operations research carried out by Tulane suggests that the removal of performance-based pay in Maniema may have had unanticipated effects on morale and motivation, which may help explain why some of the facility-based interventions did not have the anticipated impact.

- Health systems expertise. While ASSP has a very strong project management team along with project coordinators that are extremely knowledgeable of health systems and have an unparalleled understanding of the DRC context, ASSP could have benefited from additional outside technical expertise, particularly for some of the more novel community-based interventions that were introduced by the project.

Conclusions and recommendations:

Overall, the results of the evaluation suggest that the ASSP project had a positive impact on several outcomes, including reducing the incidence of childhood illnesses (fever and suspected pneumonia), improving rates of women delivering in health care facilities, reducing out-of-pocket expenditure for outpatient care, and increasing improved sources of water and sanitation, the effects were insignificant for most of the outcomes analyzed, and were sometimes negative and significant. The reasons for the negative impacts of the ASSP project are unclear, as discussed above.

The empirical results are based on a quasi-experimental survey design that was sufficiently powered to detect the anticipated improvements in most of the indicators assessed. Moreover, for those topic areas that were covered by the qualitative component of the study, the empirical findings are consistent with the qualitative findings.

The following are recommendations to consider for future DFID programming.

- More formative research focused on community perceptions and needs. This recommendation is based on the qualitative research findings indicating that 1) perceptions of low quality of care as well as cultural practices and social norms are important factors that constrain the use of facility-based maternal and child health care services, and 2) time constraints, lack of availability of caregivers, stigma associated with having a malnourished child, and other factors adversely affecting the uptake of the project's home gardening approach to improving child nutrition. More use of formative research would allow for greater consideration of geographical and cultural differences, and adaptations in the design of program approaches to better coincide with contextual conditions.

- More focus on incorporating behavior change and communications strategies in the design of interventions. This recommendation is based on limited attention that such interventions received in the ASSP approach, as well as on qualitative research findings that suggested that behavioral factors limited the uptake of key ASSP interventions.

- More programmatic emphasis on the role that changes in provider payment strategies (i.e. changing how facility- and community-based health workers are paid) can play in influencing health worker motivation and incentives, and in turn, service quality and availability. This recommendation is based on the qualitative research findings indicating that reductions in pay in Maniema may have had the unintended consequence of reducing health worker motivation of both community-based and facility-based health workers, and as a result, the quality of health services.

- More use of piloting to inform decisions on whether and how interventions should be scaled up, particularly for experimental community-based interventions that rely on untested assumptions regarding community and health worker behaviors, and more emphasis on monitoring and evaluation of those interventions. This recommendation is based on the results indicating limited uptake of the home gardening approach as well as the community-based health financing approach, investigated through a separate operations research study, that was intended to mobilize household pre-paid premiums for local health centers.

- More programmatic emphasis on supervision of local health officers and health workers and on improving the collection, availability and use of routine data, beyond the data that is available in the DHIS2. This recommendation is based on findings from the qualitative research component of the study that indicated that limited supervision of health workers may have played a role in constraining the use of ASSP-supported interventions, and findings from an operations research study on the project's community-based financing strategy that indicated problems in the quality and use of programmatic data that was reported to the Kinshasa-based ASSP management team.

Appendix A. Interpretation of results presented in this report

Results from the quantitative analyses are presented using three standardized types of tables. The interpretation of these tables is described below. Please note that while the quasi-experimental research design used for the study allows for plausible attribution of the outcomes to the project, it does not allow for the observed changes (impact) to be definitively attributed to ASSP interventions only.

General terms defined:

- **n:** The number of observations (people, households, facilities) used in the descriptive analysis or model.
- **Marginal effect**: Measure of the average effect of a one unit increase of one variable (a covariate or independent variable) has on another variable (the dependent variable).
- **SE (standard error):** Measure of the statistical accuracy of an estimate. Lower standard errors indicate higher accuracy.
- **p-value**: Measure of the statistical significance of an estimate. Ranges from 0 (strong significance) to 1 (weak significance). In most cases, an estimate is considered statistically significant if p<0.05, which is the convention on the biomedical and social sciences research literature. Statistically significant p-values are **bolded**.
- **Weighting**: A process to adjust data from a subset of a population so that it is statistically representative (i.e. so that it looks like) the entire population.

Table type 1: Full model results of determinants of ______ (DID model)

Interaction (Year*ASSP): Shows the impact of ASSP on that outcome.

Table 6.1. Full model results of determinants of stunting for children age 6-59 months (DID model) (n=5,077)

Characteristic	Marginal Effect	SE	p-value
Interaction (Year*ASSP)	11.250	3.350	**0.001**

Interpretation: If there are two otherwise average children, one in an ASSP area and one in a non-ASSP area, the child in the ASSP area's probability of being stunted is 11.25 percent *higher **because of the ASSP project***. This estimate is statistically significant (p<0.05).

Other control variables: Show the impact of each control variable included in the statistical model on the outcome. These models control for the impact of factors that are not under ASSP's influence, but which may have influence on the outcome of interest. There are three types of control variables: binary or "yes/no" variables (e.g. possession of land), other categorical variables made up of more than two categories (e.g. education level or relative wealth quintiles) and variables on a continuous scale (e.g. out-of-pocket health expenditure). The marginal effects can be interpreted in the following ways:

- **Binary (yes/no) variables:**

Table 6.1. Full model results of determinants of stunting for children age 6-59 months (DID model) (n=5,077)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Agricultural land	5.430	1.985	**0.006**

Interpretation: If there are two otherwise average children, one living in a household with agricultural land and one living in a household without, the child with agricultural land's probability of being stunted is 5.43 percent higher. This estimate is statistically significant (p<0.050).

- Categorical variables:

Table 6.1. Full model results of determinants of stunting for children age 6-59 months (DID model) (n=5,077)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Mother's education			
None	[ref]		
Some primary	-0.542	1.808	0.764
Completed primary	-4.742	1.971	**0.016**
Completed secondary	-9.504	4.101	**0.020**

Interpretation: If there are two otherwise average children, one whose mother had no formal education (i.e. the reference group) and another whose mother had some primary education, the child whose mother had some primary education's probability of being stunted is 0.54 percent lower (because the marginal effect is negative). This estimate is not statistically significant (p>0.050).
A child whose mother had completed primary education's probability of being stunted is 4.74 percent lower than a child's whose mother had no education. This estimate is statistically significant (p<0.050).

- Continuous variables:

Table 9.4. Full model results of determinants of satisfaction among patients with outpatient visits (DID model) (n=4,192)			
Characteristic	**Marginal Effect**	**SE**	**p-value**
Expenditure on visit (USD)	-8.751	1.025	**0.032**

Interpretation: A one dollar increase in expenditure is associated with an 8.75 percent decrease (because the marginal effect is negative) in the probability of that a patient is satisfied. This estimate is statistically significant (p<0.050).

Table type 2: Impact of ASSP on rates of _____, restricted to _____ (DID model)

These tables show the impact of ASSP within specific sub-groups, which can be used can be used to determine whether ASSP had a differential impact across various sub-groups. For example, ASSP may have improved immunization rates among males but not among females. The analyses were conducted separately on females and males, those in the two highest wealth quintiles, those in the three lowest wealth quintiles, those in Maniema/Tshopo, and those in Nord/Sud Ubangi. Each model used the same control variables as Table type 1, although those results are not presented. These sub-analyses have lower sample sizes than the full models and therefore have less power to detect differences.

Table type 3: Percent of _____, by selected characteristics, study sample & year

These tables show the percentages of respondents within sub-groups that have the outcome of interest.

	ASSP			
Stunting	2014 (*n=1,210*)	2017 (*n=1,432*)	Absolute change	*p-value*
Sampling domain				
Nord/Sud Ubangi	45.5	50.3	4.8	0.188
Maniema/Tshopo	42.0	57.4	15.4	0.001

Interpretation: In 2014, 45.5 percent of children in ASSP areas in Nord/Sud Ubangi were stunted. In 2017, 54.4 percent of children in those same areas were stunted. That difference is not statistically significant.

Appendix B. Research Protocol

Evaluation of the Impact of the ASSP (*Accès aux Soins de Santé Primaires*) Project in the Democratic Republic of Congo

15 January 2014

Updated: 12 April 2017

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EXECUTIVE SUMMARY

Study Objectives/ Research Questions	The objectives of the surveys are two-fold. First, data from the surveys will be used to *measure changes* between the baseline and endline surveys in health outcomes, behaviors, and exposure to and use of health interventions. Second, the survey data will be used to *assess the impact of the overall project* on selected health outcomes, behaviors, and the use of interventions. The specific research questions investigated are as follows: • What is the impact of the ASSP project on neonatal and child health outcomes (child nutritional status, anemia, fever during the past two weeks, diarrhea during the past two weeks, infant mortality)? • What is the impact of the ASSP project on specified types of health care utilization (maternal health services, including antenatal, delivery care, and postnatal services; immunization; outpatient treatment for both children and adults; inpatient services for both children and adults)? • What is the impact of the ASSP project on household out-of-pocket health care expenditure? • What is the impact of the ASSP project on family planning (utilization of modern contraceptive methods, unmet need for family planning)? • What is the impact of the ASSP project on community level environmental health (access to improved sources of drinking water and sanitation facilities)? • What is the impact of ASSP on factors related to the quality of care (health facility service readiness, client satisfaction, health worker motivation)?
Study Design	A quasi-experimental panel study design will be used to obtain changes in point estimates of health outcomes, health care utilization, out-of-pocket expenditures, malaria parasite prevalence, quality of heath care services and community participation in health care. • Data from baseline and endline studies will be collected using household, community leader and health facility surveys. The baseline survey will be conducted in 2014 and the endline survey will be conducted in 2017. • Both the baseline and endline surveys will provide data to assess plausible attribution of ASSP support on outcome and impact indicators using a dose response approach and a difference-in-differences approach (described below).
Study Site	Sampled health zones in the Orientale, Maniema, Equateur, Kasai-Occidental and Kasai-Oriental provinces in the Democratic Republic of Congo
Target Population	• Children under five years of age within selected households • Women of reproductive age (15 to 49 years of age) within selected households • Official health centers, hospitals, health zone offices, and regional centers for medicine procurement and distribution designated to serve the selected administrative *health areas*
Sampling Method	• **Household/women's survey in intervention areas:** a two-stage sampling design with probability of first stage selection proportional to relative village sizes, with equal-allocation stratified survey design resulting in three independent intervention sampling areas was used. • **Household/women's survey in matched comparison groups:** a three-stage sampling design where in the first stage non-intervention health areas were matched on four criteria (location, urban/rural, population, vaccination coverage) to health areas containing the intervention villages sampled. Second and third stages use systematic sampling within matched comparison health areas and villages, with equal-allocation stratified survey design resulting in three independent matched comparison groups. • **Health center/post survey:** the official health center designated for serving the health area in which each selected village is located will be selected. • **Heath center/post worker survey:** all individuals responsible for providing health care services (e.g., doctors, nurses, midwives) who are on duty in the selected heath center during the day of the survey will selected. • **Community leader survey:** purposefully selected individuals will be interviewed. • **Hospital survey:** the official hospital designated for serving the health area in which each

	selected village is located will be selected (endline only) • **Hospital worker survey:** random sample of 4 physicians and 4 nurses per hospital during the day of the survey will selected (endline only) • **Regional centers for medicine procurement and distribution:** all regional centers serving the sampled health areas (endline only) • **Health zone offices**: a random sample of health zone offices overseeing the sampled health (endline only)
Sample Size	• **5,600 households** (4,200 at baseline and endline plus 1,400 at endline only) • **280 health centers** (one for each selected village) • **280 – 840 health center/post providers** • **560 community leaders** (two for each selected village) • **32 hospitals (endline only)** • **256 hospital providers (endline only)** • **7 regional centers for medicine procurement and distribution (endline only)** • **32 health zone offices (endline only)**
Data Collection	• **Household survey** (health care utilization for all family members, out-of-pocket health care expenditures, perceived quality of service, community engagement, water and sanitation, malaria prevention, anemia status, malaria parasite prevalence, and anthropometric measurements for children under five years of age) • **Woman's survey** (child illness such as fever, diarrhea, suspected pneumonia, vaccination coverage, and infant mortality; treatment of child illness; maternal health care utilization, including antenatal care and skilled delivery assistance; and utilization of traditional and modern contraception) • **Health center/post survey** (service readiness such adequate equipment, drug supplies, and assessing the minimum package of services offered) • **Health center/post provider survey** (health worker satisfaction and motivation and presence of performance-based incentives) • **Community leader survey** (health zone, health area and village level characteristics; and presence of other programmes at the health zone, health area or village level) • **Hospital survey** (service readiness such adequate equipment, drug supplies, and assessing the minimum package of services offered) • **Hospital provider survey** (health worker satisfaction and motivation and presence of performance-based incentives) • **Regional centers for medicine procurement and distribution survey** (systems for purchasing and distributing drugs; availability of equipment, supplies and personnel) • **Health zone office survey** (systems for managing and prioritizing health services; availability of equipment, supplies, and personnel)
Statistical and Analytic Plan	Two types of multivariate analyses will be conducted to investigate the research questions. The first type, a dose-response approach, measures the association between the level or intensity of programme exposure and the outcomes of interest. In the second type, multivariate regression methods and a difference-in-difference approach within a quasi-experimental panel design will be used to analyze the data by comparing treatment groups with comparison groups.
Limitations	The proposed study has some limitations • While the quasi-experimental design allows for the *plausible* attribution of the outcomes to the project, it does not allow for observed changes (impact) to be definitively attributed to ASSP interventions only • Due to availability of data, comparisons groups could only be matched on four characteristics, which may limit the comparability of sampling areas and comparison groups • Data collection for the baseline phase will be delayed by almost by 10 months after launching of the ASSP Project, which means that the results of the difference-in-differences approach may be biased towards the null hypothesis • Comparison villages might have been (or will be) exposed to interventions from other health initiatives or projects • The sampled households are not representative at the health zone level nor can the

	differential impact of ASSP on the outcomes of interest be validly tested among health zones
Ethics	The following ethical consideration have been integrated into the design of the prosed study: • There may be physical risks to the household participants/respondents associated with a finger stick from blood drop collection, but they are not considered more than minimal. Data collectors for biomarkers will be trained health personnel and will receive training on how to minimize risk associated with this type of data collection. Additionally, all data collectors will be trained to ensure confidently. • Data collected will be stored under lock-and-key in a password-protected computer. • All respondents will be read an informed consent transcript and oral consent will be obtained for all participants age 15 and above. Mothers or caregivers will give oral consent for biomarker and anthropometric data collection of children under 5. • Data collection tools and informed consent transcripts have been translated into French and four national languages. Respondents will have the choice of language for the survey. • There is no cost other than a respondent's time and no compensation for participation.

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1. Background and ASSP Project Description

Background

The Democratic Republic of Congo has experienced some of the worst health indicators worldwide. Of particular concern is the health status of vulnerable populations, including poor households, woman and children under five. The under-five mortality rate is estimated at 199 per 1,000 live births (UNDP, 2013) and the three leading causes of child death, malaria (25-30%), diarrhea (16%) and pneumonia (16%) are all preventable diseases. Maternal mortality has declined in recent years but is still one of the highest in the world at 670 per 100,000 live births, while the use of safe birth practices and antennal care remain low (United Nations Population Fund, 2011).

The poor health outcomes in the DRC have been fueled by multiple political, social and economic crises over the past twenty years. As a result to these crises, the Government of Congo (then Zaire) disengaged from the health and education sectors following the pillage during the early 1990's that marked the breakdown on government control and normal societal functioning. Public funding for the country's decentralized health system, specifically to the provincial *health zones*, was drastically reduced. Currently, the government spends only about 2% of the national budget on health care (Blum, 2011). Consequently, out-of-pocket health payments from clients and development assistance to health (DAH) have helped to maintain a minimal availability of health services (Zinnen, 2012), but there is large concern that as much as 70% of the population has little or no access to the health services resulting from both physical and financial barriers (Waldman, 2006). While DAH has steadily increased in recent years, funds have largely been directed to vertical disease control programmes such as malaria, HIV/AIDS, tuberculosis control and immunization programmes. Although the government has welcomed increased DAH provided by international partners, there is concern that the emphasis on vertical programmes has neglected some primary health care services and that the programmes may not be sustainable once donor support ends (Maurizzio, 2011).

There have been several large-scale health system strengthening projects implemented in the DRC, dating back to 1981. These include: SANRU I (50 *health zones* covered from 1981 to 1985), SANRU II (100 *health zones* covered from 1985 to 1991), SANRU III (56 *health zones* covered from May 2001-Sept 2006), PMURR (67 *health zones* covered from 2002-2008) and AXxes (57 *health zones* covered from Sept 2006 – Sept 2009). Many of these projects have supported an integrated approach to improving the availability and quality of health care services. However, to date, the impact of these projects has not been rigorously evaluated. This impact evaluation marks the first time that a large-scale integrated health systems strengthening project has been rigorously evaluated in the DRC context.

ASSP Project Description

In an effort to strengthen the health care delivery system and increase service utilization, the Ministry of Health has developed a five-year health development plan, which is being implemented with support from a number of international health partners, including DFID. The DRC government's National Health Development Plan for the period 2011-2015 defines eight priority pillars: governance, human resources for health, medicines and specific inputs, health financing, health information management system, infrastructure and equipment, health service delivery and collaboration with related sectors (Ministère de la Santé Publique, 2010).

As part of its programme to assist the government in strengthening the country's health system, DFID awarded the five-year ASSP (*Accès aux Soins de Santé Primaires*) project to IMA World Health and its implementing partners and subcontractors in Fall 2012 (see Table 1). ASSP is a health systems strengthening project tasked with working in 52 *health zones* in Equateur, Orientale, Kasai-Occidental and Maniema provinces of the DRC[1]. ASSP interventions have been designed to strengthen the government's priority pillars as described above (IMA World Health, 2012). The project's targeted *health zones* were chosen by DFID because: 1) the *health zones* were considered to have relatively weak health systems, or 2) because DFID had begun to provide assistance to the *health zones* under a predecessor project and wants to continue that assistance.

Table 1. ASSP Consortium [2]

Organization	Responsibility
Tulane	Impact evaluation and Operations Research (ORIE)
Pathfinder	Reproductive health and family planning
HISP	Health management information system (SNIS and DHIS2)
IntraHealth	Human resource information systems (iHRIS)
SANRU	Implementing partner for ASSP activities in 28 *health zones* in Kasai-Occidental
CARITAS	Implementing partner for ASSP activities in 13 *health zones* in Orientale and Maniema
World Vision	Implementing partner for ASSP activities in 11 *health zones* in Equateur

The primary objective of the ASSP Project is to improve reproductive, maternal, neo-natal and child health (RMNCH) in DRC while strengthening the health system through four main outputs:

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[1] ASSP is also working in four health zones in South Kivu, but these health zones are not included in this study due to budget considerations and with DFID approval.

[2] International Red Cross is also a member of the ASSP consortium working in in South Kivu, but these health zones are not included in this study due to budget considerations.

1. Output 1: Enhanced health service delivery and quality;
2. Output 2: Increased empowerment and accountability in health service planning and delivery;
3. Output 3: Improved access to health services; and
4. Output 4: Increased and sustainable access to safe drinking water, improved sanitation.

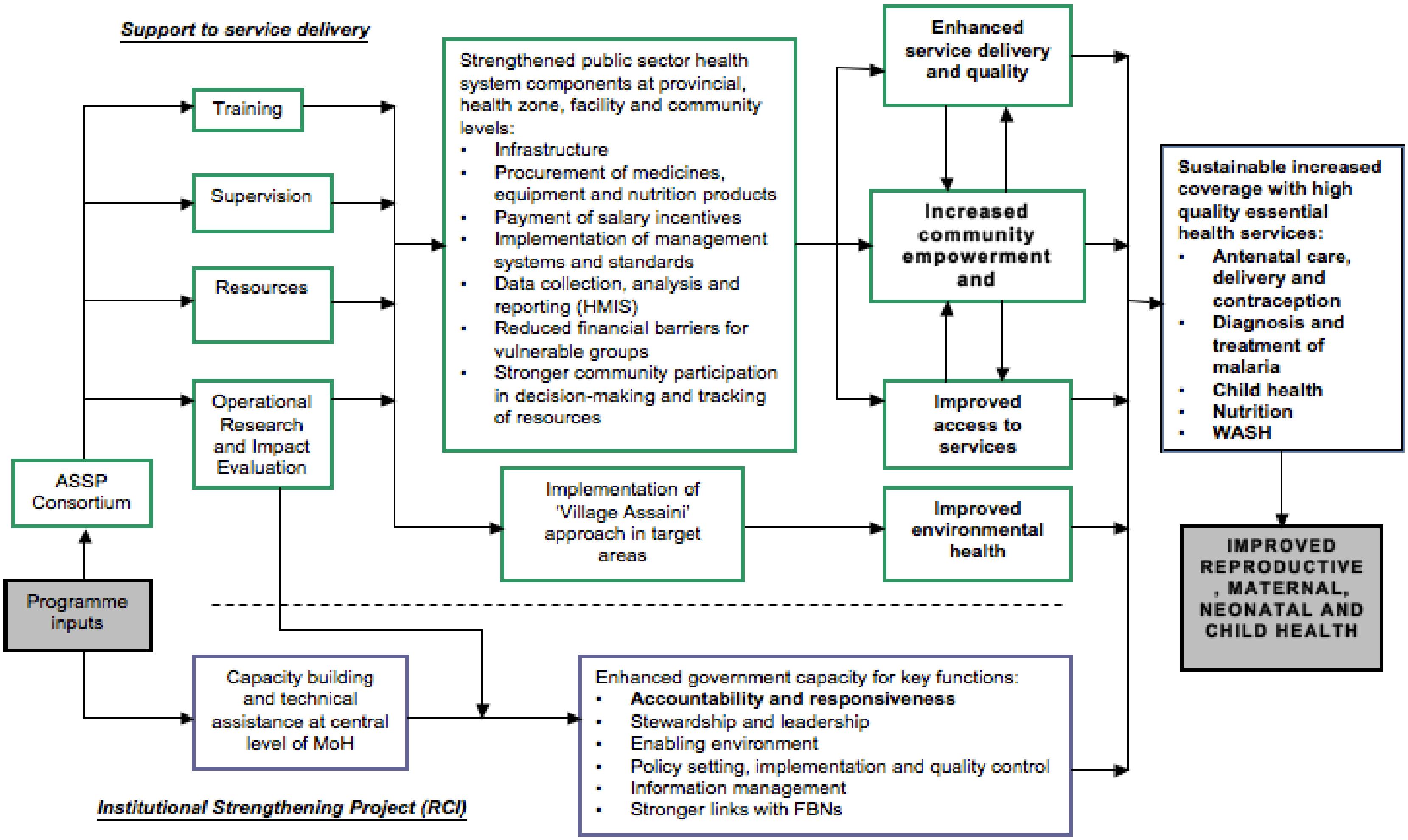
Figure 1 presents the ASSP Project's Theory of Change, which was developed by IMA World Health in consultation with DFID. The Theory of Change provides a simplified overview of how the ASSP project is expected to have an impact on health outcomes. The Theory of Change is also used as a tool to guide the evaluation of the ASSP Project.

As shown in Figure 1, ASSP consists of a broad range of facility- and community-based health interventions designed to:

1. Strengthen the public health sector at the provincial, *health zone,* facility and community level though improved availability of infrastructure, equipment, supplies and improved financial and managerial practices
2. Improve environmental health in targeted areas via the introduction of "Village Assaini," a water, sanitation, and hygiene (WASH) approach
3. Broaden key governance functions, including accountability, governance, stewardship and leadership

These health interventions, in turn, are expected to improve the availability, quality, and utilization of high quality essential health services including antenatal care, deliveries, family planning services, diagnosis and treatment of malaria, and child health services, as well as to improve environmental health. The ultimate objectives of the overall package of interventions are to improve reproductive, maternal, neonatal and child health outcomes.

Figure 1. ASSP Project's Theory of Change



Abbreviations: FBNs – faith-based networks; ECZS – Equipes Cadres de Zones de Santé (Cadre Health Zone Teams); HMIS – Health Management Information Systems; ASSP – Accès aux Services de Santé Primaires; RCI – Renforcement des Capacités Institutionelles.

Table 2 provides an overview of the types of interventions to be implemented by the ASSP project. As the table describes, ASSP covers a broad range of interventions including improving infrastructure and providing equipment to health facilities; enhancing the quality of service delivery and the range of services offered at the facility and community level; improving the medical supply chain procedures; providing trainings to increase human resource capacity; strengthening the health information system and human resource database to improve data quality; refining the governance of healthcare delivery to be more responsive to communities; increasing financial access to individual users and creating sustainable financial policies for health facilities; and introducing more innovate intersectional activities such as water and sanitation, hygiene (WASH) and nutrition programmes. Each activity is linked to the Theory of Change as activities are targeted toward quality and access of service delivery, community engagement or environmental health. Additionally, while certain activities will provide services to the general population, other activities are specifically focused on improving health outcomes for women and children.

Table 3 depicts the anticipated timeline for a staggered rollout. As the timeline indicates, some activities have already started, however the intensity of activity is still very minimal. While the timeline projects the rollout of ASSP activities beyond year one, the specific implementation plans for certain activities are still under discussion both internally at IMA and, in some cases, between IMA and DFID. The research team will take into account the timing of activities during data analysis, as described in section 9. It is expected that the design and implementation of these interventions may be modified based on evidence from the project's internal monitoring system or in consultation with Tulane's ORIE team.

Table 2. Overview of ASSP interventions and activities (developed by the ORIE team and IMA World Health)

Group of interventions	Specific interventions or strategies	Description of activities and link to Theory of Change
Infrastructure and Equipment	Renovation and construction of health centers and hospitals	The project plans to build new health centers and hospitals, as well as provide the needed major and minor repairs in health establishments and selected nursing schools in supported health zones. The project will also build efficient incinerators and placenta pits for selected facilities. **This activity is expected to contribute to the improvement of service quality and access to healthcare.**
	Provision of equipment to health zones and related facilities	The project will provide medical equipment and supplies to 55 hospitals and 962 health centers: Medical equipment and supplies include: • Improved cold boxes and solar refrigerators • Kerosene and spare parts for cold chain equipment • Medical waste management supplies • General medical supplies • Laboratory equipment and supplies Facility supplies include: • Bicycles for community health workers • Laptops, networked sim cards and printers • Motorbikes and vehicles for selected health offices • Solar energy kits **This activity is expected to contribute to the improvement of service quality and delivery.**
Service Delivery	Provision of a minimum package of services	ASSP will ensure the minimum packages of services are available at all supported health facilities. This package includes basic curative care, preventative care, promotional activities, community activities, complementary package of activities to be established in hospitals and management/administrative activities (more detail provided in Appendix 1). **This activity is expected to contribute to the improvement of service quality and access to healthcare.**
	Community-based interventions	ASSP will introduce and/or strengthen several community-based services, including: • Immunization: ASSP will support immunization and Vitamin A distribution activities through the Reach Every District (RED) approach. The project will strengthen EPI micro planning at the health zone level and will facilitate vaccine transport from Kinshasa to the health zones. • Modern family planning: ASSP will support the provision of modern family planning methods and increase their accessibility at the community level. • Mosquito-nets distribution: ASSP will support the distribution of Long-Lasting Insecticide-treated Nets (LLTN) free of

		charge. Community health workers will visit homes to help hang up the nets. • Community wide behavioral communication campaigns (BCC) to promote a range of healthy behaviors (contraceptive use, immunizations, antenatal care, malaria prevention, etc.). Specific BCC strategies will be developed by individual health zones. • Support groups for breastfeeding mothers **This activity is expected to contribute to the improvement of service quality and access to healthcare.**
Medicine Supply Chain	Medicine procurement and distribution, supply chain management	ASSP will work with the existing regional centers for medicine procurement and distribution (CDR) to strengthen their capacity to continue supply chain management after the project ends. ASSP will also work with the supported health facilities to ensure that all essential medications of good quality are purchased, properly transported and are reaching the target population. **This activity is expected to contribute to the improvement of service quality and access to healthcare.**
Human Resources Capacity	Pre-service training	ASSP will provide the following: • Support the nursing schools to produce well trained graduates • Provide scholarships for nurses **Pre-service training is expected to help improve health workers knowledge and practices and hence improve the quality of services offered.**
	In-service training	ASSP will provide the following training or training materials to health personnel in supported health zones: • Maternal and Child Health (MCH): Integrated management of childhood illness (IMCI), Prevention of Mother To Child Transmission (PMTCT) of HIV/AHDS, fistula repair, breastfeeding, maternal and newborn health, and emergency obstetric care • Family planning, reproductive health and post abortion care • Sexually transmitted infection care including post exposure prophylaxis (PEP) administration • Nutrition • Cervical cancer screening • Sexual and Gender Based Violence (SGBV) management • Drug management • Lab testing • Tuberculosis detection • Malaria detection • Behavior change communications • Financial management **In-service training is expected to help improve health workers knowledge and practices and hence improve the quality of services offered.**
Health Management Information	Strengthen the health information management	ASSP will contribute to strengthening the existing SNIS with the following: • Provide information technology for electronic reporting

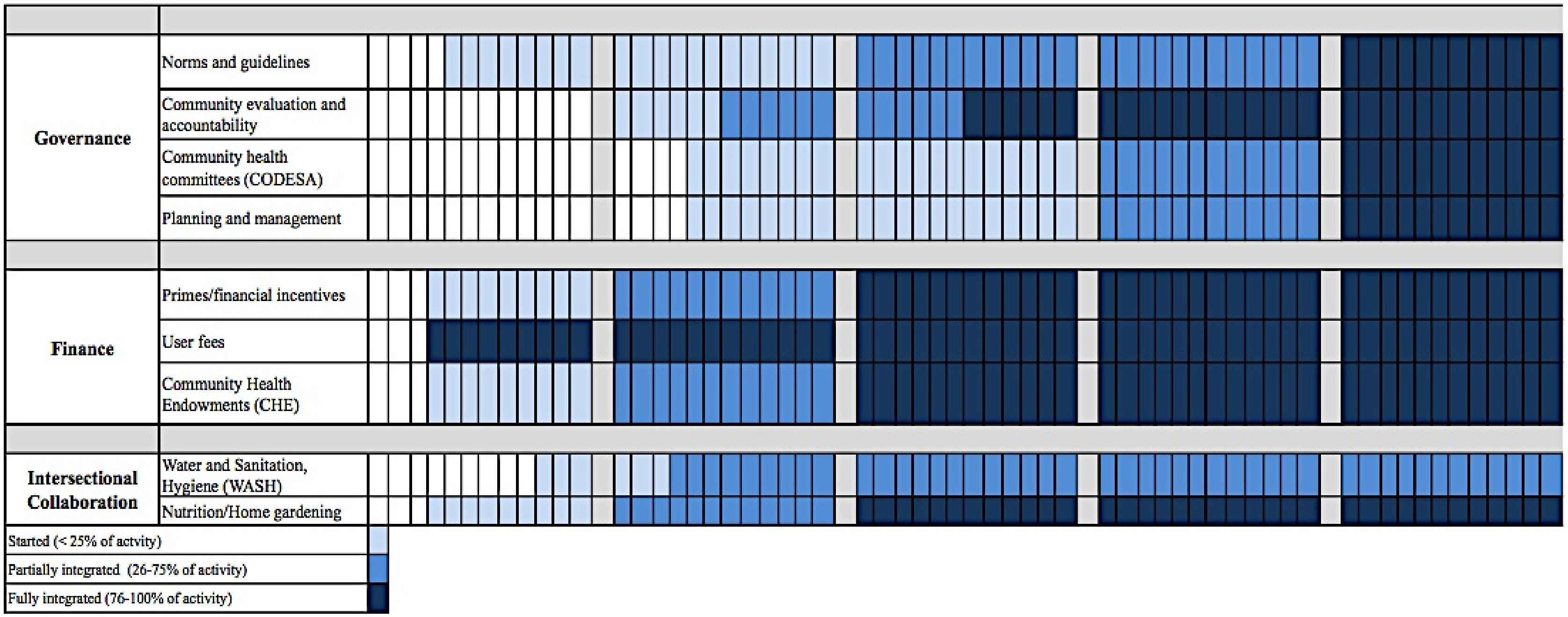
Systems	system (SNIS)	• Provide SNIS tools and forms to health facilities • Implement DHIS2 software in all ASSP supported facilities which will serve as the electronic programme for collecting SNIS data • Train health facility staff to use DHIS2 • Conduct regular quality audits to assess the routine data being collected by the project. **This activity is expected to contribute to the improvement of service quality by improving data quality.**
	Human resources information system	ASSP will establish a human resources information system at the health zones and health facility level. **This activity is expected to contribute to the improvement of service quality by improving data quality.**
Governance	Norms and guidelines	ASSP will establish norms and guidelines for new programmes and, where available, ensure that the national norms and guidelines are disseminated to health office and health facilities. They will also conduct workshops to ensure that stakeholders are aware of these standards. **This activity is expected to contribute to the improvement of service quality.**
	Community evaluation and accountability	ASSP will implement the following activity to ensure that communities have opportunities to participate in evaluating the project and are empowered to hold the health system accountable: • Establish a pilot community hotline, encouraging community members to signal poor management practices, mismanagement, fraud, theft, corruption and other dysfunctions; put pressure on health zone officials to improve governance; and hold health service officials accountable. • Develop sustainable mechanisms for collecting information on community expectations and evaluations of health services • Develop and promote a guidebook designed specifically for health zone officials on creative ways to actively invite and facilitate community participation in the health zone programme • Actively promote the theme of community ownership of the local health center through a variety of media including community radio, public billboards / posters, soccer balls and women's batik cloth and scarves. **This activity is expected to contribute to increase community empowerment.**
	Community health committees (CODESA)	ASSP will strengthen the governance and oversight capacity of the community health committees (CODESA) by: • Training CODEAS members to organize and moderate village meetings • Updating the CODESA guidelines to establish clear roles and responsibilities of the group • Training CODESA members on performance improvement • Encourage and facilitate training of CODESA members and health center staff in their respective roles and responsibilities in the co-management of health centers and the mobilizing of community partnerships **This activity is expected to contribute to increase community empowerment.**
	Planning and management	ASSP will work with individuals at multiple levels (national, provincial, health zone, community) to ensure the proper planning

		and management of the project including: • Organizing workshops to coordinate the activities of the government, implementing partners, and local facilities • Organizing regular informational meetings to engage stakeholders and partners at all levels • Supporting provincial and district technical meetings • Ensuring regular supervision is taking place at all levels of the health system including the provincial health offices, hospitals and health centers • Supporting provincial heath districts and health zone teams **This activity is expected to contribute to the improvement of quality health care and community empowerment.**
Finance	Primes/financial incentives	ASSP will provide primes (salary supplements) at a reduced rate to health workers and other health personnel in health zones where this practice has been previously established. However, in the course of the project, ASSP primes will be eliminated such that no health worker in ASSP supported zones will receive financial incentives from donors. **This activity is expected to contribute to the improvement of the access to health care and ensure sustainably.**
	User fees	ASSP will establish and disseminate guidelines for setting user fees to the provincial health offices. Each health establishment (health centers/hospitals) will then determine the baseline user fee for normal users. ASSP will provide subsidized curative care for vulnerable populations and for survivors of SGBV. **This activity is expected to contribute to the improvement of access to health care.**
	Mobilization of health financing through Community Health Endowments (CHE) (agricultural cooperatives)	ASSP will implement a community level income generating intervention that will provide additional finances to the health centers and reduce user fees for participants. CHEs are community farms that are planted and harvested by village participants who agree to give 50% of the revenue to the local health center in return for a 500-franc reduction in user fees. The following activities will be conducted • Train CODESA and CHWs on how community health endowments work • Train CHWs to provide technical support to CHE participants • Provide quality seed/seed cutting to CHE groups • Train CODESA to organize village informational meetings • Support a community-based campaign to present the community health endowment model of community financial support for the health center to community leaders and individual village groups **This activity is expected to contribute to access to health care and community empowerment.**
Intersectional Collaboration	Water and Sanitation, Hygiene (WASH)	ASSP will implement a previously established WASH campaign, Village Assaini, as well as an alternative package of activities yet to be determined. Activities include: • Providing equipment and implementing activities related to water and sanitation • Training individuals on the Village Assaini approach and providing promotional materials for Village Assaini • Providing water monitoring kits to clusters of supported villages • Supporting community mobilization and initial WASH assessment efforts

		• Establishing regular water testing activities for facilities in supported health zones • Spring capping • Building home latrines for individual households and composing latrines at health facilities and schools • Building cisterns at schools and public facilities **This activity is expected to contribute to the improvement of environmental health.**
	Nutrition/Home gardening	ASSP's nutrition project involves promoting home gardening activities indented to produce quality and nutritious food for household consumptions. Activities include: • Training Community Health Workers (CHW) on how to implement the home gardening project at the household level, nutrition education and home visits to monitor child malnutrition • Equip each health zone with a trained nutritionist • Provide nutrition education materials to health centers **This activity is expected to contribute to access to health care and community empowerment.**

Table 3. Anticipated timeline of ASSP interventions (developed by the ORIE team and IMA World Health)

Group of interventions	Specific interventions or strategies	Year 1 (Apr. to Mar.)	Year 2 (Apr. to Mar.)	Year 3 (Apr. to Mar.)	Year 4 (Apr. to Mar.)	Year 5 (Apr. to Mar.)
		A M J J A S O N D J F M	A M J J A S O N D J F M	A M J J A S O N D J F M	A M J J A S O N D J F M	A M J J A S O N D J F M
Infrastructure and Equipment	Renovation and construction of health centers and hospitals					
	Equipment to health zones and related facilities					
Service Delivery	Facility-based services: provision of a minimum package of services					
	Community-based interventions					
Medicine Supply Chain	Medicine procurement and distribution, supply chain management					
Human Resources Capacity	Pre-service training					
	In-service training					
Health Management Information Systems	Strengthen the health information management system (SNIS)					
	Human resources information system					


Governance
Norms and guidelines
Community evaluation and accountability
Community health committees (CODESA)
Planning and management
Finance
Primes/financial incentives
User fees
Community Health Endowments (CHE)
Intersectional Collaboration
Water and Sanitation, Hygiene (WASH)
Nutrition/Home gardening
Started (< 25% of actvity)
Partially integrated (26-75% of activity)
Fully integrated (76-100% of activity)

Previous research on integrated health care delivery models

Although integration models of service delivery are not new, interest in this model has increased, especially because of the desire of many governments to accelerate progress on reaching the health-related Millennium Development Goals and the promise this model holds on attaining those goals in an efficient manner (Pronyk et al., 2012; Bhutta et al., 2008). The rationale is that the management and delivery of multiple services (e.g., family planning and immunization) within the same health center is more efficient than having a client travel to separate specialist clinics for each service because of a reduction in both financial and time costs (Briggs and Garner, 2006). Integrated delivery can also reduce duplication of services and improve the overall quality of care received (Briggs and Garner, 2006).

As a result of the interest in integrated service delivery models, several studies have been conducted to evaluate the impact of integrated health services in several low- to middle-income countries in Africa, Latin America and Asia (Pronyk et al., 2012; Arifeen et al., 2009; Bhutta et al., 2008; Bryce et al., 2010; Bryce et al., 2005). Some researchers have focused on child survival (i.e., the Integrated Management of Childhood Illnesses [IMCI]) (Pronyk et al., 2012; Arifeen et al., 2009; Bryce et al., 2010; Bryce et al., 2005), while others have looked at the integration of maternal health with child health services (Briggs and Garner, 2006; Bhutta et al., 2008) and the integration of services for HIV and other sexually transmitted diseases with other primary care services (Briggs and Garner, 2006) in addition to child health outcomes.

Overall, the results of these studies, which include primary data analyses, as well as systematic reviews of other studies, have been mixed. For example, a systematic review of studies evaluating integrated maternal, newborn, and child health services (MNCH) in low- and middle-income countries in Asia, sub-Saharan Africa, Eastern Europe, Latin America and the Caribbean found that 20-30% of maternal deaths, 20-21% of neonatal deaths and 29-40% of under-five mortality could have been prevented by integrating MCH services at first-level health facilities (Bhutta et al., 2008). Similarly, a study evaluating the Millennium Villages Project in Ghana, Kenya, Malawi, Mali, Nigeria, Rwanda, Senegal, Tanzania and Uganda found that villages receiving a integrated multi-sector package of services saw improvements in child nutritional status and malaria parasitemia in addition to reduced poverty and food insecurity over the three-year follow-up period compared to the matched control village sites (Pronyk et al., 2012). Other studies in Bangladesh (Arifeen et al., 2009) and Benin, Ghana and Mali (Bryce et al., 2010) have shown mixed results or statistically insignificant changes. In studies where no significant differences were observed between intervention and control groups, the authors cited uneven implementation of the project (Bryce et al., 2010), gaps between expectations and reality (Bryce et al., 2005), and competing factors (e.g., other immunization and nutritional supplementation programmes, compounded by overall improvements in the country's economy, water and sanitation systems and female education) during the study period as potential explanations (Arifeen et al., 2009). None of the studies mentioned above has investigated the intervention packages implemented in the DRC. As a result, there is an absence of evidence on the effectiveness of integrated programmes in the DRC context. The findings from the ASSP evaluation are expected to contribute to filling this gap by rigorously studying the effectiveness of an integrated programme on improving the delivery of quality health services, increasing health care utilization and improving health outcomes.

2. Study Objectives

Under the ASSP project, Tulane University's School of Public Health and Tropical Medicine (Tulane) is responsible for developing and carrying out a robust, state-of-the-art research evaluation of the overall impact of the comprehensive ASSP package of interventions on health care service utilization, quality of care and health outcomes among the ASSP target population. To investigate the overall impact of the project, Tulane and the Kinshasa School of Public Health (KSPH) will conduct a population-based evaluation, consisting of a baseline household, health care facility, health care provider and community leaders survey in early 2014 and a follow-up survey at the end of the project in 2017. The objectives of the surveys are two-fold. First, data from the surveys will be used to *measure changes* between the baseline and endline surveys in health outcomes, behaviors, and exposure to and use of health interventions. Second, the survey data will be used to *assess the impact of the overall project* (all ASSP activities described in Table 2) on selected health outcomes, behaviors, and the use of interventions.

The following are the specific research questions that will be investigated:

1. What is the impact of the ASSP project on neonatal and child health outcomes (child nutritional status, anemia, fever during the past two weeks, diarrhea during the past two weeks, infant mortality)?
2. What is the impact of the ASSP project on specified types of health care utilization (maternal health services, including antenatal, delivery care, and postnatal services; immunization; outpatient treatment for both children and adults; inpatient services for both children and adults)?
3. What is the impact of the ASSP project on household out-of-pocket health care expenditure?
4. What is the impact of the ASSP project on family planning (utilization of modern contraceptive methods, unmet need for family planning)?
5. What is the impact of the ASSP project on community level environmental health (access to improved sources of drinking water and sanitation facilities)?
6. What is the impact of ASSP on factors related to the quality of care (health facility service readiness, client satisfaction, health worker motivation)?

Because gender is of particular interest to the Ministry of Health, the ASSP project and DFID, the study will also investigate whether the ASSP programme reduces gender disparities in the use of selected health care services and in health outcomes

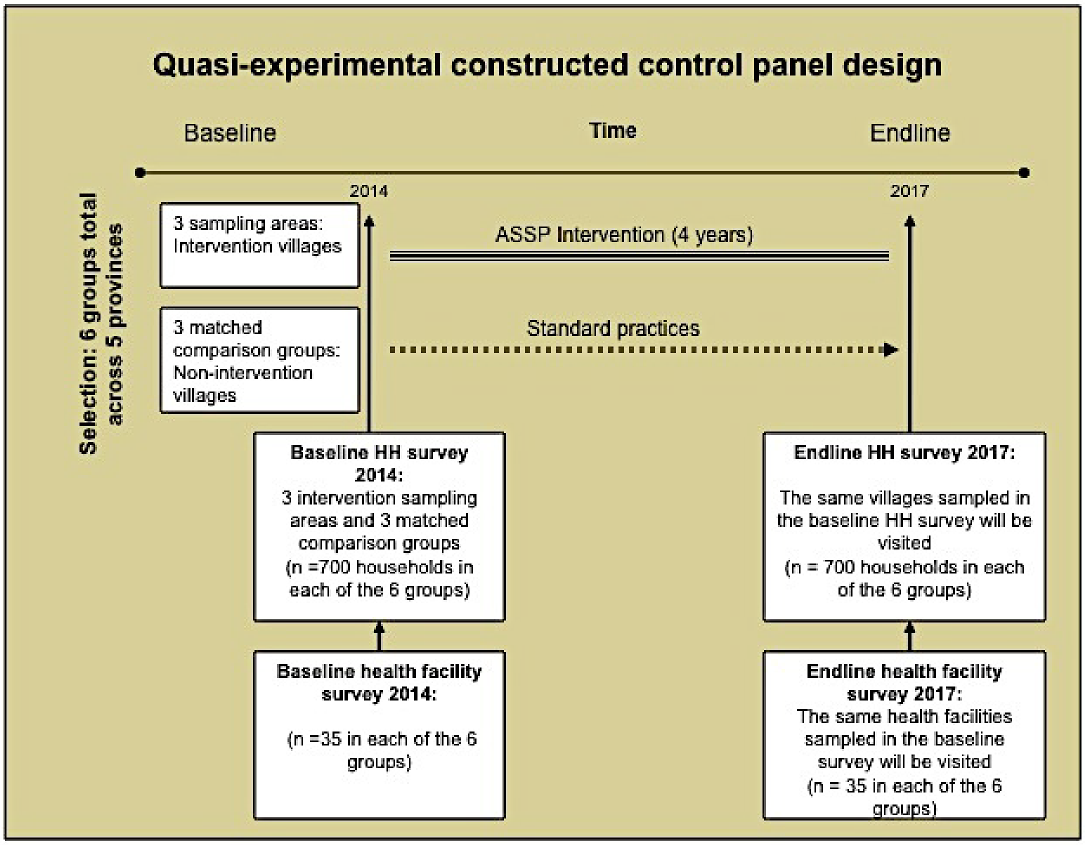
In designing the research study, Tulane is committed to adhering to the OECD DAC criteria for evaluating programmes and projects (relevance, effectiveness, efficiency, impact, and sustainability).

3. Study Methodology

While the gold standard randomized controlled trial is the strongest methodical approach to any impact evaluation, this method is not feasible for this study because health zones supported by the project were not selected randomly. An alternative approach to the evaluation given the staggered roll out of activities would be a step-wedge design. The strengths of this design include the ability of clusters to act as their own control, thus reducing the number of clusters needed as well as the ability to study the effects of time on the intervention's effectiveness. However, a step-wedge design is not possible for three reasons. First, the ASSP project is committed to rolling out certain interventions as fast as possible while the rollout for other activities has not yet been planned beyond year one. Second, the evaluation team does not control the timing and placement of most of the intervention activity. Last, given the large number of health zones targeted by the project and the lack of an efficient transportation system in the DRC, collecting data at numerous time points would increase the budget to an unreasonable level.

Because neither a randomized controlled trial nor a step-wedge design is possible, the impact evaluation will use a quasi-experimental panel design with constructed treatment and comparison groups (Figure 2). This will be coupled with appropriate data analysis strategies to assess the *plausible attribution* of ASSP support on outcome and impact indicators as described in section 9.

Figure 2. Quasi-experimental panel design with intervention and matched comparison groups

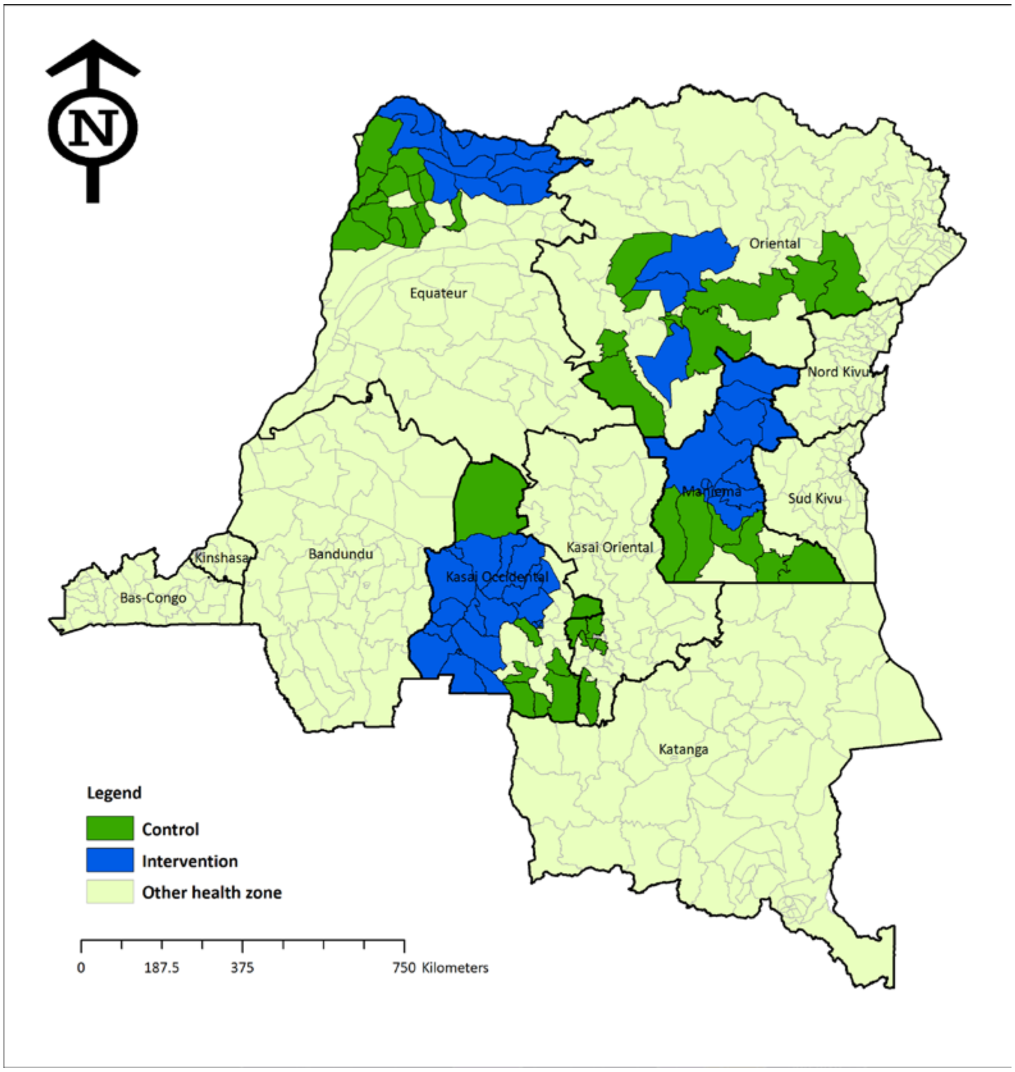


The ASSP project will intervene in the health zones in four provinces, but for the purposes of this evaluation, we will treat them as three sampling areas, as follows. The first sampling area[3] will consist of health zones in both Orientale and Maniema, the second sampling area will consist of health zones in Kasai-Occidental, and the third sampling area will consist of health zones in Equator (see Figure 3). Matched comparison groups consist of randomly selected *villages* within matched *health areas* outside of ASSP supported *health zones* that will not receive the ASSP intervention package (the matching process is described in section 4) [4].

[3] In this context, a "sampling area" is synonymous with a "survey domain."

[4] The evaluation study will also take place in some health zones in Kasai-Orientale province. Health zones in Kasai-Orientale were used as matched comparison areas for intervention sampling areas in Kasai-Occidental as almost all Health zones in Kasai-Occidental are receiving ASSP interventions.

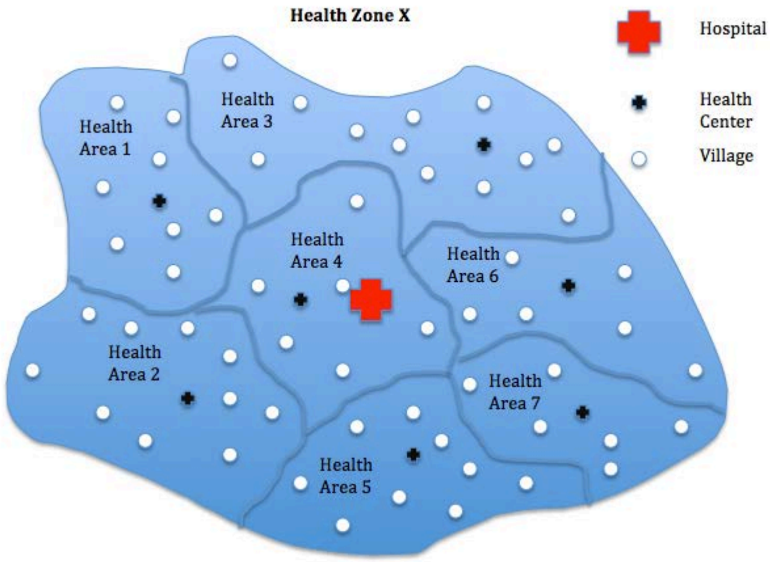
Figure 3. Map of evaluation areas



Map legend: Blue areas indicate health zones in the three ASSP sampling areas, as defined above. Green areas indicate the health zones from which matched comparison health areas were selected. Each health zone consists of multiple health areas, and each health area consists of multiple villages, as described in Figure 4.

It should be noted that a *health zone* is an administrative area used in the DRC's public health care delivery system. Each province is divided into numerous *health zones* and, as indicated in Figure 4, and each *health zone* is further divided into *health areas*. In theory, each *health zone* is comprised of one general reference hospital and is tasked with serving anywhere from 100,000 people in rural areas to 150,000 people in urban areas (Blum, 2011). Additionally, each *health area* is comprised of at least one health center and serves on average 17 *villages* in rural areas or neighborhoods in urban areas.

Figure 4. DRC health sector administrative units



Given that socio-demographic and behavioural factors likely differ between the provinces, the creation of three separate sampling areas and three matched comparison groups will reduce potential confounding and control for secular trend differences influencing observed changes in outcomes in the respective geographic areas. Furthermore, it will allow for geographically representative estimates of population coverage and outcomes to be made for the intervention sampling areas. Data will be collected from households, community leaders, health care facilities and health care providers within six distinct groups (an intervention sampling area and a matched comparison group in each of the three major geographic areas) to ascertain population point estimates for all health and intervention coverage outcomes and impact level indicators at baseline and follow-up.

As mentioned above, a quasi-experimental *panel* design will be used for this study. The study will be a panel at the village level, as villages selected for inclusion in the baseline will be the same villages used in any subsequent surveys. Data collection will occur in the sampled villages in 2014 and again in the same villages in 2017. A household level panel design (i.e., a design whereby the same household is visited during follow-up surveys) across the two survey rounds makes it possible to control for unobserved household-level confounding factors that are fixed across time within units of observation (households), as well as to accurately measure changes in exposure over time.

Additional data collection during endline survey

There will be two types of additional data that will be collected at endline.

First, additional data will be collected to understand the degree of and reasons for ASSP's impact on health system functioning and health outcomes. This data collection will be comprised of a hospital survey that includes a module for hospital workers, a survey of regional centers for medicine procurement and distribution (CDRs), and a survey of health zone offices (BCZs). Data will be collected from 32 hospitals, 7 CDR's, and 32 BCZ's, half in ASSP and half in non-ASSP areas.

Second, additional villages will be selected in two of the sampling domains, the first covering Orientale and Maniema, and the second covering Equator. The reason for collecting this additional data is that it was determined in April 2017 that it would not be possible to revisit villages in one of the sampling areas (Kasai) that were included in the baseline survey due to political instability and violence. By collecting data from additional households and health facilities in the remaining sample provinces that can be revisited, it will be possible to conduct a single-difference approach to estimate impact by comparing intervention areas with matched comparison areas. The additional data will be collected from 70 additional villages (35 intervention and 35 matched comparison) and 70 additional health facilities (35 intervention and 35 matched comparison). Once the political conditions stabilize, the endline survey will be conducted in Kasai at a later date by visiting the same villages and health facilities that were included in the baseline survey.

4. Sampling

Intervention sampling areas

For the intervention sampling areas, a two stage sampling strategy was used. At first stage, the sampling frame consisted of a full list of all villages with population estimates for each ASSP supported health area provided by IMA World Health's needs assessment, conducted in June 2013. Villages were then separated out to create three separate lists of all possible villages for each of the three sampling areas. Next, for each sampling area, 35 villages were selected using probability proportional to size (PPS) to maximize sampling efficiency. This means a total of 105 villages were selected (35 in each of the three sampling areas) for the intervention area. The second-stage sampling frames will be created in the field where the survey team will map village boundaries and then enumerate all households in the village, writing a sequential number on each household dwelling in chalk and recording the total number of households in each selected village. Following complete enumeration, a constant number of 20 households will be systematically selected from each village at the second stage to meet the desired sample size of 700 households in each sampling area. Enumeration of households within each village will also allow data to be weighted in the analysis.

In addition, at endline, an additional 35 intervention villages will be selected in two of the three sampling domains (18 in the first of the two and 17 in the second of the two). The sampling procedures described above will be carried out to select a total of 700 additional intervention households).

Matched comparison groups

For the matched comparison groups, a three stage sampling design is necessary as a complete list of villages with population estimates is not available. At the first stage, a comparison group health area was matched to each health area that contained a selected village in the corresponding intervention sampling area. This was done using a list of health areas with population estimates obtained from the Ministry of Health. Health areas were matched based on four criteria: geographic location, health area population size, health area urban/rural status, and health zone vaccination coverage[5]. For geographic location, comparison health areas were included from non-intervention health zones within the same province or geographic area (Equateur, Kasai Orientale/Occidental and Maniema/Province-Oriental), but close enough to the ASSP supported health zones to be considered similar on socio-demographic characteristics, and additionally, to facilitate logistics for data collection. Health area population size was categorized as greater than or less than 5,000 population. Health zone vaccination coverage was categorized as “High,” “Second highest,” “Low” or “Lowest.” Matched health areas were then randomly selected within each comparison group from listings of all health areas with the same four characteristics as the selected health area in the corresponding intervention sampling area. In this way, each selected health area in the intervention sampling areas has a corresponding matched health area in its comparison group in the same geographic location, with the same population level, the same urban/rural status, and the same vaccination coverage (at the level of its health zone). Thirty-five matched health areas were selected within each comparison group, one for each of the health areas containing a selected village in the corresponding intervention group (no selected health areas contained more than one village). This means a total of 105 health areas were selected (35 in each of the three comparison groups) for the comparison area.

At the second stage, once teams are in the field, a detailed list of villages with population estimates will be obtained from the health area office in the selected matched comparison health

[5] Health zone vaccination coverage was used as a proxy as information on health area coverage was not available. Information on vaccination coverage was obtained from the national Extended Programme on Immunization.

areas. One village will be randomly selected from the list using simple random sampling. All households within each selected village will then be enumerated in the same manner as in intervention sampling areas. In the third stage, 20 households will be systematically selected from each village to meet the desired sample size of 700 households in each comparison group.

In addition, at endline, an additional 35 matched comparison villages will be selected in two of the three sampling domains (18 in the first of these two and 17 in the second of these two). The sampling procedures described above will be carried out to select a total of 700 additional matched comparison households).

Matching was conducted using all available background information for both project intervention areas and control areas. This information was unfortunately limited to a small number (n=4) of variables. As such, the matching might not be adequate to control for all possible differences between intervention and control areas. After the baseline survey, the quality of matching will be evaluated through a series of descriptive comparisons of various demographic and community characteristics as well as baseline values for the study outcomes. This will help to ensure that any covariates not adequately controlled for in the matching process can be controlled for in adjusted difference-in-differences models of study outcomes for the final evaluation.

While a difference-in-differences analysis relies on the assumption of equal trends, the validity of such an assumption is impossible to prove and difficult to assess in practice. In the framework of this study it would require background data on the study outcomes at a minimum of two time points in the intervention and control areas before the start of baseline data collection. Such data is unavailable.

Sample size for household survey

For measuring changes in key indicators of health outcomes and intervention coverage within the quasi-experimental design, a total of 4,200 households will be sampled at baseline and again at endline, and an additional 1,400 households will be sampled at endline only. A sample size of 700 households per sampling area in the ASSP project area and in comparison groups was sought for measuring changes in all health and intervention coverage indicators, based on being able to detect a 10% increase in the percentage of household members using improved sources of drinking water from a baseline of 31%, with 80% statistical power, assuming a 5% probability of committing a type-1 error (1-sided test), a design effect of 2 and non-response rate of 10% for each round (household non-response). A design effect of 2 equates to an intraclass correlation coefficient of 0.176 based on previous data from the Demographic and Health Survey (DHS), and sampling 35 villages per sampling area or matched comparison group at first sampling stage, given the overall sample size of households estimated above. This means a total sample size of

4,200 households when including both the three intervention sampling areas and the three matched comparison groups, and an additional 1,400 household at endline only in two of the three intervention sampling areas and two of the three matched comparison sampling areas. The sample size formula used and a table of sample size input parameters is described in Appendix 2. As this survey uses a village level panel design approach, and not an individual panel design approach, dropout from baseline survey to endline survey is not anticipated to be a risk.

Table 4 presents the detailed samples size estimates by subgroup and Table 5 presents the detectable differences expected with 80% statistical power for illustrative health and intervention coverage indicators. Detectable differences for the sample size of 700 households for elements below the household level (e.g., children, WRA and pregnant women) assume 5.20 people of all ages, 0.99 children, 1.00 WRA and 0.13 pregnant women per household (assumptions are based on data from the DHS 2007 using only rural sampling areas). Illustrative examples of the resultant statistical power based on the given sample size, across potential detectable difference ranges, is given in Appendix 2.

As outlined above, the sampling method will aim to take the maximum number of villages per sampling area that is logistically feasible for fieldwork given the survey budget, while maximizing precision and statistical power (number of village per sampling area/ matched comparison group = 35; 210 total across the 3 intervention sampling areas and the 3 match comparison groups). While taking more villages and fewer households per village would result in a slight addition of statistical power of approximately 1% for each additional 5 villages in the first stage selection (e.g., going from 80% to 81%), the logistical and budgetary constraints of the study prohibit this.

Table 4: Detailed sample size estimates by subgroups

Unit of analysis	**Conditional probability obtained from DRC 2007 DHS**	**Sample size per sampling group**	**Total sample size across 3 intervention and 3 control sampling areas at each survey round**	**Total sample size for all sampling areas, intervention and control groups and both survey rounds**
Households		700	4,200	8,400
Individuals all ages	5.2 people per household	3,640	21,840	43,680
Children <5 years old	0.99 per household	693	4,158	8,316

Children with fever ≤2 weeks	31% of children <5	215	1,290	2,580
Children with diarrhea ≤2 weeks	16% of children <5	111	666	1,332
Children with symptoms of ARI ≥2 weeks	15% of children <5	104	624	1,248
Women of reproductive age	1 per household	700	4,200	8,400
Pregnant women	0.13 per household	91	546	1,092

*Assumes non-response and loos-to-follow-up = 10%

Table 5: Selected maternal, neonatal and child health outcome indicators, and minimal detectable difference between baseline and follow-up surveys (n = 4,200 households per survey with 80% statistical power, divided between intervention sampling areas and matched comparison groups)

Indicator	Baseline point estimateƗ	Design effect*	Intraclass correlation coefficient	Detectable difference at endline in each sampling group†	Detectable difference at endline for all sampling groups†
Intervention coverage					
Percentage of households with improved sources of drinking water	31			10%	7%
Percentage of households with improved sanitation facilities	4			5%	4%
Percentage of women age 15-49 currently using any modern method of family planning	18	2.6	0.339	12%	8%
Percentage of women age 15-49 with an unmet need for family planning	24	2.6	0.339	13%	9%
Percentage of live births delivered in past 2 years with skilled birth attendant	67	3.3	0.582	21%	14%
Percentage of households with ≥1 ITN	48			10%	7%

Percent of pregnant women used ITN last night	42			27%	17%
Percentage of children with fever who received antimalarial treatment	36			19%	12%
Percentage of children with diarrhea who received either ORS or RHS	40	1.8	0.132	23%	15%
Percentage of children with suspected pneumonia who received antibiotics	39			33%	20%
Health outcomes					
Percentage of children with fever in past 2 weeks	27			9%	7%
Percentage of children with diarrhea in the past 2 weeks	18	2.1	0.201	7%	6%
Percentage of children with suspected pneumonia in the past 2 weeks	6			4%	4%
Percentage of children underweight (-2 SD)	27	1.8	0.132	8%	6%
Percentage of children stunted (-2 SD)	47	2.0	0.176	10%	7%
Percentage of children wasted (-2 SD)	9	1.7	0.111	5%	4%

All indicators for intervention and health outcomes will be consistent with those measured by the DHS and MICS.
ɫObtained from the 2010 MICS preliminary results (rural *sampling areas* used unless denoted as urban and rural combined)
†Absolute change (not relative percent)
*Obtained from the 2007 DHS rural *sampling areas*; where design effect unavailable, design effect of 2 was used.

Sample size for health center/post survey

A convenience sample of one health center/post for each sampled village, in total 280 facilities (210 health centers/posts at both baseline and endline, and an additional 80 health centers/posts at endline only) will be chosen once teams are in the field. As the sample for the household survey consists of one village per health area, the health center/post officially designated to serve households in that health area will be chosen for the health center/post survey.

Conducting the facility survey in the same areas as the household survey will allow sample households to be “linked” to the attributes of a nearby health care facility that they can utilize, making it possible to investigate the role of facility attributes in the utilization of health care services. Following the panel design approach, the same selected facilities will be surveyed at baseline and endline.

Sample size for health center/post providers survey

A convenience sample of all health center/post providers on duty at chosen health facilities the day of the survey will be used. The exact sample size will be dependent on the number of individuals working in each facility on the day of the visit. As 280 health facilities will be visited, a minimum of 280 health care providers will be interviewed. However, it is estimated that the average number of health care providers on duty at a facility on any given day is between two and three. As such the sample size is expected to be between 560 and 840 health workers.

Sample size for community leaders survey

A minimum of two community leaders will be interviewed for each sampled village, totaling a minimum of 560 community leaders to be interviewed (420 villages and endline and baseline and an additional 140 at endline only).

Sample size for hospital survey

A random sample of 32 hospitals serving the sampled health areas at endline only will be chosen once teams are in the field.

Sample size for hospital provider survey

Within each hospital visited at endline only, a random sample of 4 physicians and 4 nurses will be selected, yielding a total of 256 hospital workers.

Sample size for regional center for medicine procurement and distribution (CDR) survey

All seven regional centers for medicine procurement and distribution in provinces serving the sampled health zones will be visited at endline only.

Sample size for health zone office survey

A random sample of 32 health zone offices serving the sampled health areas at endline only will be chosen once teams are in the field.

5. Recruitment and Data Collection Tools

Recruitment

As all data collection requires face-to-face interviews, the data collection team will recruit individuals in selected households, health facilities and at the home or office of the appropriate community leader. Once sampled households, health facilities and community leaders have been selected, data collectors will approach the household or facility and speak with the head of household or facility in-charge. Data collectors will carry out the informed consent process, which includes an explanation of the purpose of the study, the risks and benefits of participating in the study and the time required by each interview. Also, it explains that the individual has the choice to participate or not participate in the study. If a household respondent decides not to participate, the survey team will note this and approach the next selected household or eligible household member. There will be no replacement for refusal in the household or women’s survey. If a community leader or an entire health facility refuses to participate, data collectors will visit another prominent community member or another health establishment (the closest or next closest health establishment to the sampled village), to ensure the target sample size is met. If an individual health care provider refuses to participate, data collectors will note this and continue interviewing all other eligible health care provider on duty the day of the survey.

Household and Woman's Survey Tools

Questionnaire

For each household selected, the head of the household as well as all female household members of reproductive age (15-49 years) will be interviewed. All individuals who slept in the household last night (the de facto population), as well as usual household members (the de jure population) will be considered household residents. Information for all children under five years of age who are household members will also be collected. When possible, this will be done by interviewing the mother. However, in a case where no mother is present, the primary care giver will be interviewed to take into account vulnerable children, orphans and child-headed households.

Anthropometric Measurements

To assess child nutritional status, age, height and weight data for children 0 to 59 months of age will be collected using standard scales and height measurement tools. This information will be used to generate standardized measures for weight-for-height, weight-for-age and height-for-age.

Biomarker Collection

Finger pricks will be performed on all children age 1 to 59 months who are household members. The data collectors for all blood samples will be trained health personnel. Data collectors will receive standardized training to conduct finger pricks for anemia and malaria parasitaemia in every household sampled. The purpose of the survey will be explained and if the parent's consent is given, a finger prick will be done. The blood drops will be used as follows: (i) 1st drop of blood will be wiped from the finger; (ii) 2nd drop will be used in the Hemocue photometer to determine the child's hemoglobin level; (iii) 3rd drop will be applied to a malaria rapid diagnostic test (RDT); and (iv) the 4th and final drop will be placed on a filter paper for confirmation of diagnoses using PCR. After the tests have been conducted and the results have been obtained, used supplies will be discarded according to local disposal regulations.

All filter paper blood specimens from selected households will also be examined at Tulane University for the presence of malaria parasites using PCR. This will allow for a very sensitive and precise measurement of infection within the study population.

Health Center/Post Survey Tool

As only one village for the household survey is selected per health area, the health center designated for serving that health area will be selected. The head nurse will be interviewed using a structured questionnaire to measure facility level indicators.

Hospital Survey Tool

The head physician or nurse will be interviewed using a structured questionnaire to measure hospital level indicators. Assessment of the availability of specific types of health care services and an abbreviated inventory of infrastructure, equipment, laboratories, medicines and other commodities will be conducted to provide an independent assessment of the facility's readiness to provide health care services.

Health Provider Survey Tool (to be administered at health facilities including hospitals)

For each health facility selected, individuals responsible for providing health care services (e.g., doctors, nurses, midwives) are considered health workers and are eligible for the health worker survey. Within health centres/posts all individuals meeting these criteria who are on duty the day of the survey will be interviewed using a structured questionnaire to measure individual heath worker indicators. Within hospitals, a random sample of four physicians and four nurses will be surveyed.

Community Leader Survey Tool

For each village selected, a minimum of two community leaders will be interviewed using a structured questionnaire. One of the respondents will be a health zone or health area official. The other respondent will be a community health committee (CODESA) member where possible, and if no CODESA member is available, another prominent member of the community such as a village chief or teacher will be interviewed.

Regional Center for Medicine Procurement and Distribution (CDR) Survey Tool

The director of the CDR (or designee) will be interviewed using a structured questionnaire to measure organization level indicators and to assess SSP's level of influence on the performance of the CDR.

Health Zone Office (BCZ) Survey Tool

The Chief Physician of the Health Zone (or designee) will be interviewed using a structured questionnaire to measure organization level indicators and assess ASSP's level of influence on the performance of the BCZ.

Data collection methods

Baseline data will be collected via paper forms. For the endline survey, data will be collected with smartphones using OpenDataKit (ODK). ODK is an open source, Android-based data collection application which has been used for many large household and facility surveys in the DRC since 2012.

Geographical information system data

The longitude and latitude of each village and health facility will be ascertained using geographic positioning system (GPS) to assess community level factors associated with ecological conditions and distance to health services. Such data will be ascertained from taking a longitude and latitude reading with a GPS unit at the center of each selected village at first visit and at each selected health facility. Such data will then be analyzed using a geographic information system (GIS). As GPS points will be for the center of the village only and not for each selected household, no personal data will be able to be linked back to households or individuals.

6. Indicators

Household and individual level indicators

The household survey will cover the major health topics of interest under the ASSP Project including access to safe drinking water, immunizations, reproductive health, child malaria parasite prevalence, family planning and child nutrition and well as community engagement, health care utilization for acute and chronic health problems and health care financing. Face-to-face interviews will be conducted and wherever appropriate, the survey uses similar indicators and collection protocols as the DHS and MICS, to ensure comparability of data and processes. It also draws on questionnaires used by IMA and DFID in previous Knowledge-Practice-Coverage studies in the DRC.

To assess whether the project is having its intended effects, the following selected indicators will be used (for exact definitions, calculation methods and data sources see Appendix 3):

Children's Health Outcomes

1. Percentage of children under 5 with fever in past 2 weeks
2. Percentage of children under 5 with diarrhea in the past 2 weeks
3. Percentage of children under 5 with suspected pneumonia in the past 2 weeks
4. Percentage of children under 5 underweight (-2 SD)
5. Percentage of children under 5 stunted (-2 SD)
6. Percentage of children under 5 wasted (-2 SD)
7. Percentage of children age 1 to 59 months with Malaria parasite in their blood
8. Percentage of children 1-59 months with anemia
9. Percentage of children 12-23 months who received all specified vaccinations at any time before the survey
10. Infant mortality rate

Health care Utilization and Out of Pocket Expenditures

11. Percentage of women with a birth in the last five years, distributed by number of antenatal care visits
12. Percentage of live births delivered in past 5 years by skilled birth attendant
13. Percentage of children under 5 with fever who received antimalarial treatment
14. Percentage of children under 5 with diarrhea who received either ORS or RHS
15. Percentage of children with suspected pneumonia who received antibiotics
16. Percentage of individuals sick or injured in the last four week who sought care, by chronic or acute health problems
17. Percentage of people who were hospitalized in the last six months, by chronic or acute health problems
18. Average out of pocket household health expenditures per episode of illness/injury

Water, Sanitation and Hygiene

19. Percentage of households with improved sources of drinking water
20. Percentage of households with improved sanitation facilities
21. Percentage of households with hand-washing materials in dwelling/yard/plot

Community Participation in Health care

22. Percentage of households that are informed about health care services offered in the community
23. Percentage of households that are satisfied with their involvement in decision making regarding health care
24. Percentage of communities with a health committee (CODESA)

Client Satisfaction

25. Percent of clients sick or injured in the last four weeks who were satisfied with services received
26. Percent of client hospitalized in the last six months who were satisfied with services received

Family Planning

27. Percentage of women age 15-49 currently using any modern method of family planning
28. Contraceptive method mix (percent distribution of users by method)
29. Percentage of woman age 15-49 with an unmet need for family planning

Malaria

30. Percentage of households with ≥1 ITN

31. Percentage of pregnant women who slept under ITN last night

Health facility level indicators

An interviewer or assistant supervisor will visit the official health center designated for serving the health area in which each selected village is located. The head doctor/nurse will be interviewed about the availability of specific types of health care services and an abbreviated inventory of infrastructure, equipment, laboratories, medicines and other commodities will be conducted to provide an independent assessment of the facility's readiness to provide health care services, an important aspect of the quality of care available. In addition, all health care providers on duty the day of the visit will be interviewed regarding health care provider motivation, job satisfaction and priorities. Both surveys will use a structured questionnaire. The health facility and health care provider survey will be designed to answer three broad questions related to the health system at the local level:

- What is the availability of various types of health care services (preventive and curative) at the facility?
- To what extent are facilities and health workers prepared to provide these services?
- What are the perceptions of health workers about various aspects of the work environment, including financial and non-financial factors?

The following selected indicators will be used (for exact definitions, calculation methods and data sources see Appendix 3):

Service readiness

1. Percentage of health centers with adequate equipment
2. Percentage of health centers with adequate drug supplies
3. Percentage of health centers offering the minimum package of services required to provide preventative services
4. Percentage of health centers offering the minimum package of services to provide curative care

Health worker incentives and motivation

5. Percentage of health care providers satisfied with specified aspects of the work environment, including financial and non-financial aspects
6. Percentage of health care providers receiving performance-based incentives

Community leader indicators

While the community leaders survey will not provide data specifically tracking indicators to assess the impact of ASSP, it will provide basic community level information. This information will be used to track community level changes over the course of the 5-year study. Data from this survey will be particularly useful in comparison areas where it is likely that other, non-ASSP interventions will be introduced. The introduction of outside interventions is out of the control of the evaluation team and will likely change community characteristic from the time of the baseline study to the endline survey. In order to control for these changes, community level data needs to be collected and accounted for in the analysis stage.

7. Data Collection

KSPH will take a lead role in overseeing the fieldwork for this study and are required to submit monthly progress reports to Tulane. KSPH will be responsible for recruiting and training interviewers and health personnel for blood collection; pre-testing the instruments; supervising the fieldwork; overseeing the data entry, cleaning and processing; and producing descriptive analyses. Data collectors will be hired from each of the provinces to insure appropriate language skills and familiarity with the cultural context. Ethical approval of the study and collection procedures will be obtained from the Institutional Review Boards (IRB) of both Tulane and KSPH before data collection commences.

Table 6. Summary of data collection

Survey	Unit of Analysis	Sampling Frame	Sampling Methodology	Sample Size	Summary of indicators
Household	• Households • Individual household members	• **Intervention sampling area-** list of villages with population size from IMA's internal assessment in June 2013 • **Matched comparison groups-** list of health areas with population size estimates and urban or rural status from MOH. Matching was done using this list as well as vaccination coverage data	Both two-stage sampling design (intervention sampling areas) and three-stage sampling design (matched comparison groups). See study methodology section 3 for more details.	**5,600 (4,200 originally planned and 1,400 additional households at endline in non-Kasai sampling domains)**	• Health care utilization for all family members • Out-of-pocket health care expenditures, quality of service • Community engagement • WASH • Malaria prevention • Anemia status • Malaria parasite prevalence • Anthropometric measurements for assessing under five nutritional status

		from the national EPI programme.			
Women's	• Woman age 15-49 • Children under 5	• Same as household survey	All eligible woman from sampled households	**Estimate: 5,600** (one woman of reproductive age per household)	• Child health outcomes such as fever, diarrhea, suspected pneumonia, vaccination coverage, and infant mortality rate • Treatment of child illness • Maternal health such as utilization of antenatal care and births by skilled birth attendant • Family planning utilization
Health Facility	Health Centers	Documentation of the official health center serving the health area in which each selected village is located.	Convenience sample of the official health center designated for serving the administrative health area in which each selected village is located	**280 (210 originally planned and 70 additional households at endline in non-Kasai sampling domains)**	• Service readiness (adequate equipment and drug supplies) • Minimum package of services offered
Health care provider (health centre/post)	Individual health care provider	Duty roster	Convenience sample of all individuals responsible for providing heath care services (doctors, nurses, midwives) on duty in the selected heath center the day of the survey	**Estimated range: 280-840** (280 * number of health workers on duty the day of the survey)	• Health worker satisfaction • Health worker motivation • Presence of performance-based incentives
Community Leader	• Health zones • Health areas • Villages	NA	Purposely selected individuals	**560**	• Health zone, health area and village level characteristics • Presence of other programmes at the health zone, health area or village level
Hospital	Hospital	Roster of government hospitals	Random	**32**	• Service readiness (adequate equipment and drug supplies) • Minimum package of services offered
Health care provider (hospital)	Individual health care provider	Duty roster	Random	**256**	• Health worker satisfaction • Health worker motivation • Presence of performance-based

					incentives
Regional Center for Medicine Procurement and Distribution (CDR)	CDR	List of all CDRs in selected areas	All	**7**	• Service readiness • Data demand and use
Health Zone Office (BCZ)	BCZ	List of all health zones in selected areas	Random	**32**	• Service readiness • Data demand and use

8. Data Processing and Management

Tulane will be responsible for overseeing data management. Baseline data will be double entered by KSPH study personnel into EpiInfo using customized entry screens. Endline data will be collected on mobile devices. Data will be cleaned by thoroughly checking whether indicator values fall within plausible ranges, confirming whether skip patterns have been respected and assessing whether survey responses are consistent with previous responses. In addition, for many indicators that are in common with those in the 2013-2014 DRC DHS, the validity of the results will be assessed by comparing data from the baseline survey with the DHS survey.

All data forms and records collected during this research will be held in a secure location at KSPH and/or Tulane University for the duration of the proposed research by the principal investigator, Dr. Joe Keating. Confidentiality of all respondents will be ensured through the replacement of any personal information with unrelated unique identifiers. Where relevant, names and location information will be separated from the electronic data processed for analysis. The only identifiers used during the analysis will be a unique identification number. All data will be kept under lock and key or password protected computer, with only key personnel having access.

9. Data Analysis

The evaluation will employ multiple state-of-the-art analytic approaches, nested within a linked population-based and health facility-based quasi-experimental panel study design. The use of multiple data analysis methods will provide a robust and comprehensive assessment of the impact of the overall package of ASSP-supported interventions on a range of indicators. Based on the study design described earlier in this protocol, analyses will be conducted at the individual-, household-, facility-, and health worker-levels, depending on the outcome of interest. (See Table 6 for a summary of outcome indicators and their respective units of analysis).

All point estimates from surveys will be weighted to correct for differences in sampling area sizes and inaccurate estimates of village sizes. All standard errors will be empirically estimated to account for correlated data at the village level. Differences in key outcome indicators of interest between intervention areas and comparison groups and between baseline and follow-up surveys will be assessed with multivariate regression modeling to account for potential confounding factors. This approach is necessary, given the non-randomized study design. Such models will also allow us to assess the association of exposures to interventions and risk factors on health outcomes.

Two types of multivariate analysis will be conducted: a dose-response analysis and a difference-in-differences analysis. The dose-response analysis is designed to assess how programme outcomes relate to the intensity of programme interventions. The analysis will account for the fact that certain activities will have been implemented before the baseline study data collection has started. It will focus on measuring programme exposure as a dose-response, irrespective of intervention or comparison group assignation. Each village will be categorized using an index into "None," "Low," "Medium," or "High" groups to measure the incremental effect on health coverage and impact indicators. The index of exposure will be developed and villages will be categorized through consultations with IMA and the implementing partners, by examining ASSP quarterly progress reports and routine data collected by ASSP, as well as the data collected by this study's community-, health facility- and health provider surveys. Specifically, the community leaders survey is designed to capture information on specific programmes or interventions happening at the village-, health area- and health zone- level and this data will inform the development of the index and categorization of villages. Using assigned categories, we will use multinomial regression models to test for the effect on outcomes (including health care utilization and health outcomes), while controlling for potential confounding factors.

Additionally, for assessing the impact of the ASSP project, a difference-in-difference analysis with a multiplicative interaction term in models for representing time*group assignment will be used. In this way, the net programme effect can be distinguished from the gross programme effect, thereby limiting the bias of secular drift, external confounding factors and potential confounding factors, to the extent possible. For all models, nested random effects at the sampling area and village level will be used to account for correlated data within geographic areas for standard error estimation, as well as heterogeneity between areas in estimation of regression coefficients. Many of the analyses, when appropriate, will be stratified by gender to assess whether the project had an impact on reducing disparities between males and females (e.g., child health outcomes and health care utilization).

10. Study limitations

The proposed study has some limitations. First, as mentioned above, a "gold standard" randomized control trial is not feasible for this study because the target health zones were selected non-randomly. In addition, a step-wedge design is not appropriate due to IMA Health's approach to introduce and scale up the interventions, as described earlier. While the quasi-experimental design allows for the *plausible* attribution of the outcomes to the project, it does not allow for observed changes (impact) to be definitively attributed to ASSP interventions only. Indeed other projects and initiatives might also explain changes in the observed value of indicators, although the study attempts to control for these factors. Second, as this study will employ a panel design, there is the risk of loss-to-follow up from baseline to endline. This risk is limited however, baring a disaster or extreme population movement, as the panel design follows the same villages, and not the same individuals or households over time. Third, the limited availability of data means that the matching of comparison groups could only be done on four characteristics. The limited number of matching variables may hinder the comparability of the invention areas and matched comparisons groups. To account for this, descriptive comparisons of demographic and community characteristics will be assessed which will help ensure all covariates are appropriately controlled for in the difference-in-difference analysis. Fourth, due to unforeseen circumstances, data collection for the baseline phase will be delayed by almost by 10 months after launching of the ASSP Project, which means that the results of the difference-in-differences approach may be biased towards the null hypothesis. To address this constraint, a dose-response analysis will be conducted to assess the associations between the intensity and coverage of the ASSP interventions with the outcomes of interest. Fifth, the selection of villages in the comparison groups was made based on common characteristics between the health areas in which they are located and health areas containing villages in the intervention sampling area. However, these comparison villages might have been (or could be) exposed to interventions from other health initiatives or projects. While this is out of the control of the research team, the presence of other intervention efforts will be controlled for using data collected through the community leaders survey. Last, the sampling plan allows for comparisons to be made between ASSP supported health zones and those not supported by ASSP. However, the sampled households are not representative at the health zone level nor can the differential impact of ASSP on the outcomes of interest be validly tested across health zones.

11. Results Dissemination

Upon completion of the baseline and endline survey reports, Tulane and KSPH will be responsible for hosting a results dissemination workshop to inform all stakeholders of the survey results. Reports will be written in English and in French, summarizing the study results. The workshop will present the findings in a clear and concise manner and invitees will include representative from DFID, IMA World Health, Implementing Partners, Tulane, the Ministry of Health and where possible community leaders from the communities selected for the study. In addition, datasets will be publicly released after the conclusion of the study, following data sharing policies of the Ministry of Health and DFID.

12. Ethical Considerations for Human Subjects Research

Protection of human subjects

Risks to subjects

We will use a quasi-experimental, matched comparison group design that targets households and residents in addition to health workers and community leaders. Survey data will be collected at baseline and post-intervention. All households and health facilities satisfying the geographic criterion, and all health workers and community leaders with the appropriate credentials, irrespective of the respondents' health status will be considered for selection into the study. Because a representative sample of villages and households will be taken, no sub-population will be deliberately included or excluded from the study. Age, gender, location, demographic characteristics of the respondents and health-related or employment-related data will be collected at each sampling interval. The ASSP project will support a wide array of health interventions (including clinical interventions, behavioral interventions and interventions designed to improve health financing and community engagement). All of the ASSP targeted health zones will receive most of the interventions during the course of the project, with the exception of some health systems interventions that are viewed as experimental. For these interventions, ASSP will conduct pilot interventions, and then these interventions will be scaled up during follow-up activities if effectiveness is shown by supplemental operations research studies.

There may be physical risks to the household participants/respondents associated with a finger stick from blood drop collection, but they are not considered more than minimal. Lancets or needle sticks are potentially, but only temporarily, painful. In addition, blood will be collected using standard hygienic practices (e.g., one needle per child, disinfecting finger using alcohol swabs, etc.) and materials will be disposed of according to national guidelines. The risk to data collectors of needle sticks involving HIV positive individuals and the risks of transmission, however, will be minimized, as the study will use trained health personnel.

Our proposed strategy to reduce risks associated with finger pricks include:

- Explaining the physical procedures carefully to the mother or caretaker of each child so that she understands the potential pain associated with collection of blood for parasitemia or hemoglobin data but also understands that the pain is unlikely to be more than temporary.

- Using specially trained and supervised fieldworkers who will be able to answer commonly asked questions.
- Specially training fieldworkers to collect potentially sensitive questionnaire data and ensuring that all data entry personnel are trained on confidentiality and safety issues, as well as on informed consent procedures.
- Using the most efficacious testing procedures available to ensure sterile and safe biological data collection and testing.
- Using trained health personnel to collect and handle biological specimens and receive special training on universal precautions for handling all biological specimens (see section on training below).
- Using trained health personnel to minimize the potential for HIV transmission to data collectors from the needle stick procedure.

Results from the anemia testing and malaria RDTs will be available immediately. Anyone testing positive for malaria or found with hemoglobin levels of less than 7g/dl will be given written results and referred to the nearest health facility where treatment will be provided based on national guidelines. Anyone with severe malaria will be referred to the closest hospital.

There is also the risk of breach of confidentiality or privacy during the data collection or storage process; processes to mitigate these risks are detailed below. In addition, all data will be stored under lock and key or password protected computers. Only key personnel and data managers will have access to collected data. The use of unique identifiers will further ensure that no data are linked to individuals. The researchers will retain the data without identifiers for possible use in future data analysis related to this project, which will be consistent with the original research purpose.

Informed consent

The study team will obtain oral informed consent from each survey respondent as well as provide contact information to each participant.

The consent transcript will be read to the respondent in French and/or a local language by the interviewer. The consent forms and procedures will follow exactly those that are approved by the Ministry of Health and institutional review board of Tulane and KSPH. These forms will be read to each participant and will include a description of voluntary participation (no penalty for non-participation), the right to withdraw from the study at any time and the right to not answer any question or refuse to have blood samples taken. This will also include a description of the panel design approach, explaining that data collectors will conduct the survey during the current visit and then will attempt to return (to the village or health facility) and conduct the full survey one more time in 2017. As some households may be selected for the baseline and endline surveys, it will be explained that consent will be obtained before each interview. The transcript will also address the risks, benefits and purpose of the study and what we hope to learn.

All respondents 15 years of age and older will provide oral consent for their own participation, as well as for the participation of their children. In the DRC, anyone under the age of 18 is legally considered a minor. However, individuals 15 years of age and older frequently assume adult responsibilities, including marriage, childbearing, caretaking and labor force participation, and are expected to understand the implications of informed consent. Therefore, for the purposes for this study, 15 years of age will be used as the age of consent. In health facilities and for community leaders, the assumption is that all respondents will be over the age of 18.

We will train all interviewers extensively on the consent procedures, and each form will be signed by a team member to ensure all participants have consented (see section on training below). Checks in the field by the PI and project leaders will further ensure the consenting process is followed in all cases. Data collection team members will provide a list of health facilities they can contact for any further information on the topics brought up in the interview, or for treatment if necessary. The confidentiality procedures are designed to meet all contingencies so that the privacy of the participants is preserved.

Language

While the DRC's official language is French, the four national languages, Kikongo, Swahili, Tshiluba and Lingala, are the languages predominating spoken in different regions of the country. For the propose of this study, all survey instruments and consent transcripts were professionally translated from English to French and reviewed by the Tulane ORIE Research Director based in Kinshasa, as well as the KSPH researchers. The household, woman's and community leader's surveys and accompanying consent transcripts were then translated from French into Swahili, Tshiluba and Lingala by local translation teams identified by KSPH[6]. The teams consisted of professional multi-lingual translators whose first language was the local language of interest. The Tulane ORIE Research Director based in Kinshasa and KSPH then held a workshop to back translate selected questions and review the local language translations for accuracy.

Household members and community leaders will be given the choice of language for the interview. All data collectors will be fluent in French as well as the dominant local language spoken in the area to which they are assigned. It is assumed that health care providers have obtained a certain level of education and are fluent in French; therefore all health facility and health worker surveys, the CDR and the BCZ surveys will be administered in French.

[6] This study is not operating in areas where Kikongo is spoken.

Potential benefits of the proposed research to the subjects and others

The selected intervention villages as a whole and the individuals within the selected intervention villages specifically will potentially benefit from improved health as a result of the planned health systems strengthening interventions. The national health policy makers will potentially benefit from the availability of evidence of the effectiveness of the project in improving health outcomes.

Importance of knowledge to be gained

The development of novel strategies for improving access to health care and health seeking behavior, and subsequently the control of disease, is essential if we are to successfully improve child and maternal health in DRC. The results from this study will inform decision-makers as to the potential effectiveness, or lack thereof, of interventions for increasing health care seeking behavior, and thus reducing the burden of various diseases. As well, the results of this study will provide information about why individuals choose to use or not-use methods of personal protection against disease, as well as why or why not individuals choose to access health care within a specific cultural and societal context; this information is extremely important for formulating cost-effective disease control strategies.

Inclusion of women and minorities

Most of the adult participants will be women, as this project has a strong focus on maternal and child health and consists of a woman's questionnaire. The household questionnaire will be administered to the head of household, which can be male or female. Our study will be conducted outside of the U.S., and no racial, ethnic group will be excluded. We do not expect to find race/ethnicity differences in the intervention effect.

Inclusion of children

Children are a major focus of this research, and all child household members between the ages of 0 and 59 months will be selected for the study.

Training of data collectors

All data collectors will undergo a ten-day training on interview techniques, privacy, confidentiality and the consent procedure. Health personnel will be trained on the collection of biological samples. The PI and investigators have extensive experience administering such trainings in international settings. The trainings will utilize standard materials developed by USAID's MEASURE/DHS Project, which carried out a nationally representative household surveys in DR-Congo in 2007 and 2013.

Remuneration

Respondents will not be paid to participate in the study.

Costs

Apart from the respondents' time, there will be no costs to individuals participating in this research study.

13. Planning, Study Management and Governance

Planning

The evaluation of ASSP Project is being conducted by Tulane University's School of Public Health and Tropical Medicine Operations Research and Impact Evaluation (ORIE) team as part of the research activities of the Department of Global Health Systems and Development. Tulane has established an office in Kinshasa to monitor the implementation of health development activities undertaken with Tulane technical assistance in the DRC. With regard to ASSP evaluation, the Tulane KSPH team is composed of a Senior Research Director and a Research Manger. Tulane's ORIE Team has already accomplished the following activities: (1) signature of subcontract with IMA for conducting ASSP project impact evaluation and implementing operations research; (2) elaboration and submission of impact evaluation baseline study protocol; (3) submission of the Protocol to Tulane's Institutional Review Board; (4) subcontracting of KSPH to conduct a pretest of methodology and instruments; (5) revision of baseline study methodology and instruments based on the findings from the pretest; (6) subcontracting of KSPH for implementing the baseline study.

KSPH has so far accomplished the following activities: (1) submission of the Protocol to KSPH Institutional Review Board; (2) pretesting of study methodology and instruments; (3) reporting of pretest findings to Tulane ORIE Team; (4) translation of study instruments into local languages (Lingala, Swahili and Tshiluba); (5) and an initial training of baseline study data collection supervisors.

KSPH will also be responsible for the following activities as soon as all parties agree to proceed with the study: (1) retraining of supervisors and training of data collectors at four provincial pools (Bwamanda in Equateur province, Kananga in Kasai occidental province, Kindu in Maniema province, and Kisangani in Orientale province); (2) data collection in selected ASSP intervention areas and in comparison areas; (3) data entry and cleaning; (4) descriptive data analysis; (5) presentation of the findings to all stakeholders; and (6) submission of a report to the Principal Investigator. Tulane ORIE team will be responsible to run PCR blood testing for malaria and conduct in-depth data analysis for establishing baseline value for ASSP project outcome and impact indicators.

Table 7. Study timeline

Timeline of completed work:	Organizations responsible:

Feb 2013	Tulane subcontract with IMA	Tulane and IMA
Apr – June 2013	Initial protocol and questionnaires developed	Tulane in consultation with IMA and DFID
June 2013	Protocol and Questionnaires translated into French	Independent translator
14, 15, & 18 June 2013	Workshop with DRC Ministry of Health to review survey tools and protocol	Tulane, IMA and the MOH
24 July 2013	KSPH IRB approval	KSPH
2 Aug 2013	Tulane IRB approval	Tulane
5-9 Aug 2013	Training and pretesting survey instruments in Kasangulu, Bas-Congo	KSPH and Tulane
Sept – Oct 2013	Intervention sample drawn and comparison samples matched	Tulane and KSPH
28 Oct 2013	Subcontract with KSPH signed	KSPH and Tulane
14-20 Oct 2013	Initial supervisors training	KSPH
Nov 2013	Provincial administrators contacted	KSPH
Oct 2013	Questionnaires finalized in French and English	Tulane
15 Oct - Nov 2013	Translation of questionnaires into local languages and local language translation reviewed	Independent translators and reviewed by KSPH
Nov-Dec 2013	Initial submission to DFID's quality assurance board (SEQAS)	Tulane
Expected timeline of fieldwork for evaluation study:		**Organizations responsible:**
Jan 2014	Updated TOR from DFID in consultation with IMA	DFID in consultation with IMA and Tulane
Jan 2014	Quality assurance (SEQAS) process complete	Tulane
Feb 2014	Tulane IRB amendment approved	Tulane
Mar 2014	Approval from DFID in writing start research	DFID
Mar 2014	Retrain primary supervisors	KSPH
Mar-Apr 2014	Recruiting and training of data collectors in 4 provincial sites	KSPH
May 2014	Training report from KSPH due to Tulane	KSPH
Apr-June 2014	Fieldwork: 40 data collection teams in 210 villages in Equateur, Kasai-Occidental, Kasai-Oriental, Province Orientale and Maniema (see Appendix 4 for a detailed fieldwork schedule)	KSPH
July 2014	Data entry to be completed by KSPH	KSPH
Oct 2014	Cleaning, validating and analyzing data	KSPH/Tulane
Oct 2014	Final report from KSPH due	KSPH
Nov 2014	Preliminary report submitted to DIFD	Tulane
Dec 2014 - Jan 2015	Final report and results dissemination activities complete	Tulane
2017	Endline survey	Tulane

Timeline of deliverables: Milestones for baseline study

Deliverable	**Description**	**Organizations responsible**	**Date**
1st draft of surveys	A completed draft of all survey tools	Tulane, in consultation with MOH, IMA, Implementing Partners, KSPH, and DFID	**14 June 2013**
IRB package submission	• IRB required paperwork • Protocol in English and French	KSPH and Tulane	**31 July 2013**

	• Surveys in English and French • Consent forms in English and French		
Pretest report	• Training manuals and curriculum used • Report on training process including any problems encountered • Descriptive report of the pretesting • Suggestions for revision of questionnaires	Tulane	**16 August 2013**
Sampling	• List of *village* with population estimates from IMA's internal assessment • List of *heath areas* with population estimates from MOH • Vaccination coverage data from PEV • Intervention sample drawn • Comparison groups matched	Tulane	**Sept- Oct 2013**
Finalized surveys	• All surveys finalized in English, French and local languages where applicable	Tulane, in consultation with MOH, IMA, Implementing Partners, KSPH, and DFID	**Oct 2013**
SEQAS approval	• Obtain approval for the study protocol and research methodology	Tulane and SEQAS	**Jan 2014**
IRB Amendment submission	• IRB amendment required paperwork • Amended protocol in English and French • Amended surveys in English and French • Amended consent forms in English and French	Tulane and KSPH	**Feb 2014**
Survey training records	• Detailed report of the training workshops in Kinshasa and provincial sites • List of participants, CVs and contact information for all supervisors, lab tech and data collectors	Tulane and KSPH	**Apr 2014**
Training Materials	• Training manuals for supervisors and data collectors including specific details about the research and sampling protocol, fieldwork procedures (including biomarker and anthropometry procedures), roles and responsibilities and instructions for all questionnaires • Training curriculum PowerPoint used for supervisors training and training of data collectors	Tulane and KSPH	**Apr 2014**
Fieldwork report	• Field work records including a final report on each survey component • Details on the number of households, individuals, health facilities and community leader surveys • Information broken down by *sampling area*, province and community • Validation of the counts and quality of paper survey records by the PI at Tulane or their deputy in writing	Tulane and KSPH	**July 2014**
Data	• Double-entered, validated and cleaned datasets for the household, health facility and community leaders surveys • Original entered datasets for each survey • All paper survey records/forms	Tulane and KSPH	**Oct 2014**
Final report	• Final report in French and English that contains a descriptive analysis of the findings	Tulane, in consultation with MOH, IMA, Implementing Partners, KSPH, and DFID	**Oct 2014**

Results dissemination workshop report	• Attendance records, power point presentations for results dissemination workshop	Tulane and KSPH	**Jan 2015**

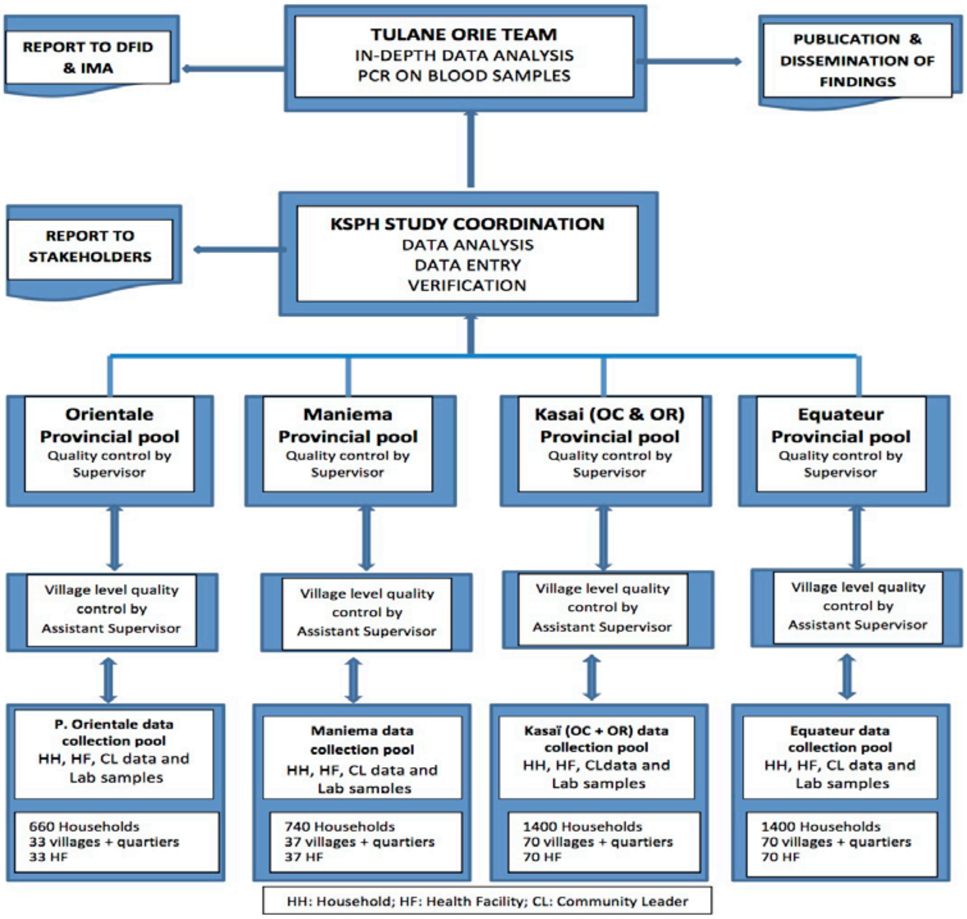
Management

The day-to-day management of the baseline study is ensured at three levels: the Tulane based ORIE team, the Kinshasa based Tulane team and KSPH. The Tulane ORIE team based in New Orleans, led by Professors Jane Bertrand (the Principal Investigator of the ORIE component and responsible for administrative issues), David Hotchkiss (the Technical lead for the ORIE component), and Joe (the PI for the impact evaluation). They are assisted by Ms. Sarah Mattison, a grant specialist who is responsible for the financial management of the study. The ORIE team regularly visits Kinshasa for discussions with DFID, IMA, local Tulane team and KSPH team. Tulane reports on progress of the study to DFID and IMA.

The local Tulane team works closely with DFID, IMA, KSPH, and the Ministry of Health to ensure that relevant aspects of DRC health system are taken into account in the study. The team also participates in all study activities undertaken by KSPH (e.g., pretest of instruments, selection of data collection sites, training of supervisors and data collectors, translation of study instruments into French and local languages). The team plays a key role in the planning of field activities and in the revision of study instruments. It also participates in discussions with DFID on a regular basis. Quality control is ensured both by both the New Orleans-based and Kinshasa-based team. Figures 5 presents the organogram of the ASSP evaluation team and information flow.

Study Co-investigator, Professor Antoinette Tshefu, Director of KSPH (at the University of Kinshasa) is responsible for the management of the subcontract between Tulane and KSPH and for the implementation of the study. She is assisted by Professor Mala Ali Mapatano who heads the study's research team at KSPH. There are four other members in the coordination team (a professor of public health, two graduate students who hold MD/MPH degrees among which is a laboratory specialist, and an administrator/accountant). Several other KSPH graduates are members of data collection supervision team (see Appendix 5 for KSPH organogram).

Figure 5. ASSP evaluation baseline study data and information flow



Governance

The decisions related to study methodology, budget and timing are taken in consultation with DFID and IMA on the basis of proposals made by Tulane ORIE Team. This is achieved through both face-to-face and telephone discussions. Tulane's ORIE team and IMA entertain collaborative relationships facilitated by the physical proximity of their two offices in Kinshasa. However Tulane's ORIE team remains independent from IMA in terms of financial management, staffing, office space, equipment and operations.

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Appendix 1: Components of the minimum package of services and complementary package of services

MPA Curative Activities	MPA Preventive Activities

– Growth monitoring for under-fives – Prenatal and postnatal counseling – PMTCT (ARV and Cotrimoxazole) – FP counseling and services – Immunizations – Infection prevention & blood safety – Distribution of IPTp and LLINs – HIV information – Vitamin A & other micronutrients – HIV/AIDS: PMTCT & blood testing	– Clinic-based IMCI – Testing/treating diseases, including NTDs – TB: Sputum collection/forwarding to CDTs – Nutritional rehabilitation – Minor surgery – Normal labor & delivery services – IPTp for pregnant women – STI syndromic treatment and referrals – S/GBV Post-exposure prophylaxis & counseling – Acute respiratory infection treatment – Other basic curative care
MPA Promotional Activities	**MPA Community Activities**
– Condom use for dual protection – Environmental sanitation – Exclusive breast feeding – Healthy eating & food handling – Iodized salt – Improved latrines – ORT and diarrheal disease control – Fistula awareness and prevention – Vegetable gardens, fish farming, livestock	– Community-based IMCI (c-IMCI) – Food safety and food handling – Potable water improvements,(e.g., spring capping) – Household sanitation, (e.g., improved latrines) – Community water treatment – Disease/Vector control (e.g., LLINs & tsetse control) – Community based IEC – Distribution of FP commodities – S/GBV Community awareness and prevention
Complementary Package of Activities (CPA)	**Management/Administrative Activities**
– Internal medicine, surgery, OB/GYN, and pediatrics – Long acting & permanent contraception methods – Post-abortion care (PAC) – Blood screening, storage & collection – Multi-drug resistant (MDR)TB sputum collection – PMTCT-plus with ARV prophylaxis – TB-HIV co-infection screening and treatment – Rehabilitation and Physiotherapy – Lab Tests: parasites, HIV, TB & Bacterial – Biochemical medical Imaging: Radio/Echography	- Increase availability of essential services - Resource Mgmt (human, material, financial) - Continuous health personnel training - Train/Mentor (community) outreach workers - Links/Referrals from private health providers - Management of health information - Management of pharmaceutical information - Managing resources, applied research

Appendix 2: Sampling

The sample size formula for detecting differences between two proportions obtained from complex sampling designs is presented below (between intervention and control, or between baseline and follow-up survey rounds) (Levy and Lemeshow, 1999). This sample size formula was used instead of the more complex Bennett and Hayes formula for cluster randomized controlled trials because the study design used in this study requires that only proportions obtained from a two-stage cluster sampling design be compared.

$$n = deft\ \frac{\left[Z_{1-\left(\frac{\alpha}{2}\right)}\sqrt{2p(1-p)} + Z_{\beta}\sqrt{p_2(1-p_2)+p_1(1-p_1)}\right]^2}{(p_2-p_1)^2}$$

Where:

deft = design effect

$Z_{1-\left(\frac{\alpha}{2}\right)}$ = Probability of committing a type-1 error

Z_{β} = Statistical power

p_1 = proportion at baseline (compared to follow-up) or group 1 (compared to group 2)

p_2 = proportion at follow-up (compared to baseline) or group 2 (compared to group 1)

$p = \frac{p_1+p_2}{2}$

Table A1: Sample size input parameters

Variable	Input parameter
Deft	2 (ICC = 0.176)
$Z_{1-\left(\frac{\alpha}{2}\right)}$	5%, assuming a 1-sided test (Z score = 1.645)
Z_{β}	80% (Z score = 0.84)
p_1, p_2, p_3	Refer to Table 4 for baseline proportion values and detectable differences (p_2-p_1) for each indicator

*Assumes non-response and loos-to-follow-up = 10%

The following figures indicate the statistical power for increasing levels of detectable differences for various groups of indicators.

Figure A1: Statistical power across detectable differences (absolute % change) across various baseline scenarios for measuring changes in indicators at the household level between intervention and comparison areas (and between pre and post intervention), given a sample size of 2,100 households in each round (700 per sampling area and 700 per comparison group), a probability of committing a type-1 error of 5%, design effect of 2.0, and survey non-response of 10%

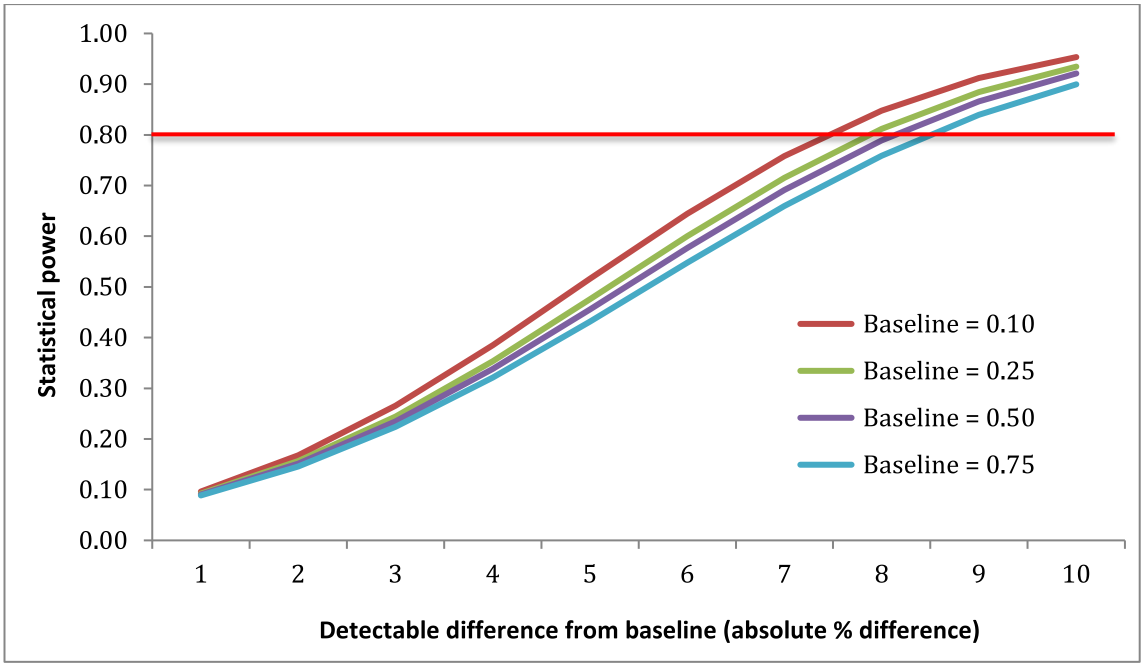


Figure A2: Statistical power across detectable differences (absolute % change) across various baseline scenarios for measuring changes in indicators at the child level between intervention and comparison areas (and between pre and post intervention), given a sample size of 2,100 households in each round (700 per sampling area and 700 per comparison group), a probability of committing a type-1 error of 5%, design effect of 2.0, and survey non-response of 10%

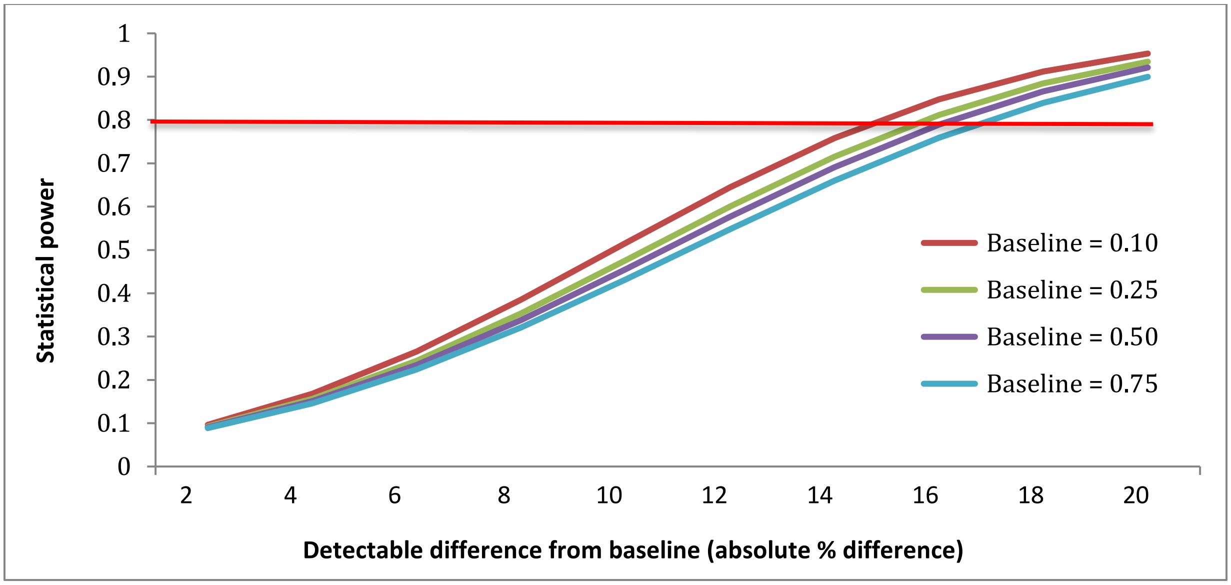
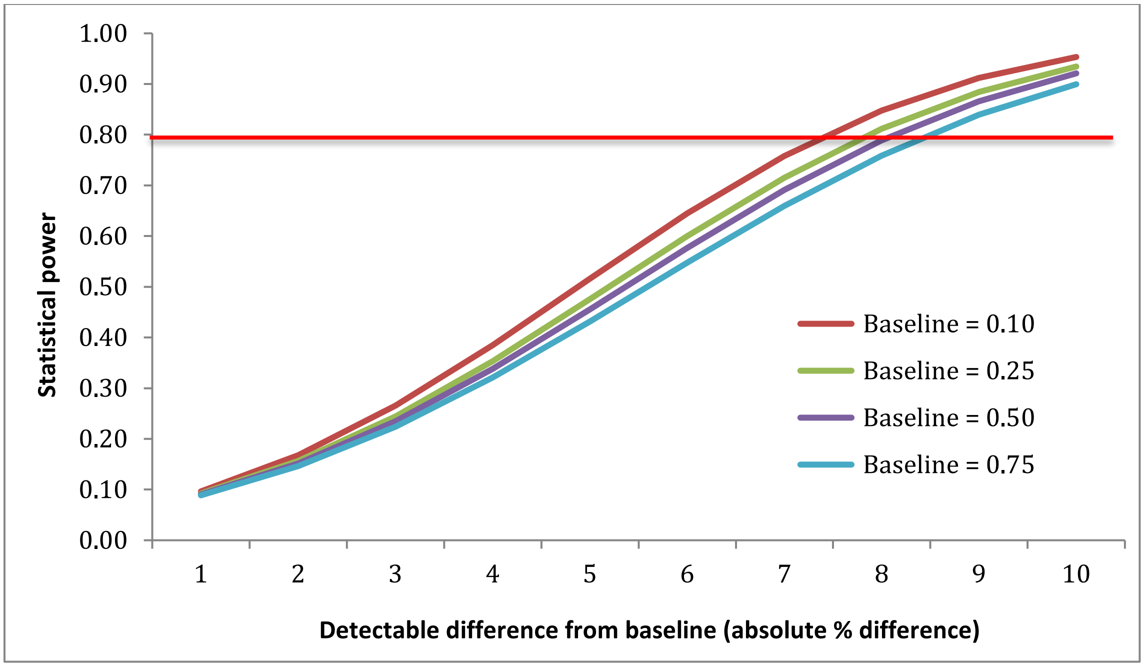


Figure A3: Statistical power across detectable differences (absolute % change) across various baseline scenarios for measuring changes in indicators at level of WRA between intervention and comparison areas (and between pre and post intervention), given a sample size of 2,100 households in each round (700 per sampling area and 700 per comparison group), a probability of committing a type-1 error of 5%, design effect of 2.0, and survey non-response of 10%


1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
Statistical power
1
2
3
4
5
6
7
8
9
10
Detectable difference from baseline (absolute % difference)
Baseline = 0.10
Baseline = 0.25
Baseline = 0.50
Baseline = 0.75

Appendix 3. Indicator Definitions and Linkages to Theory of Change

Indicator	**Percentage of children under 5 with fever in past 2 weeks (**Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of children under 5 whose mothers reported that he/she had a fever at some point in time during the two weeks prior to the survey
Numerator	Number of children ill with a fever at any time during the two weeks preceding the interview
Denominator	Number of living children under five years of age
Link to TOC/Assumption	**TOC:** Improved Child Helath **Assumptions:** Improving the quality of preventative health care, including access to malaria prevention methods, and improving environmental health will reduce the incidence of child fever
Data Source	**Woman's questionnaire, question 529**
Indicator	**Percentage of children under 5 with diarrhea in the past 2 weeks (**Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome--** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of children under 5 whose mothers reported that he/she had diarrhea at some point in time during the two weeks prior to the survey

	Diarrhea is defined as 3 or more loose or watery stools in a 24-hour period.
Numerator	Number of children ill with diarrhea at any time during the two weeks preceding the interview
Denominator	Number of children under five years of age
Link to TOC/Assumption	**TOC:** Improved Environmental Health and Improved Child Helath **Assumptions:** Improving access to clean drinking water and improved environmental health will reduce the incidence of child diarrhea
Data Source	**Woman's questionnaire, question 517**
Indicator	**Percentage of children under 5 with suspected pneumonia in the past 2 weeks (**Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percentage of children under five years of age ill with a cough accompanied by short, rapid breathing and/or with a fever, at any time during the two weeks preceding the interview
Numerator	Number of children under five years of age ill with a cough accompanied by short, rapid breathing and/or with a fever, at any time during the two weeks preceding the interview
Denominator	Number of living children under five years of age
Link to TOC/Assumption	**TOC:** Improved Child Helath

	Assumptions: Improving the quality of preventative health care will reduce the incidence of child suspected pneumonia
Data Source	**Woman's questionnaire, questions 532 and 533**
Indicator	**Percentage of children under 5 underweight (-2 SD) (**Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of children whose weight for age z-score is less than –2.0 standard deviations (SD) below the mean on the NCHS/CDC/WHO international references standard. Weight measurements will be taken using salter scales for children older than 1 month. For children 1 month or younger, standing scales will be used and weight will be calculated by subtracting the weight of the mother alone from the weight of the mother holding the child.
Numerator	Number of children whose weight for age z-score is less than –2.0 standard deviations (SD) below the mean on the NCHS/CDC/WHO international references standard
Denominator	Number of living children between ages 0 and 59 months before the survey
Link to TOC/Assumption	**TOC:** Improved Child Health **Assumptions:** Introducing family gardens and providing nutrition products will reduce the number of children under five who are underweight
Data Source	**Household survey anthropometric measurements, questions 403 and 405**
Indicator	**Percentage of children under 5 stunted (-2 SD) (**Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes

Precise Definition	The percent of children whose height for age z-score is less than -2.0 standard deviations (SD) below the mean on the NCHS/CDC/WHO international references standard. Height measurements will be taken lying down using a height map for children 2 years or younger. For children older than 2 years, height will be measured standing up using a tape measure.
Numerator	Number of children whose height for age z-score is less than -2.0 standard deviations (SD) below the mean on the NCHS/CDC/WHO international references standard
Denominator	Number of living children between ages 0 and 59 months before the survey
Link to TOC/Assumption	**TOC:** Improved Child Health **Assumptions:** Introducing family gardens and providing nutrition products will reduce the number of children under five who are stunted
Data Source	**Household survey anthropometric measurements, questions 403 and 406**
Indicator	**Percentage of children under 5 wasted (-2 SD) (**Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of children whose weight for height z-score is less than -2.0 standard deviations (SD) below the mean on the NCHS/CDC/WHO international references standard. Height measurements will be taken lying down using a height mat for children 2 years or younger. For children older than 2 years, height will be measured standing up using a tape measure.
Numerator	Number of children whose weight for height z-score is less than -2.0 standard deviations (SD) below the mean on the NCHS/CDC/WHO international references standard
Denominator	Number of living children between ages 0 and 59 months before the survey
Link to	**TOC:**

TOC/Assumption	Improved Child Health **Assumptions:** Introducing family gardens and providing nutrition products will reduce the number of children under five who are wasted
Data Source	**Household survey anthropometric measurements, questions 405 and 406**
Indicator	**Percentage of children age 1 to 59 months with Malaria parasite in their blood** (Roll Back Malaria, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The proportion of children age 1 to 59 months with confirmed malaria infection detected by microscopy
Numerator	Number of children age 1 to 59 months with confirmed malaria infection detected by microscopy
Denominator	Number of living children between ages 1 and 59 months tested for malaria
Link to TOC/Assumption	**TOC:** Improved Child Health **Assumptions:** Improving the quality of preventative health care, including access to malaria prevention methods will reduce the incidence of malaria in children under 5
Data Source	**Household survey biomarker collection and PCR analysis**
Indicator	**Percentage of children 1-59 months with anemia** (Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of children age 1 to 59 months with the following levels of hemoglobin in the blood at the time of the survey: Any anemia: hemoglobin count is less than 11 grams per deciliter (g/dl).

	Mild anemia: hemoglobin count is between 10.0 and 10.9 grams per deciliter (g/dl). Moderate anemia: hemoglobin count is between 7.0 and 9.9 grams per deciliter (g/dl). Severe anemia: hemoglobin count is less than 7.0 grams per deciliter (g/dl) . *Children who were not tested and those children whose values were not recorded are excluded from both the denominator and the numerators
Numerator	Any anemia: Number of children whose hemoglobin count is less than 11 grams per deciliter (g/dl). Mild anemia: Number of children whose hemoglobin count is between 10.0 and 10.9 grams per deciliter (g/dl). Moderate anemia: Number of children whose hemoglobin count is between 7.0 and 9.9 grams per deciliter (g/dl). Severe anemia: Number of children whose hemoglobin count is less than 7.0 grams per deciliter (g/dl)
Denominator	Number of living children between ages 1 and 59 months before the survey
Link to TOC/Assumption	**TOC:** Improved Child Health **Assumptions:** Improving the quality of preventative health care, introducing family gardens and providing nutrition products will reduce the number of children under five who are anemic
Data Source	**Household survey biomarker collection, question 412**
Indicator	**Infant mortality rate** (Rutstein, 2006)
Type *(process, outcome, impact)*	**Impact -** Indicators concerned with the long term outcomes such as morbidity and mortality
Precise Definition	The probability of dying between birth and exactly one year of age expressed per 1,000 live births. A live birth is defined as the complete expulsion or extraction from its mother of a product of conception, irrespective of the duration of the pregnancy, which, after such separation, breathes or shows any other evidence of life, such as beating of heart, pulsation of the umbilical cord, or definite movement of voluntary muscles, whether or not the umbilical cord has been cut or the placenta is attached. (WHO, 1950 and 1992)
Numerator	Number of deaths at ages 0 to 11 months (also includes deaths reported as age zero years)

Denominator	Number of surviving children at beginning of specified age range during the specified time period
Link to TOC/Assumption	**TOC:** Improved Child Health **Assumptions:** The totality of ASSP interventions combined will result in a reduction in the infant mortality rate
Data Source	**Woman's survey, questions 211-222**
Indicator	**Percentage of children 12-23 months who received all specified vaccinations at any time before the survey** (Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of children who received BCG, three doses of DPT, three doses of polio (excluding. the dose given shortly after birth), and measles at any point prior tor the survey according to his/her vaccination card or mother's report
Numerator	Number of living children between 12 and 23 months of age at the time of the survey who received the specified vaccine. Where the information is present on a vaccination card shown to the interviewer, the record of the vaccination is used. Where no card was shown to the interview or there was no record of the vaccination, the mother's report of the vaccination is used. For DPT, where not asked of the mother, if the mother reported a polio vaccination given not shortly after birth, then the equivalent dose of DPT is assumed. Care needs to be taken not to confuse the polio vaccine dose given at birth (called polio 0) from the doses given later (polio 1, polio 2, and polio 3).
Denominator	Number of living children between ages 12 and 23 months of age
Link to TOC/Assumption	**TOC:** Improved Child Health **Assumptions:** Improving the quality of preventative health care, including providing appropriate vaccinations to health centers will increase the vaccination coverage rate for children

Data Source and Study	**Woman's survey questions 506 or 510 A-I**
Indicator	**Percentage of women with a birth in the last five years, distributed by number of antenatal care visits** (Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	Percent of woman who have had a birth in the 5 years preceding the survey who received antenatal care during their last birth, according to number of visits
Numerator	Numbers of women who received antenatal care for their last birth in the five years prior to the survey, according to number of visits: 0 visits 1 visit 2 visits 3 visits 4 visits
Denominator	Number of women with a birth in the last five year
Link to TOC/Assumption	**TOC:** Improved reproductive health **Assumptions:** Improving the quality of and access to reproductive health will increase the number of pregnant woman receiving the WHO recommended 4 antenatal care visits
Data Source	**Woman's questionnaire, questions 408 and 413**
Indicator	**Percentage of live births delivered in past 5 years by skilled birth attendant** (Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes

Precise Definition	Percentage of women with a birth in the five years prior to the survey who delivery was attended to by a skilled attendant The category skilled birth attendant includes only medically trained and licensed personnel. Traditional birth attendants (also sometimes called midwives) are not included, whether trained or untrained. The category "Traditional birth attendant/other" includes auxiliary health personnel and cases where the respondent did not know the level of qualification.
Numerator	Number of births in the five years prior to the survey that was attended to by a skilled birth attendant
Denominator	Number of births in the five years prior to the survey
Link to TOC/Assumption	**TOC:** Improved reproductive health **Assumptions:** Improving the quality of and access to reproductive health will increase the number of pregnant woman receiving use trained birth attendants for delivery
Data Source	**Woman's questionnaire, question 434**
Indicator	**Percentage of children under 5 with fever who received antimalarial treatment** (Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	Percentage of children under five years of age ill with a fever, at any time during the two weeks preceding the interview, who took fansidar, chloroquine, or any anti-malarial drug.
Numerator	Number of children under five years of age ill with a fever, at any time during the two weeks preceding the interview, who took fansidar, chloroquine, or any anti-malarial drug
Denominator	Number of children under five years of age who were ill with a fever in the two weeks preceding the interview

Link to TOC/Assumption	**TOC:** Improved Child Health **Assumptions:** Improving the quality of curative health care, including access to anti-malarial drugs will increase the number of children under five with a fever who are treated
Data Source	**Woman's questionnaire, question 543**
Indicator	**Percentage of children under 5 with diarrhea who received either ORS or RHS (**Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percentage of children ill with diarrhea at any time during the two weeks preceding the interview who received oral rehydration salts (ORS) packets, recommended home fluids (RHF), or both Diarrhea is defined as 3 or more loose or watery stools in a 24-hour period.
Numerator	Number of children ill with diarrhea at any time during the two weeks preceding the interview who received oral rehydration salts (ORS) packets, recommended home fluids (RHF), or both
Denominator	Number of children under five years of age who were ill with diarrhea in the two weeks preceding the interview
Link to TOC/Assumption	**TOC:** Improved Child Health **Assumptions:** Improving the quality of curative health care will increase the number of children under five with diarrhea who are treated with ORS or RHS
Data Source	**Woman's questionnaire, question 526**
Indicator	**Percentage of children with suspected pneumonia who received antibiotics** (Rutstein, 2006)

Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percentage of children under five years of age ill with a cough accompanied by short, rapid breathing and/or with a fever, at any time during the two weeks preceding the interview, for whom antibiotics were given
Numerator	Number of children under five years of age ill with a cough accompanied by short, rapid breathing and/or with a fever, at any time during the two weeks preceding the interview, for whom antibiotics were given
Denominator	Number of children under five years of age ill with a cough accompanied by short, rapid breathing and/or with a fever, at any time during the two weeks preceding the interview
Link to TOC/Assumption	**TOC:** Improved Child Health and improved access to services **Assumptions:** Improving the quality and access to curative services will increase the number of children with suspected pneumonia who receive proper treatment.
Data Source	**Woman's questionnaire, question 543**
Indicator	**Percentage of individuals sick or injured in the last four week who sought care, by chronic or acute health problems**
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of individuals who reported being sick or injured in the four weeks prior to the survey who sought care, including care from traditional healers, pharmacists, doctors and nurses in health care facilities To avoid problems of recall bias, questions on outpatient care will be limited to the previous 30 days
Numerator	Number of individuals who reported being sick or injured in the four weeks prior to the survey who sought care, including care from

	traditional healers, pharmacists, doctors and nurses in health care facilities
Denominator	Number of individuals who reported being sick or injured in the four weeks prior to the survey
Link to TOC/Assumption	**TOC:** Improved Access to Services **Assumptions:** Improving the quality of and access to curative health care will increase the number of individuals sick or injured who seek care.
Data Source	**Household survey, question 306**
Indicator	**Percentage of people who were hospitalized in the last six months, by chronic or acute health problems**
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of individuals who spent one or more nights in a health care facility in the six months prior to the survey Since inpatient care is less common and easier to remember, the recall period for inpatient care will be the previous 6 months
Numerator	Number of individuals who reported spending one or more nights in a health care facility in the six months prior to the survey
Denominator	Number of household members
Link to TOC/Assumption	**TOC:** Improved Access to Services **Assumptions:** Improving the quality of and access to preventative and curative health care will both increase the number hospitalized who need services and decrease the number of individuals hospitalized as a result of preventative care
Data Source	**Household survey, question 20**

Indicator	Average out-of-pocket household health expenditures per episode of illness/injury
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The average of all household health expenditures paid in cash per episode of illness or injury Expenditures will include consultation and hospitalization costs, medicine costs, laboratory test costs, and transportation costs.
Numerator	Total household health expenditures paid in cash
Denominator	Number of illnesses or injuries
Link to TOC/Assumption	**TOC:** Improved Access to Services **Assumptions:** Households exposed to health care financing interventions, such as community health endowments, will reduce the average out-of-pocket expense per illness/injury
Data Source	**Household survey, questions 213, 214, 314, 315, 332, 333, 347, 348**
Indicator	**Percentage of households with improved sources of drinking water (**WHO, 2013)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	Drinking water is water used for domestic purposes, drinking, cooking and personal hygiene. Improved drinking water source is a source that, by nature of its construction, adequately protects the water from outside contamination, in particular from fecal matter. Common examples: - Piped household water connection - Public standpipe - Borehole

	- Protected dug well - Protected spring - Rainwater collection. Unimproved drinking water sources include: - Unprotected dug well - Unprotected spring - Surface water (river, dam, lake, pond, stream, canal, irrigation channel) - Vendor-provided water (cart with small tank/drum, tanker truck) - Bottled water (bottled water is considered improved only when the household use another improved source for cooking and personal hygiene) - Tanker truck water
Numerator	Number of households with improved sources of drinking water
Denominator	Number of households
Link to TOC/Assumption	**TOC**: Implementation of "Village Assaini" approach to target areas an improved environmenal health. **Assumption**: By implementing Village Assaini activities which include providing communities with improved drinking water sources, the number of households with access to clean drinking water will increase.
Data Source	**Household survey, question 119**
Indicator	**Percentage of households with improved sanitation facilities** (WHO, 2013)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes

Precise Definition	Improved sanitation includes sanitation facilities that hygienically separate human excreta from human contact. Improved sanitation facilities: such as those with sewer connections, septic system connections, pour-flush latrines, ventilated improved pit latrines and pit latrines with a slab or covered pit Shared sanitation facilities are otherwise-acceptable improved sanitation facilities that are shared between two or more households. Shared facilities include public toilets and are not considered improved. Unimproved sanitation facilities do not ensure a hygienic separation of human excreta from human contact and include: - Pit latrines without slabs or platforms or open pit - Hanging latrines - Bucket latrines - Open defecation in fields, forests, bushes, bodies of water or other open spaces, or disposal of human feces with other forms of solid waste.
Numerator	Number of households with improved sanitation facilities
Denominator	Number of households
Link to TOC/Assumption	**TOC**: Implementation of "Village Assaini" approach to target areas an improved environmental health. **Assumption**: By implementing Village Assaini activities which include building sanitation facilities, the number of households with access to improved sanitation facility will increase
Data Source	**Household survey, question 141**
Indicator	**Percentage of households with hand-washing materials in dwelling/yard/plot** (Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes

Precise Definition	The percent of households with hand-washing materials- water/tap, soap/ash/other cleansing agent, basin or all three - in the dwelling, yard or plot
Numerator	Number of households with hand-washing materials- water/tap, soap/ash/other cleansing agent, basin or all three - in the dwelling, yard or plot
Denominator	Number of households
Link to TOC/Assumption	**TOC**: Implementation of "Village Assaini" approach to target areas an improved environmental health. **Assumption**: By implementing Village Assaini activities which include education on proper hand-washing techniques, the number of households that have proper hand-washing materials in the dwelling/yard/plot will increase.
Data Source	**Household survey, questions 132 and 134**
Indicator	**Percentage of households that are informed about health care services offered in the community**
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of households that report they are informed about the health care services offered in the community
Numerator	Number of households that report they are informed about the health care services offered in the community
Denominator	Number of households
Link to TOC/Assumption	**TOC:** Increased community engagement and participation **Assumptions:** The introduction of community engagement interventions will increase the number of households who are informed about the availability of

	services
Data Source	**Household survey, question 150**
Indicator	**Percentage of households that are satisfied with their involvement in decision making regarding health care**
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of households that report they are satisfied with their involvement in decision making regarding health care
Numerator	Number of households that report they are satisfied with their involvement in decision making regarding health care
Denominator	Number of households
Link to TOC/Assumption	**TOC:** Increased community engagement and participation **Assumptions:** The introduction of community engagement interventions will increase the number of households who are satisfied with their involvement in decision making regarding health care
Data Source	**Household survey, question 151**
Indicator	**Percentage of communities with a health committee (CODESA)**
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes

Precise Definition	The percent of communities where a majority of households report the existence of a health committee, including a CODESA
Numerator	Number of communities where a majority of households report the existence of a health committee, including a CODESA
Denominator	Number of communities
Link to TOC/Assumption	**TOC:** Increased community engagement and participation **Assumptions:** The introduction of community engagement interventions will increase the number of communities with a health committee, including CODESAs
Data Source	**Household survey, question 152**
Indicator	**Percentage of individuals who were sick or injured in the last four weeks who were satisfied with services received**
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of individuals who were sick or injured in the four weeks prior to the survey who sought care from a health care facility who report being satisfied with the services received.
Numerator	Number of individuals who were sick or injured in the four weeks prior to the survey who sought care in a health care facilities who report being satisfied with the services received
Denominator	Number of individuals who were sick or injured in the four weeks prior to the survey who sought care

Link to TOC/Assumption	**TOC:** Improved quality of care **Assumptions:** The introduction of interventions designed to improve quality in health care will increase client satisfaction
Data Source	**Household survey, questions 215-222**
Indicator	**Percentage of individuals who were hospitalized in the last six months who were satisfied with services received**
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of individuals who spent one or more nights in a health care facility in the six months prior to the survey who report being satisfied with the services received.
Numerator	Number of individuals who spent one or more nights in a health care facility in the six months prior to the survey who report being satisfied with the services received
Denominator	Number of individuals who spent one or more nights in a health care facility
Link to TOC/Assumption	**TOC:** Improved quality of care **Assumptions:** The introduction of interventions designed to improve quality in health care will increase client satisfaction
Data Source	**Household survey, questions 316-323, 334-341, 349-356**

Indicator	**Percentage of women age 15-49 currently using any modern method of family planning** (Rutstein, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of woman age 15-49 who are using a modern method of family planning at the time of the survey. Modern methods include: female sterilization (tubal ligation, hysterectomy, voluntary surgical contraception for women), male sterilization (vasectomy, voluntary surgical contraception for men), the contraceptive pill (oral contraceptives), intra-uterine contraceptive device (IUD), injectables (Depo-Provera), implants (Norplant), female condom, male condom (prophylactic, rubber), diaphragm, contraceptive foam and contraceptive jelly, lactational amenorrhea method (LAM), emergency contraception (double dose of contraceptive pill twice in 24 hours for two days and specific dosage “emergency pills,” does NOT include abortion, menstrual regulation), country-specific modern methods and other modern contraceptive methods respondent mentioned (including cervical cap, contraceptive sponge, and others). Traditional methods include periodic abstinence, withdrawal, and any country-specific traditional methods.
Numerator	The number of woman age 15-49 who report using a modern method of family planning at the time of the survey
Denominator	Number of woman age 15-49
Link to TOC/Assumption	**TOC:** Improved Access to Services **Assumptions:** Improving the quality of preventative health care, including access to modern methods of family planning will increase the modern contraceptive utilization rate
Data Source	**Woman’s Questionnaire, question 304**
Indicator	**Contraceptive method mix (percent distribution of users by method)** (Rutstein, 2006)

Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent distribution of contraceptive users by method Modern methods include: female sterilization (tubal ligation, hysterectomy, voluntary surgical contraception for women), male sterilization (vasectomy, voluntary surgical contraception for men), the contraceptive pill (oral contraceptives), intra-uterine contraceptive device (IUD), injectables (Depo-Provera), implants (Norplant), female condom, male condom (prophylactic, rubber), diaphragm, contraceptive foam and contraceptive jelly, lactational amenorrhea method (LAM), emergency contraception (double dose of contraceptive pill twice in 24 hours for two days and specific dosage “emergency pills,” does NOT include abortion, menstrual regulation), country-specific modern methods and other modern contraceptive methods respondent mentioned (including cervical cap, contraceptive sponge, and others). Traditional methods include periodic abstinence, withdrawal, and any country-specific traditional methods.
Numerator	The number of woman age 15-49 who report using a specific family planning method at the time of the survey
Denominator	Number of woman age 15-49
Link to TOC/Assumption	Improved Access to Services **Assumptions:** Improving the quality of preventative health care, including access to modern methods of family planning will increase the modern contraceptive utilization rate
Data Source	**Woman’s Questionnaire, question 304**
Indicator	**Percentage of woman age 15-49 with an unmet need for family planning** (Rutstein, 2006)

Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of woman age 15-49 with an unmet need for family planning Women with unmet need are those who are fecund and sexually active but are not using any method of contraception, and report not wanting any more children or wanting to delay the birth of their next. Fecundity—A woman is assumed to be fecund unless she declares that she is infecund, had a hysterectomy, or is menopausic. Also considered infecund is a woman who is neither pregnant nor postpartum amenorrheic but who has not had a menstruation for six or more months. Also infecund are women who while married and not using contraception during the past five years have not had a birth and are not currently pregnant
Numerator	Number of woman who are not using contraction, are fecund, and desire to either stop childbearing or postpone their next birth for at least two years + pregnant woman whose current pregnancy as unwanted or mistimed + woman in post-partum amenorrhea who are not using contraception and, at the time the became pregnancy had wanted to delay or prevent the pregnancy
Denominator	Number of woman 15-49
Link to TOC/Assumption	**TOC:** Improved Access to Services **Assumptions:** Improving the quality of preventative health care, including access to modern methods of family planning will reduce the unmet need for family planning
Data Source	**Woman's Questionnaire, questions 225, 227, 228, 237, 303, 308, 405, 406, 614, 703, 704, 709**
Indicator	**Percentage of households with ≥1 ITN** (Roll Back Malaria, 2006)

Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of household with one or more insecticide-treated mosquito nets An *insecticide-treated mosquito net*, or bed-net, is a net that has been treated with insecticide within the previous 12 months or has been permanently treated. In permanently treated nets the insecticide lasts for the useful life of the mosquito net, defined as at least 20 washes and at least three years of use under field conditions
Numerator	Number of household with one or more insecticide-treated mosquito nets
Denominator	Number of households
Link to TOC/Assumption	**TOC:** Improved Child and Maternal Health **Assumptions:** Improving the quality of preventative health care, including access to malaria prevention products, will increase the number of household with ITNs.
Data Source	**Household survey, questions 160-164**
Indicator	**Percentage of pregnant women used ITN last night** (Roll Back Malaria, 2006)
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The Percent of pregnant women slept under an insecticide-treated mosquito net the night prior to the survey . An *insecticide-treated mosquito net*, or bed-net, is a net that has been treated with insecticide within the previous 12 months or has been permanently treated. In permanently treated nets the insecticide lasts for the useful life of the mosquito net, defined as at least 20 washes and

	at least three years of use under field conditions
Numerator	Number of pregnant women slept under an insecticide-treated mosquito net the night prior to the survey
Denominator	Number of pregnant women
Link to TOC/Assumption	**TOC:** Improved Maternal Health **Assumptions:** Improving the quality of preventative health care, including access to malaria prevention products, will increase the number of woman sleeping under ITNs.
Data Source	**Household survey, questions 165 and166 and Woman's Questionnaire, questions 225**
Indicator	**Percentage of health centers with adequate equipment**
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of health centers that have adequate equipment Adequate equipment is defined by an index of available and functioning basic equipment.
Numerator	Number of health centers that have adequate equipment
Denominator	Number of health centers
Link to TOC/Assumption	**TOC:** Enhanced service delivery and quality **Assumptions:**

	Health centers supported by ASSP interventions will be stocked with adequate equipment and be better prepared to provide services
Data Source	**Health Facility Survey, questions 117-149**
Indicator	**Percentage of health centers with adequate drug supplies**
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of health centers that have adequate drug supplies Adequate drug supply is defined by an index of available and non-expired basic drugs.
Numerator	Number of health centers that have adequate drug supplies
Denominator	Number of health centers
Link to TOC/Assumption	**TOC:** Enhanced service delivery and quality **Assumptions:** Health centers supported by ASSP interventions will be stocked with adequate drug supplies and be better prepared to provide services
Data Source	**Health Facility Survey, questions 78-116**
Indicator	**Percentage of health centers offering the minimum package of services required to provide preventative services**
Type *(process, outcome,*	**Outcome-** Indicators concerned with the intermediate or long term outcomes

impact)	
Precise Definition	Percent of health centers offering the minimum package of services required to provide preventative services The minimum package of services is defined by the MOH and ASSP.
Numerator	Number of health centers offering the minimum package of services required to provide preventative services
Denominator	Number of health centers
Link to TOC/Assumption	**TOC:** Enhanced service delivery and quality **Assumptions:** Health centers supported by ASSP interventions will be prepared to provide the minimum package of services required for preventative services
Data Source	**Health Facility Survey, questions 9-21, 150-165, 169, 173-182, 195-197**
Indicator	**Percentage of health centers offering the minimum package of services required to provide curative care**
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	Percent of health centers offering the minimum package of services required to provide curative care The minimum package of services is defined by the MOH and ASSP.
Numerator	Number of health centers offering the minimum package of services required to provide curative care.

Denominator	Number of health centers
Link to TOC/Assumption	**TOC:** Enhanced service delivery and quality **Assumptions:** Health centers supported by ASSP interventions will be prepared to provide the minimum package of services required for curative care.
Data Source	**Health Facility Survey, questions 9-21, 150-165, 169, 173-182, 195-197**
Indicator	**Percentage of health workers satisfied with specified aspects of the work environment, including financial and non-financial aspects**
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of health care workers who report they are satisfied with specified aspects of the work environment, including financial and non-financial aspects
Numerator	Number of health care workers who report they are satisfied with specified aspects of the work environment, including financial and non-financial aspects
Denominator	Number of health workers
Link to TOC/Assumption	**TOC:** Enhanced service delivery and quality **Assumptions:** Health workers who work in health centers supported by ASSP interventions will be more satisfied with specified aspects of their work which will in turn improve quality of service
Data Source	**Health Facility Survey, questions 301-322**

Indicator	Percentage of health workers receiving performance-based incentives
Type *(process, outcome, impact)*	**Outcome-** Indicators concerned with the intermediate or long term outcomes
Precise Definition	The percent of health workers receiving performance-based incentives
Numerator	Number of health workers receiving performance-based incentives
Denominator	Number of health workers
Link to TOC/Assumption	**TOC:** Enhanced performance-based incentives **Assumptions:** Promoting incentive based primes and reducing other primes will ensure quality of care
Data Source	**Health Facility Survey, question 505**

Appendix 4. Timeline of fieldwork

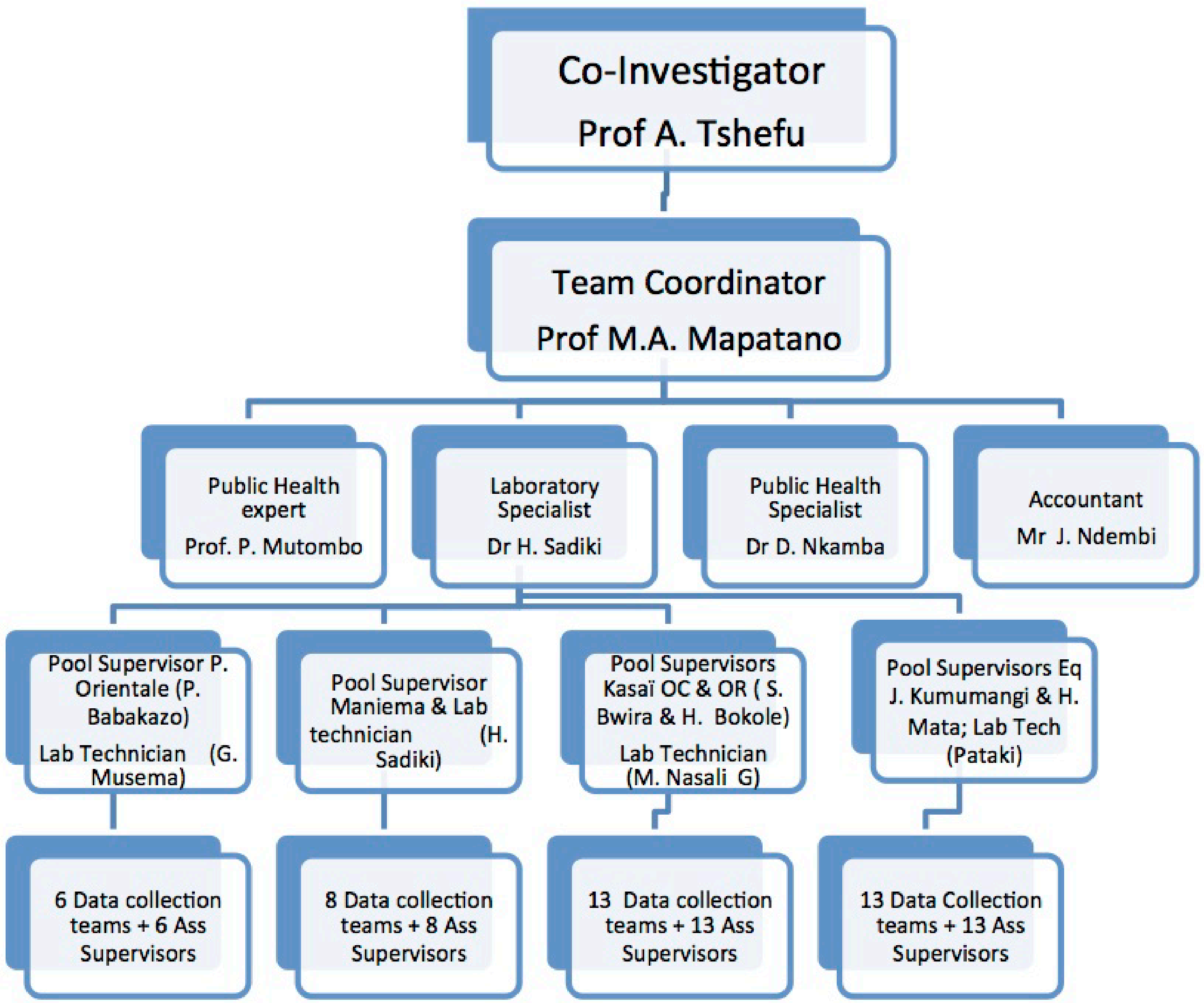
ASSP PROJECT EVALUATION
BASELINE HOUSEHOLD , HEALTH FACILITY AND COMMUNITY LEADERS SURVEY
TIMELINE FOR TRAINING AND DATA COLLECTION IN PROVINCIAL POOLS

PROVICIAL POOL	DATA COLLECTION TEAMS ACTIVITIES	TIME IN WEEKS									
Equateur		1	2	3	4	5	6	7	8	9	10
		Kinshasa staff travel to Gemena									
		Recruting and Training of data collectors	Complete training of data collectors								
	Field work										
	All 13 teams collect data in Gemena and Bwamanda		79 HH, 4HF+10 CL	Travel from Bwamanda to different axis							
	Data collection by teams										
	Teams 1 and 2			41 HH, 2 HF, 4 CL in Bwamanda	36 HH, 2HF, 6 CL Libenge and Mawuya	48 HH, 2 HF, 5 CL in Mawuya and Boto	56 HH, 3HF, and 6 CL in Boto	Return to Gemena			
	Teams 3-4			40 HH, 2 HF and 5 CL in Bulu	48HH, 4 HF and 9 CL in Ndange	56HH in Ndange	36HH in Ndange and return to Gemena				
	Teams 5-6			40 HH in Businga	36 HH, 11HF and 24 CL in Businga and Karawa	56 HH in Karawa	56 HH in Karawa	34 HH, 1HF,3CL in Karawa and Bominenge	Return to Gemena		
	Teams 7 - 8			40 HH, 2HF, 5CL in Bokonzi	56 HH, 3HF, 6CL in Bokonzi	44 HH, 2HF, 5CL in Bokonzi and Bangabola	40 HH, 2HF, 4CL in Bangabola	40 HH, 2HF,6CL in Kungu and Budjala	Return to Gemena		
	Teams 9-10-11			60 HH, 3HF,7CL in Bili	72 HH, 4HF,9CL in Bosobolo	48 HH, 2HF,5CL in Bosobolo and Gbado	64 HH, 3HF,8CL in Mobayi and Loko	36 HH, 2HF,5CL in Loko and Bogosenubea	Return to Gemena		
	Teams 12-13			40 HH, 2HF, 5CL in Yakoma	48 HH, 3HF, 7CL in Yakoma and Wapinda	52 HH, 2HF, 4CL in Wapinda	32 HH, 2HF, 6CL in Wasolo and Abuzi	44 HH, 2HF, 4CL in Abuzi return to Gemena			

Kasai Occidental and Oriental		Kinshasa staff travel to Kananga									
		Recruting and Training of data collectors	Complete training of data collectors								
	Field work										
	All 13 teams collect data in Kananga		78 HH, 4HF+9 CL	Kananga to different axis							
	Data collection by teams										
	Teams 1, 2 and 3			82 HH, 4 HF, 10 CL in Kananga, Katoka, Lukonga	40 HH, 2HF, 5 CL Ndesha and Mikalayi	40 HH, 2 HF, 4 CL in Mikalayi	60 HH, 3HF, and 10 CL in Bunkonde and Lubondayi	40 HH, 2HF+5 CL in Lubondayi and Demba	20 HH, 1 HF, and 2CL in Demba and return to kananga		
	Teams 4-5			40 HH, 2 HF and 5 CL in Tshibala	60HH, 3 HF and 5 CL in Tshibala and Maswika	40HH, 2HF and 5 CL in Maswika and Yangala	40HH, 2HF and 5 CL in Yangala and Luambo	Return to Kananga			
	Team 6			20 HH, 1 HF and 3CL in Kakenge	23 HH, 2HF and 6 CL in Bena Leka and Bena Tshiadi	24 HH, 1HF and 3CL in Bena Tshiadi and Lubunga	13 HH in Lubunga and return to Kananga				
	Teams 7,8 and 9			48 HH, 3HF, 6 CL in Ndjoko, Luebo and Mweka	72 HH, 4HF,10 CL in Mweka and Bulape	60 HH,3HF, 8 CL in Mushenge and and Ilebo	52 HH, 3HF, 5CL in Dekese and Mikope	8 HH in Dekese and Mikope	Return to Kananga		
	Teams 10 and 11			40 HH, 2HF,5CL in Kanzala	48 HH, 3HF,8CL in Kalonda and Tshikapa	52 HH, 2HF,3CL in Tshikapa and Kitangua	26 HH, 2HF,6CL in Nyanga and Banga	34 HH, 2HF,5CL in Banga and Kamonia	40 HH, 2HF,5CL in Mutena and Kamonia	44 HH, 2HF,5CL in Mutena and Kamuesha	16HH,5CL in Kamuesha and return in Kananga
	Teams 12 and 13			32 HH, HF, CL in Tshilenge	56 HH, HF, CL in Tshilenge and Miabi	52 HH, HF, CL in Miabi and Tshishimbi	40 HH, HF, CL in Tshishimbi and Mukumbi	20 HH, HF, CL in Kalenda	40 HH, HF, CL in Kabyea Kamuanga and return in Kananga/Mbuji Mayi		

Province Orientale		Kinshasa staff travel to Kisangani									
		Recruting and Training of data collectors	Complete training of data collectors								
	Field work										
	All 6 teams collect data in Kisangani axe (Lubunga-Kisangani-Mangobo-Yakusu)		140 HH, 7HF+ 18CL + travel from Kisangani to different axes								
	Data collection by teams										
	Teams 1 and 2			120 HH+6HF+14CL in Wanyerukura and Ubundu			Help team 6 collect data in Yahisuli				
	Teams 3			100 HH+5HF+13CL in Bwasende-NiaNia-Mambasa							
	Team 4			100 HH+5HF+12CL in Bengamisa-Banalia							
	Team 5			80 HH+4HF+10CL in Isangi and Banalia							
	Team 6			120 HH+6HF+14CL in Yahisuli and Opala							
Maniema		Kinshasa staff travel to Kindu									
		Recruting and Training of data collectors	Complete training of data collectors								
	Field work										
	All 8 teams collect data in Kindu		100 HH, 5HF+ 15CL + travel from Kindu to different axes								
	Data collection by teams										
	Teams 1 and 2			120 HH+6HF+14CL in Kampene and Kailo							
	Teams 3 and 4			180 HH+9HF+24CL in Kabambare-Lusangi-Kasongo-Kunda-Kibombo-							
	Teams 5 and 6			180 HH+9HF+21CL in Alunguli-Pangi-Kalima							
	Teams 7 and 8			160 HH+8HF+20CL in Lubutu-Obokote-Punia-Ferekeni							

Appendix 5. KSPH Coordination Organogram



Operational Research and Impact Evaluation (ORIE) component of ASSP
Terms of Reference – 12th Feb 2014

Contents

DFID has contracted IMA World Health to be the consortium lead/lead supplier of the ASSP project in DRC. IMA have subcontracted Tulane University to deliver the ORIE component of the project.

The ASSP project inception phase began in late 2012. It was intended that the consortium lead would be responsible for developing and agreeing ToRs with subcontracted partners at the time of signing their sub-contracts. DFID provided some basic guidance in terms of minimum specifications for sub-contracts of the ASSP project in Annex 1 of the overall ASSP ToRs. However, IMA contracted Tulane in the absence of ToRs. Therefore, in December 2013 DFID drafted the following ToRs on behalf of IMA and they were agreed in January 2014. These now replace the technical sub-contract specifications (as outlined in Annex 1 of the Terms of Reference for the Consortium Lead of ASSP).

The ToRs reflect the current programme requirements and adjustments that have been made since the ASSP project started in 2012. These ToRs follow the DFID SEQAS template for evaluation ToRs rather than the DFID PRG format (which the ASSP ToRs use).

This document only outlines technical rather than financial/other requirements. Other requirements such as financial reporting, management of assets and liability etc are outlined in the contract between IMA and Tulane University.

1.0 Introduction

DFID and SIDA are providing £185 million over five years (2012-2017) to strengthen basic health service provision in the Democratic Republic of Congo (DRC) in order to improve reproductive, maternal, neonatal and child health. The ASSP (Accès aux Soins de Santé Primaires) programme is implemented by IMA World Health for DFID and focuses on supporting basic service provision (through government and faith based facilities across 56 health zones) and wider health systems strengthening work nationally.

ASSP is an ambitious project with considerable investment. DFID is committed to ensuring that impact is evaluated and that lessons are learnt that can be fed back both into the project and disseminated more widely. In recognition of this, within the overall ASSP budget, DFID has allocated £4.7m for an Operations Research and Impact Evaluation sub-component. This subcomponent is implemented by Tulane University as a sub-contract to IMA.

The ASSP consortium was selected in July 2012 and a design-phase contract awarded to IMA in October 2012. After a procedural delay, implementation began in April 2013. Support was limited to 20 pre-existing project health zones for the first quarter and then expanded to 56 zones from July 2013. In January 2013, Tulane completed an Evaluability Assessment for ASSP.

These ToRs were drafted in December 2013 (14 months after the inception phase started) and therefore reflect some of the discussion and work that has already been done within the project. DFID has taken an active role in drafting these ToRs since it recognises that since this is a specialised function that it was not an appropriate expectation for IMA to have developed these without appropriate technical support.

2.0 Purpose and Objectives of the ORIE component

2.1 Purpose

The purpose of ASSP's operational research is to improve programme outcomes and performance, to assess the feasibility and cost effectiveness of specific programme components in the DRC and, when necessary, to advocate for policy or programme change.

2.2 Objectives

The objectives of the evaluation and operational research component are as follows:

A. Provide a baseline and end line assessment of health status and health service status.

B. Evaluate of the overall impact of the ASSP Project , for example, on health behaviours, service utilization, and health outcomes.

C. Conduct a mid-point process evaluation to provide information to strengthen the management of the ASSP project.

D. Conduct a series of operations research studies that focus on specific interventions within the ASSP programme to provide information for DFID and implementing partners on what works in supporting health service delivery and health systems strengthening in the DRC.

E. Participate in implementing the monitoring plan by tracking and monitoring indicators requiring surveys in the log-frame that will be measured with data from baseline and follow up household and health care facility surveys.

F. Disseminate evaluation and operational research findings to ASSP implementing partners, DFID and the Government of DRC/other donors to inform programme implementation decisions, demonstrate programme impact (both positive and unintended negative effects) and to share good practice and lessons learnt.

2.3 Theory of Change

See annex (ii)

2.4 Research questions to be answered

Evaluation studies

(i) Baseline assessment

The baseline assessment should be able to collect baseline data in order to answer the endpoint impact evaluation questions outlined in section 2.4.iii below. It should also be able to produce a stand-alone report summarising key health status information and health service information for the populations/areas assessed.

(ii) Midpoint process evaluation

The midpoint evaluation should be able to produce key information to inform the on-going management of the ASSP project including questions such as;

a) Is the ASSP project being implemented according to the plan and is it likely to reach the targets in the logframe?
b) Can the results reported to date be verified? Provide independent verification of reported results from the project through spot checks and third party verification at health facilities and in communities.
c) What are the main barriers to ASSP reaching its potential and what solutions are proposed for the second half of the project?

(iii) Endpoint impact evaluation

The evaluation should assess the overall impact of the ASSP (*Accès aux Soins de Santé Primaires*) project on health outcomes, health care utilization, out-of-pocket expenditures, and exposure to and use of health interventions. This question is concerned with the core package of services provided by ASSP; it is not focusing on the programme in conjunction with other interventions such as WASH. The specific research questions are the following:

- What is the impact of the ASSP project on neonatal and child health outcomes (child nutritional status, anemia, fever during the past two weeks, diarrhea during the past two weeks, infant mortality)?
- What is the impact of the ASSP project on specified types of health care utilization (maternal health services, including antenatal, delivery care, and postnatal services; immunization; outpatient treatment for both children and adults; inpatient services for both children and adults)?
- What is the impact of the ASSP project on household out-of-pocket health care expenditure?
- What is the impact of the ASSP project on family planning (utilization of modern contraceptive methods, unmet need for family planning)?
- What is the impact of the ASSP project on community level environmental health (access to improved sources of drinking water and sanitation facilities)?
- What is the impact of ASSP on factors related to the quality of care (health facility service readiness, client satisfaction, health worker motivation)?

NB: In the longer term, DFID is interested to know whether the ASSP program was sustainable and did it remain as effective? In order to assess this research would need to be carried out after the package of support from ASSP has ended. Currently the contract of Tulane ends at the same time as the end of the ASSP project. DFID may therefore commission a further study on sustainability either as a cost-extension of the subcontract, a stand-alone contract to Tulane or commission this to another supplier.

Operations Research studies

DFID and Tulane University[1] have agreed that operations research will be conducted to answer questions related to interventions relevant to ASSP.

Tulane should conduct a minimum of six operations research studies. The exact study titles and study questions should be developed by Tulane and approved by DFID in a concept note for each one before proceeding to the next stage.

	Study name	**Examples of types of questions/issues**
OR1	User Fees study	Examination of elasticity of demand and utilisation in relation to different levels of user fees. Private facilities supported by ASSP are charging higher fees and there is some geographical variation in tariffs which provide natural experiments.
OR2	Community Health endowment study	Do community agriculture schemes enable clinics to lower user fees and are they a sustainable way of financing health care in the absence of reliable public financing?
OR3	Health worker salaries/incentives study	Examination of impact of incentives/salaries/financial and non-financial motivation on utilisation and delivery of health services.
OR4	Value for money study	What is the most cost effective amount per capita for donors to spend on appui global? This study could

[1] Email from DFID to Tulane '13-12-12 meeting note - second meeting on OR topics', 13 December 2013

		compare results from other donors and/or compare results between health zones within ASSP if there is any variation in cost per capita between health zones. What is the value for money of the overall ASSP programme in terms of cost per DALYs averted? This was modelled at the business case stage and DFID committed to review this during the life of the project. How do effects and costs vary with different combinations of interventions; for example are the services provided under the ASSP programme coupled with WASH or the Community Health Endowment programme more cost effective even when taking the additional expenditures into account?
OR5	Family planning study	To include a situation analysis and tracking of SNIS (National Health Management Information System) data on progress in zones. Possible question - Is it possible to increase contraception uptake amongst adolescents through mainstream health care provision in rural DRC?
OR6	WASH study	Which approach to WASH is most cost-effective within a health programme? Village Assaini or hybrid model?
OR7	Governance, Accountability and Community Engagement study	How do people judge the quality of health care on offer by the health service? What criteria do they use for making this judgment? How can community opinions be incorporated into decisions to improve both the quality and the range of services on offer?

2.5 Gender issues to be addressed in the research

Improving the lives of women and girls in the DRC is a priority for DFID. The ASSP project has an overall gender strategy which fits into the wider Action Plan for Women and Girls for DFID DRC. For the ORIE component, it is vital therefore that particular attention is paid to d<u>esigning research, disaggregating information and conducting appropriate analysis</u> to provide information on impact on these groups. In particular, the evaluation should be designed so that issue of equity and access to health services can be evaluated by gender. For instance the evaluation should compare women and adolescent girls' utilisation rates to those of men for services which aim to benefit men, women and girls (which would not include antenatal/maternity services).

2.6 Target audience/s

The main audience for the research produced will be DFID DRC and IMA to inform current and future programming. More widely this research may be of interest to the Government of DR Congo and other development partners including other donors and implementing NGOs.

3.0 Recipient

The recipients of the Evaluation and Operational Research services are IMA on behalf of DFID DRC.

4.0 Scope and implementation requirements

4.1 Areas the research needs to address

In total it is expected that the ORIE contract will deliver an evaluability assessment[2] plus ten research studies as listed in the table below.

List of ten studies

	Study name
E1	Baseline assessment
E2	Midpoint process evaluation
E3	Endpoint impact evaluation
OR1	User Fees study
OR2	Community Health endowment study
OR3	Health worker salaries/incentives study
OR4	Value for money study
OR5	Family planning study
OR6	WASH study
OR7	Governance, Accountability and Community Engagement study

The evaluations should refer specifically to the effectiveness and sustainability of the intervention in addressing financial and non-financial barriers to healthcare access for the poorest, to addressing issues of exclusion for vulnerable groups, including women and girls, and to the particular impact of the intervention upon these groups.

Tulane may conduct some of the OR research in two or more phases if needed. For example, for the topic "user fees," one study phase could investigate the responsiveness of households to changes in user fees based on data from the baseline survey, and a second study phase could investigate (a) whether the ASSP health financing interventions are leading to the anticipated changes to user fees and (b) whether these changes are having an impact on health care utilization, based on data from baseline and one or more follow up surveys.

The evaluations should also identify any unintended outcomes of the intervention.

4.2 Methodology

Evaluation studies

[2] The evaluability study was completed in 2013.

In answering the overall evaluation questions listed above, the impact evaluation should investigate whether observed changes in health service use, quality and affordability would not have happened in the absence of the intervention and to quantify the magnitude of that effect. A quasi-experimental design, comparing groups, coupled with appropriate data analysis strategies, is expected to be the best means of assessing the plausible attribution of ASSP support on outcome and impact indicators.

The Evaluability Assessment and then the Impact Evaluation Study Protocol should examine then explain the strengths and weaknesses of options, and recommend the strongest feasible study design.

The sample frame should cover all the health zones in the ASSP programme with the exception of the four zones in South Kivu which were removed from the evaluation due to budget constraints early on.

Sample attrition and population turn over should be monitored closely. The sample size should be large enough to investigate the research questions with a sufficient degree of power.

For the evaluation study of the impact of the overall ASSP project, the sampling strategy does not allow for the data to be representative at the health zone level. As such, DFID is aware that it will not be possible to test for the differential impact of the project interventions by health zone.

It is important to ensure that treatment and comparison groups are statistically matched. The Evaluation Study protocol should clearly set out the aspects that will be considered for this matching, and the data that will be used to determine it. Statistical techniques such as propensity score matching may also be used to match the groups on relevant variables.

It is expected that at least three surveys will be conducted over a five year period, which will include a baseline, a mid-term review, and an endpoint study.

DFID and Tulane University agreed that evaluation studies may have different stages with different foci as follows:

E1	Baseline impact evaluation	Baseline assessment of health status and health services
E2	Midpoint evaluation	A process evaluation to provide information to improve management of the ASSP project mid way.
E3	Endpoint impact evaluation	Assessment of impact of ASSP project

The Evaluation Study Protocol should outline how the three surveys will be co-ordinated with the roll-out of the programme, and how frequently each of the proposed indicators should be measured. NB: Only two *household* surveys will be conducted – one at baseline and one at the end of the project. As such, the household-level indicators will only be measured twice.

<u>Operational research studies</u>

For the operational research questions is envisaged that qualitative methods will be used in addition to quantitative methods. This should include case studies and semi structured interviews (which should be used to verify facility records), focus group discussion (FGDs) and, where appropriate, observation methods. The final mix of methods will be decided based on the concept notes and discussion between DFID and Tulane for each operational research question.

Separate concept notes will be provided by Tulane to DFID to consider the appropriate methodology to address each OR question below. Some questions may use only qualitative, only quantitative, or a mixed approach with varying degrees of quantitative and qualitative methods.

In addition, Tulane University should consider how best to address the following issues in the evaluation and operational research designs they propose. Issues may include;

i. How best to ensure a participatory approach is taken to the design and implementation of the studies once research topics have been established. Tulane should comment on how they will ensure that this approach incorporates women and excluded groups.

ii. How best to separate out real changes in service provision and usage from improved measurement of changes/data ascertainment (possibly arising from activities relating to improving the SNIS health information systems).

iii. How to control for contagion between outputs of the intervention. For example, implementation of the ASSP programme in one health zone may attract residents of contingent health zones that are being used in the studies as controls thereby treating some members of the 'no treatment' population. Similarly, compelling behaviour change communications messaging may well be shared beyond the ASSP health zones.

iv. How to assess the merits of alternative explanations for the outcomes that are observed, other than the expected influence of the DFID funded intervention. It should take account of the outcomes and impacts of other health, infrastructure and WASH, and empowerment and accountability interventions in the ASSP health zones.

v. How best to distinguish between "theory failure" and "implementation failure". The project may have failed because of faulty beliefs about causal linkages in the design document, but still have been implemented competently. Or the basic design idea may have been sound, but implementation difficult in practice. These differences have implications for relevant policy advocacy efforts.

Separate concept notes will be provided by Tulane to DFID to consider the appropriate methodology to address each OR question below. Some questions may use only qualitative, only quantitative, or a mixed approach with varying degrees of quantitative and qualitative methods.

4.3 Governance arrangements

<u>Role of IMA versus DFID</u>

Both DFID and IMA will be closely involved in reviewing progress on delivering the evaluation and operational research plan. The ORIE component is contracted by IMA who is responsible for the oversight and performance management of Tulane University. As the project has progressed it has become apparent that managing a large research contract is quite specialised and that the performance management of Tulane University needs to be strengthened. Therefore DFID has recently provided additional oversight and management of the contract, over and above that provided by IMA. DFID expects that it will need to continue to provide detailed direction and close monitoring of the contract. This does not replace the role of IMA in the day to day management of the sub-contract. We currently see no benefit in reversing out the sub-contract and contracting directly to DFID as long as IMA remain in agreement that DFID play an active role in oversight.

Later sections in the document outline reporting arrangements to both DFID and IMA to reflect this dual accountability arrangement. See also section on DFID coordination.

ASSP ORIE Oversight Committee

The evaluation and operational research will be guided by an ASSP ORIE Oversight Committee consisting of IMA, Tulane University, DFID and two evaluation and research experts who are not directly involved in the ASSP programme. DFID will propose members of the panel, recruit them and draft the terms of reference for the panel by the 1st of March 2014.

This panel will guide the strategic direction of the independent evaluation and operational research, reviewing and commenting on key reports and outputs. See sections on approvals and quality assurance for clarification on which stages the committee is responsible for approving and quality assuring. The committee may make recommendations to DFID and IMA rather than having any direct management responsibility or control over the contract.

Tulane has responsibility for secretariat function (convening and minuting meetings etc). Tulane should convene panel members (virtually) for first time by end of March 2014. Meeting costs should be met by Tulane using project funds.

Other institutional oversight/regulation

Tulane University should respect the ethics and research regulation requirements of their own institution and those within DRC.

4.4 Limitations likely to impact on the scope

DRC is a challenging context to work in and there are likely to be operational limitations resulting from security, political and logistical constraints. Tulane is expected to take reasonable steps to ensure that the research can be modified appropriately according to the situation. See also any sections on force majeur within the contract with IMA in terms of impact on expectation on delivering the contracted research.

4.5 Resources available

Tulane University is responsible for providing in-country transport, translation, logistical support and office space.

4.6 Ethics

All studies must be designed and implemented in accordance with DFID Ethics Principles for Research and Evaluation.

Tulane University should document out how they will ensure the study is ethically sound and with which relevant ethical protocols it will comply.

Tulane University is expected to fulfil all academic institution/university with ethical standards requirements and document successful IRB reviews.

4.7 Evaluation code of conduct

Tulane University is expected to design and implement studies in accordance to DFID Evaluation Policy and core principles of independence, transparency, quality, utility and ethics[3].

4.8 Fieldwork

Tulane University is responsible for deciding scope, planning and implementation of all fieldwork. Tulane will need to liaise closely with IMA and other implementing partners on logistics and project implementation plans.

4.9 Inception, work-planning and review meetings

The official inception phase has now been completed. Going forward it is expected that Tulane University and IMA will liaise closely on a daily/weekly basis to ensure that implementation and research plans correspond. DFID welcomes regular meetings with Tulane and/or IMA to discuss research plans in addition to the more formal arrangements outlined in the section on reporting.

4.10 Commenting and quality assurance of study outputs (including timescales)

See section 5.3

5.0 Requirements

5.1 Outputs/ deliverables

[3] DFID (2013), DFID Evaluation Policy 2013 https://www.gov.uk/government/publications/dfid-evaluation-policy-2013, pp6-7.

The following deliverables are expected;

Output/Deliverable
1) Evaluability Assessment
2) ORIE plan
For each of the ten studies;
A. Concept Note (operational research studies only)
B. Study Protocol with research instruments and proposed dissemination strategy
C. Preliminary report including dissemination strategy
D. Final report

Tulane are expected to have had at least one study accepted for publication in a peer reviewed journal by the end of December 2017.

<u>Requirements and specifications of key deliverables</u>

All reports should be provided in English and in electronic format compatible with MS Word or Excel.

Any data sets that are shared should be clean, clearly documented and in an accessible format. As much as possible data should be disaggregated in particular by gender, age and disability.

<u>ORIE Plan</u>

A stand-alone document summarising the overall research plan providing the following information for each of the ten pieces of research (i.e. baseline, midpoint and endpoint evaluations and the seven operations research studies);

i. approximate budget
ii. timeline
iii. lead researcher
iv. 2-3 key questions that the study will address

<u>Concept Note</u>

A stand-alone document as outlined in annex (iv).

<u>Study Protocol</u>

This is a stand-alone document and should comprehensively meet the requirements as outlined in the DFID SEQAS criteria document. This should include a summary of international literature already in existence of relevance.

<u>Final Report</u>

This is a stand-alone document and should comprehensively meet the Quality Assurance requirements as outlined by DFID's M&E Adviser. This should include a summary of international literature already in existence of relevance.

5.2 Personnel and team requirements

The evaluation and operational research must be carried out by qualified evaluators and public health researchers with a recognised reputation for work at an international standard and practical experience of rigorous impact evaluation and health systems research. This includes but is not limited to:

- Experience of designing and implementing household level surveys with associated knowledge of sampling design and data analysis.
- Expertise in the successful application of a purposeful mix of in-depth qualitative and quantitative methods in research and evaluation including the use of participatory research methods.
- The analytical capacity to draw implications from evaluation findings, developing evidence-based recommendations for policy and programming approaches.

The evaluation and operational research must reflect the local context so the capacity to operate in the DRC operational environment is necessary.

It is expected that at least one member of the team have specific qualifications or credentials in public health systems strengthening with solid experience in impoverished, fragile state and post-conflict poor rural environments such as in the DRC.

It is expected that the team put forward will comprise a small core team of international and national evaluators with plans for a survey team and support researchers. It is also expected that where possible there will be an appropriate gender balance in the evaluation team.

<u>Project/Research Manager</u>

There should be a designated project/research manager who will be expected to be responsible for:

- Co-ordinating and monitoring the performance of the various activities of the evaluation and operational research, taking action to strengthen any weak elements of the programme and reinforce strong ones
- Ensuring that the work plan and budget are being followed and that deliverables are ready for approval on time and on budget.
- Liaising between different components of the project, particularly about strategic and directional issues, and trouble-shooting when required
- Reporting and liaising with IMA and DFID

5.3 Routine reporting requirements

Tulane should;

1) Provide <u>a narrative report</u> to IMA quarterly. This should be provided within 30 days of the end of the quarter and follow a format agreed with IMA.

IMA is required to include the following information as an annex to the main ASSP narrative report to DFID;

   a. Narrative overview
   b. The improvement plan agreed in December 2013 with updated progress to date until all actions have been completed.
   c. A table outlining where each study has reached in terms of stage/milestones
   d. A table outlining for each study current problems/exceptions and what steps are being taken to solve these.
   e. A table outlining recommendations from last ORIE oversight committee meeting and progress achieving them plus date of next meeting.

2) Provide a quarterly presentation to DFID in the month after the quarterly report has been submitted by IMA.

3) Arrange a monthly meeting with DFID Evaluation Advisor

4) Tulane should also participate in Annual Reviews conducted by DFID.

5) Tulane's work plan and budget should be kept up to date (showing timelines and sub-budgets for each study) and shared with IMA and DFID when requested.

6.0 Constraints and dependencies

6.1 Coordination with programme implementation

Tulane will need to liaise closely with IMA to ensure that they have a clear in depth understanding of the ASSP programme in terms of what and how it is trying to achieve. IMA should provide detailed summary information outlining which intervention will be delivered at what time in which health zones to inform study design and study implementation planning. Lack of information about programme implementation and operational planning could inhibit effective evaluation and research designs and study implementation.

Tulane should ensure that learning is shared within the project as early as possible to inform implementation. The collaboration between Tulane University, IMA and other component sub-contractors should enhance the coordination and relevance of the research and evaluation activities with the programme implementation, is expected to enhance iterative learning within the project.

6.2 Independent evaluation and academic impartiality

Since the operational research and evaluation work is contracted as a sub-contract to the consortium lead, this will mean that it will be unable to provide a completely independent evaluation of the project overall.

Tulane's University should ensure that academic impartiality is maintained throughout the project and document steps it is taking to ensure this in the ORIE plan.

It is expected that the team will aim to publish the evaluations in peer-reviewed journals so that the research is reviewed and critiqued by experts in the field that are independent of the consortium and the evaluation team itself.

If Tulane feels that their independence is coming under pressure then they should raise concerns with either the oversight committee or with DFID. DFID is committed to publishing evidence of failure and what doesn't work as well as success.

The evaluation provider is expected to undertake the evaluation as independently as possible, recruiting its own staff for survey design, data collection and analysis, and report production. It will be expected that Tulane will be retained throughout the project period, depending upon satisfactory completion of deliverables, to ensure consistency of survey execution and to build on historical knowledge.

6.3 Handling and analysis of data

Data must be managed professionally and its analysis must be conducted to a high standard using widely recognised and appropriate methods. Tulane should ensure high standards in terms of confidentiality and security in term of handling/storing data.

- Where data generated internally by the ASSP project are used, independent verification may be required to be undertaken by Tulane, if necessary, on a sampling basis. This should be done as part of the mid-term process evaluation and as part of specific operations research studies when appropriate.

- The independent quality assurance arranged by DFID will approve the scale of surveys and the degree of sampling required, but methodologies must comply with generally accepted best practice. The QA arranged by DFID will also review all survey instruments before they are sent to the field.

- All findings, datasets, analytical frameworks and methods for the evaluation and operational research must be published per DFID Evaluation and Research policies and made available to allow researchers to replicate findings. Publication in peer reviewed journals should be an objective. Findings of the studies should be published in standalone reports and through peer reviewed journals where possible.

- Participation will be expected in various fora, including international and national conferences, particularly in later years as evidence is emerging. This will require high calibre expertise in presenting and debating findings. Tulane should seek approval from DFID before publishing any papers.

7.0 Other implementation Requirements

Approvals

Tulane are required to seek approval from DFID for the following before moving to the next step;

i. Approval of the OR topic(s)
ii. Approval of the Concept Note
iii. Approval CV of lead researcher for each study
iv. Approval of the Study Protocol, following a QA process
v. Approval of Preliminary Report and Dissemination Strategy
vi. Approval of Final Report

Each of these approvals will be followed by an authorisation in writing from DFID to proceed with the next steps of the research process.

Tulane is not required to request DFID approval for the submission of manuscripts to peer-reviewed journals. However, Tulane should provide DFID staff the opportunity to review draft manuscripts and would welcome their comments and suggestions for improving the drafts.

8.0 Timeframe

The timeframe for the contract is outlined in the contract signed between IMA and Tulane. The ASSP contract itself is a five year contract which commenced in April 2013. There is a break point in the contract at the end of the spending period (see IMA contract for wording).

Timeframes for Deliverables

Output/Deliverable	**Deadlines**
Evaluability Assessment	Completed
ORIE plan	By end February 2014
For evaluation studies i.e. E1 and E3:	
Study Protocol with research instruments	Feb 2014
Preliminary report including dissemination strategy	November 2014 for baseline and October 2017 for endline
Final report	December 2014 for baseline and November 2017 for endline
Tentative timeline of deliverables for OR studies:	
Concept Note	August 2014
Last study Protocol with research instruments	January 2015
Last preliminary report including dissemination strategy	July 2015
Last final report	September 2015

Timeline for all OR studies

Each concept note should include this timeline, however exact timetables or dates will be reflective of the type of data being collecting, the magnitude and scope of the study, and the type of analysis that will be conducted.

Milestone and deliverables	**Date**	**Process and timetable**
Topic agreed by DFID	Dec-13	
CV of lead researcher		Submit as soon as Tulane identifies an appropriate candidate or with to be submitted with the concept note *at the latest.*
Discussion with DFID and IMA on research questions to be completed		Minimum two weeks before submission of concept note. This will take place during the standing biweekly ASSP ORIE meetings with DFID, Tulane and IMA
Concept note approved by DFID		2 weeks after submission. At least 4 months before data collection is scheduled, or by August 2014 at the latest.
Protocol and instruments completed		3 months after concept note approved or at least 3 months before data collection is scheduled.
Protocol has passed QA		10 days after submission (this is SEQAS but can DFID DRC commit to this timeframe?)
Tulane and local IRB approval		1 month after passing QA Both IRB approvals will be sought simultaneously as Tulane IRB approval is contingent on local IRB approval
Approval in writing from DFID to start research implementation		Immediately after QA and IRB approval is granted
Field workers trained		TBD based on timing and scale of OR
Training report		1 month after training. Will be completed by local implementing agency and distributed to DFID and IMA.
Fieldwork complete		TBD based on timing and scale of OR
Field brief		6 weeks after completion of fieldwork. Includes: • Field work records including a final

		report on each survey component • Details on the sample size obtained • Preliminary findings, broken down by sampling domain • Validation of the counts and quality of paper survey records by the PI at Tulane or their deputy in writing
Analysis of data complete		4 months after fieldwork
Preliminary report		4 months after fieldwork
Preliminary report including dissemination strategy approved by DFID (following QA)		1 month after submission
Final report submitted to DFID		5 months after completion of data collection
Final report approved by DFID		1 month after submission of final report
Dissemination activities complete		1 month after final report approved

Tentative start dates for OR studies:

OR study in order of priority	**Tentative start date**
Community Health endowment study	April 2014
User Fees study	April 2014
WASH study	August 2014
Health worker salaries/incentives study	January 2015
Family planning study	January 2015
Cost per capita level of investment study	January 2015
To be decided	March 2015

Note: Start dates for operations research studies on WASH, health worker salaries/incentives, family planning, level of investment, and the “topic to be decided” are tentative and will be revised as needed during the development of each concept note. All concept notes are due August 2014.

Indicative timeframes for milestones Tulane should complete the milestone table below by the end of August 2014.

	Milestone	Baseline	Midline	Endline	OR1	OR2	OR3	OR4	OR5	OR6	OR7
1	Study topic agreed by DFID (with input from IMA)	Oct-13	Dec-13	Oct-13	Feb-14	Feb-14	Feb-14	Feb-14	Feb-14	Feb-14	Jan-15
2	CV of lead researcher agreed by DFID	Oct-13		Oct-13							
3	Discussions with DFID, gov and other stakeholders on research questions for the study completed	Oct-13		Oct-13		Dec-13			Jan-13		
4	OR Concept Note approved by DFID	NA	NA	NA							
5	Protocol and instruments completed	Nov -13		Nov -13							
6	Protocol has passed QA	Feb -14		Feb -14							
7	Tulane IRB approval given	Feb-14		Mar - 14							
8	Local IRB approval given	Jul -13		Jul -13							
9	Approval in writing from DFID to start research implementation	Mar -14		Feb -17							
10	Field workers trained	Mar -14		Mar -17							
11	Field work/ secondary data collection completed.	June -14		May -17							
12	Analysis of data completed	Oct -14		Sept -17							
13	Preliminary report submitted	Oct -14		Sept -17							
14	Preliminary report including dissemination strategy approved by DFID (following QA)	Nov -14		Oct -17							
15	Final report approved by DFID	Dec -14		Nov -17							
16	Publication paper reviewed by DFID	NA	NA	TBD							
17	Dissemination activities completed	Jan-14		Dec -17							
18	Study published.	NA	NA	TBD							

9.0 DFID Co-ordination

The DFID DRC Health Advisor will be the direct point of contact in DFID with Tulane and IMA for matters relating to performance -management of this sub-contract.

The DFID DRC Results and Evaluation Advisor will liaise with Tulane University on technical matters and for quality assurance purposes, making recommendations to the Health Adviser, and be a member of the Evaluation and Research Oversight Panel for DFID.

10.0 Background to the ASSP project

The ASSP project supports 56 health zones (out of 515) in up to four of the eleven provinces in DRC, providing at least 8 million people with access to essential primary and secondary healthcare services. The design phase was from November 2012 with implementation running for five years from early 2013 to March 2018.

In addition to delivering health outcomes, health facilities and health zones with better capacity, the programme will also support the government to be a more effective steward, to provide an enabling environment and to seek a stronger social contract through empowering citizens to hold both the government and non-state providers of health care (such as faith based organisations) to account.

The programme investment is expected to achieve the following:

Impact: Improved reproductive, maternal, neo-natal and child health (RMNCH) in the Democratic Republic of Congo.

Outcomes: Increased coverage with essential reproductive, maternal and child health services in DFID-supported health zones target areas.

Key results:
Under the DFID DRC Country Operational Plan 2011-2015, this programme aims to deliver the following key results in target areas by the end of 2014/15 DFID spending period:

- Reduce U5 mortality in target areas:
  - Vaccinate *522,000 one year old children against measles*

- Improve reproductive and maternal health:
  - Provide contraception – 553,000 new acceptors of modern methods of family planning (10% of which are age 19 years or under)
  - Ensure that 580,000 births are attended by skilled personnel
  - Make sure 100% of health facilities in target areas offer appropriate emergency obstetric care.
  - Provide 437,000 pregnant women with two doses of Intermittent Presumptive Treatment (IPT) for malaria during ante-natal visits.

- Provide 374,000 people with access to clean water and sanitation.

The programme will also deliver additional benefits beyond those identified in the Country Operational Plan, such as improved nutrition, enhanced empowerment and accountability, and institutional capacity building/health systems strengthening.

See appendix for Theory of Change for the ASSP project.

11.0 Duty of Care

Duty of Care responsibilities are as outlined in the contract between Tulane University and IMA. See also duty of care section in IMA contract with DFID.

12.0 Security

Parts of DRC are relatively insecure and Tulane University need to consider how to ensure the security of their workforce and those of subcontracted partners such as the Public School of Kinshasa when they are conducting fieldwork in particular. See also section on security in IMA contract with DFID.

13.0 Quality Standards/Performance Requirements

Evaluation principle standards

It is expected that the evaluations should conform to OECD-DAC principles of accuracy and credibility, and to the evaluation principles set out in the DFID's 2013 Evaluation Policy.

The evaluations will test hypotheses around the following criteria, which are in line with the OECD-DAC evaluation criteria, and with DFID's policy on evaluation. The hypotheses draw on the programme theory of change and the intervention logics of specific components that are the focus of operational research studies. Tulane is expected to draft hypotheses to be tested and to propose appropriate methodologies to test them.

- Efficiency measures the outputs -- qualitative and quantitative -- in relation to the inputs.
- Effectiveness - A measure of the extent to which an aid activity attains its objectives.

Quality Assurance of evaluation products

Evaluations should fulfill DFID policy requirements for Quality Assurance. DFID contracts some QA to SEQAS (the Specialist Evaluation & Quality Assurance Service). DFID evaluation guidelines recommend that the following evaluators' products are QA'd through SEQAS;

i. QA is required for the evaluation design/approach as outlined in the evaluation protocol.
ii. If there is a baseline report or other inception reports, these need also to be QA'd before publication.

iii. QA at exit focuses upon analytic approach, findings, lessons and recommendations and the utility of the product for different audiences. This normally means the final draft report.

All evaluation reports and DFID management responses should be published internally and externally in accordance with DFID's transparency initiative and publication guidance.

Quality assurance of operations research products

DFID QA SEQAS evaluation standards will be adapted for the operational research. The Operational Research protocols will be reviewed by the Evaluation and Research Oversight Panel according to these standards. OR protocols must be of adequate standard and have passed the QA for the study to proceed.

Summary of how quality of products will be assessed.

The table below outlines how each deliverable will be assessed for quality.

Output/Deliverable	**How quality will be assessed**	**Who will approve**
Evaluability Assessment	Completed	Approved
ORIE plan	DFID DRC will review against format outlined in section above	DFID
Concept Notes	DFID DRC will review against format outlined in section above	DFID
Study Protocol with research instruments	SEQAS assessment of impact evaluation protocol before baseline survey. Midpoint evaluation protocol to be QA'd by Oversight Panel Operations research study protocols to be QA'd by Oversight Panel.	DFID based on SEQAS recommendation DFID DFID
Preliminary report including dissemination strategy	Impact evaluation preliminary report to be reviewed by SEQAS. Baseline survey report and midpoint process evaluation report to be reviewed by oversight panel. Operations Research preliminary reports to be	DFID based on SEQAS recommendation

	reviewed by Oversight panel.	
Final reports	All reviewed by Oversight Committee panel	DFID

13.1 Management of performance issues

Tulane's contract is managed by IMA. If issues arise around the performance of Tulane it is the responsibility of IMA to manage those issues in close collaboration with DFID.

Failure to perform would typically be defined as any of the issues below;

- Failure to produce research outputs/deliverables <u>on time</u> as or failure to meet milestones as outlined in the terms of reference
- Failure to produce research outputs/products of <u>adequate quality</u> (as demonstrated by failure to pass quality assurance review(s) as outlined in the table above).
- <u>Failure to manage the budget</u> appropriately and over-commit resources such that the budget is adequate to complete the research started.

In the event that the ORIE component is deemed to be failing to perform, IMA should issue an improvement plan to Tulane outlining the steps that need to be taken to improve. In the event that the action points of the improvement plan are not achieved then DFID reserves the right to direct IMA to terminate Tulane's contract according to the terms and conditions of the agreement.

14.0 Budget

DFID allocated £4.7m GBP for Research and Evaluation within the ASSP project. Tulane's budget is as set out in their contract with IMA.

15.0 Publication and access to data sets

The evaluation should be published in full by the evaluation provider. Data sets should be made available to other researchers for analysis, with due consideration given for the privacy of respondents.

16.0 Intellectual property and title rights

In line with the UK Government's Freedom of Information Act and the International Aid Transparency Initiative, all of DFID-funded key evaluation reports set out in these Terms of Reference will be made publically available. This should include publication and ensuring open access to underlying data sets where appropriate[4].

[4] See DFID (2013), *DFID Research Open and Enhanced Access Policy,* available: www.gov.uk/government/publications/dfid-research-open-and-enhanced-access-policy

17.0 Annexes

i. DAC Criteria for Evaluating Development Assistance
ii. ASSP Theory of Change
iii. Links to DFID guidance documents
iv. ASSP Operational Research Concept Note format

Annex (i): DAC Criteria for evaluating development assistance

DFID applies internationally-agreed criteria to help ensure that our evaluations consistently tackle the issues widely recognised as important in the development evaluation community. These are described briefly below. It is not necessary to investigate every criterion in depth in every evaluation. However, you should provide an explanation of the criteria you have chosen to cover in your evaluation approach.

Relevance - *The extent to which the aid activity is suited to the priorities and policies of the target group, recipient and donor.*

Effectiveness - *A measure of the extent to which an aid activity attains its objectives.*

Efficiency *measures the outputs -- qualitative and quantitative -- in relation to the inputs.*

Impact - *The positive and negative changes produced by a development intervention, directly, or indirectly, intended or unintended*.

Sustainability *is concerned with measuring whether the benefits of an activity are likely to continue after donor funding has been withdrawn. Note that projects need to be environmentally as well as financially sustainable.*

The following additional three criteria are also useful; they were developed by the DAC for use in humanitarian evaluations but can apply in other contexts.

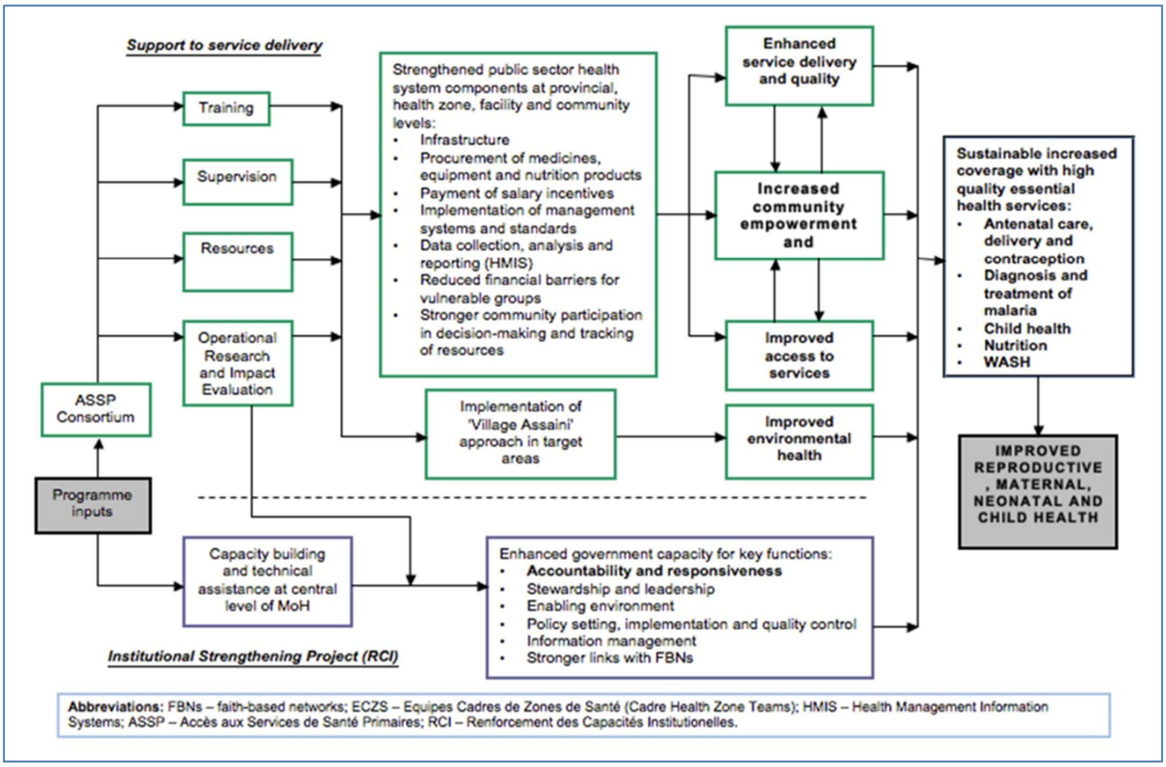
Coverage *looks at which groups are included in / excluded from a programme and the differential impact on those included and excluded. (Who and how many people are we reaching?)*

Coherence *is the need to assess other policies and programmes which affect the intervention being evaluated*.

Co-ordination *includes assessing both harmonisation with other aid agencies and alignment with country priorities and systems. (How are we working with others?)*

Annex (ii): Theory of Change for ASSP (intervention logic)

The diagram shows how programme inputs will be converted into outputs, outcomes and impact. Activities through which this will take place consist of training, supervision, provision of resources (e.g. for purchasing supplies and providing salary incentives), operational research and impact evaluation (ORIE), and capacity building / technical assistance.



The programme engages at several levels:

- Engagement with non-state service providers to strengthen public sector health services

DFID will continue to work through non-governmental organisations and in particular faith based networks to implement this programme, rather than through direct assistance to the Government of DRC. By working through faith based networks ASSP will seek to strengthen public provision in both government and FBN facilities and build capacity for sustainable service delivery through investing in key health inputs such as supervision/training, salary incentives, drugs and equipment and infrastructure rehabilitation.

- Engagement with communities and individuals

Central to the theory of change is that improved accountability of the Ministry of Health and service providers will strengthen service delivery in the long term. Empowered citizens who are able to hold the government to account on service delivery will play a crucial role in assisting the government to be more responsive to citizens' needs which should lead to better access to quality services.

- Behavioural change points in the model

There are a number of points in the theory of change which will rely on behaviour change. In particular the theory assumes that people will change their behaviour in adopting healthier hygiene and sanitation practices, will want family planning and will want their children to be vaccinated.

- Engagement with the state.

The ASSP programme will also strengthen Ministry of Health management teams at Health Zone and provincial level. The Ministry of Health at central level has a key role in stewardship and policy setting and we will therefore invest more in strengthening these core functions so that the government is able to provide a more enabling environment and more people have access to higher quality service delivery. In using this approach, DFID will be actively seeking to strengthen decentralised levels of governance and legitimate authority by strengthening both decentralised Ministry of Health management teams at provincial and health zone level. Strengthening the institutional capacity of the Ministry of health centrally and of decentralised entities is a major step to move towards a more systemic approach in DFID's health programme.

A change to a more sustainable approach is expected to bring marked cost savings in terms of cost-per-capita and should enable DFID therefore to expand its footprint in terms of number of zones and population supported.

Small cost savings on cost per capita would have a dramatic effect on the number of people supported – a reduction of just $2 per capita per annum on DFID's current programme would enable a further one million people to access to health services.

Annex (iii) DFID guidance documents

The below are key DFID-wide policy and guidance documents in relation to conducting evaluation and research, as well as the Department's approach to value for money.

DFID (2013), DFID Evaluation Policy 2013
https://www.gov.uk/government/publications/dfid-evaluation-policy-2013

DFID Ethical principles for research and evaluation
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/49551/DFID-approach-value-money.pdf

DFID VFM guidelines:
www.gov.uk/government/uploads/system/uploads/attachment_data/file/49551/DFID-approach-value-money.pdf

DFID (2013), Research Uptake: a guide for DFID-funded research programmes:
www.gov.uk/government/uploads/system/uploads/attachment_data/file/200088/Research_uptake_guidance.pdf

Annex (iv) Proposed ASSP Operational Research Concept Note Format

The purpose of each concept note is to propose the research questions, methodological approach and cost estimate for each of the studies proposed for consideration by DFID.

1. Background/Introduction – The purpose of this section is to provide the motivation for the study, including the health systems context and ASSP program component, and the existing evidence base. Specifically, this section will address why evidence from the study is needed by the ASSP project (why it is programmatically important).

2. Research questions – This section presents the research questions. Where applicable, this will also detail the different phases of research.

3. Methodology – This section presents the methodological approach, data to be used, as well as proposed sampling frame and sampling strategy. Included will be a brief discussion of the strengths and weakness of the different options for study design and a rational for why the methodical approach was chosen (feasibility, limitations due to access and/or budget, etc.).

4. Analysis – This section presents a brief description of the proposed analysis plan. This will include a discussion of how the analysis will be interpreted in order to provide recommendations to ASSP.

5. Ethics - This section outlines the key ethics risks and mitigations planned, including consent processes and IRB reviews.

6. Research staff – This section describes the research staff, including the lead researcher, in-country partners (including sub-contractors), and research assistants. We will also provide the lead researcher's CV for approval.

7. Deliverables – This section presents the outputs for the study, and describes how the results will be disseminated.

8. Timeline

9. Estimated costs

Appendix D. Comparison of DHS, ASSP routine, and survey data

Maniema and Province Orientale/Tshopo	2013/14 DHS Maniema		ASSP baseline survey ASSP areas in Maniema & Tshopo		ASSP routine data (2014) ASSP areas in Maniema & Tshopo		Control areas in Maniema & Tshopo	
Maternal health								
Antenatal care								
Percentage of pregnant women who have attended at least 3 ANC visits	N/A	N/A	57.6	79.8	N/A	53.8	55.5	81.4
Percentage of pregnant women who have attended at least 4 ANC visits	N/A	N/A	37.9	47.7	N/A	27.1	36.3	74.9
Malaria								
Use of an ITN by pregnant women	57.3	46.7	43.5	51.3	N/A	49.6	45.7	N/A
Household ownership of an ITN	59.7	49.3	49.0	45.1	N/A	58.6	69.6	N/A
Facility-based delivery								
At a health facility by a skilled provider	86.6	85.9	45.8	44.0	64.4	60.0	55.7	95.9
Postpartum care visit	46.2	34.6	34.4	55.1	N/A	34.2	34.3	N/A
Postnatal care visit	1.9	2.1	1.9	3.9	N/A	1.1	3.4	N/A
Child health								
Illness								
% under five with diarrhea	9.2	13.4	5.7	7.7	N/A	4.4	7.4	N/A
% under five with malaria parasite	N/A	N/A	48.2	37.7	N/A	62.1	48.2	N/A
% under five with suspected pneumonia (symptoms of ARI)	4.3	12.3	4.9	5.4	N/A	2.2	5.4	N/A
% under five with fever	23.6	23.5	23.6	28.6	N/A	15.3	15.4	N/A
Treatment								
% with fever who received antimalarials	46.7	38.4	21.7	52.8	N/A	51.7	44.9	N/A
% with diarrhea who received ORS or RHF	57.8	33.0	59.6	59.6	N/A	43.6	29.9	N/A
% with suspected pneumonia who received antibiotics	57.8	51.3	49.6	62.5	N/A	36.0	43.4	N/A
% of children aged 12-23 months fully vaccinated	42.0	29.9	33.6	30.7	N/A	37.9	36.1	N/A
% of children aged 12-23 months vaccinated against measles	62.3	67.4	N/A	N/A	87.9	N/A	N/A	93.2
Child nutrition								
Anthropometry								
% underweight (weight for age)	31.9	20.2	18.6	28.3	N/A	28.6	19.1	N/A
% stunted (height for age)	46.4	42.9	42.0	42.2	N/A	57.4	37.2	N/A
% wasted (weight for height)	22.7	7.2	10.5	16.5	N/A	6.6	4.4	N/A
% of malnourished children who recovered	N/A	N/A	N/A	N/A	N/A	N/A	N/A	63.2
Number of children & pregnant women reached with nutritional intervention (e.g., 5 home visits for children & 3 Iron/Folic courses for pregnant women)	N/A	N/A	N/A	N/A	24,413	N/A	N/A	37,283
Family planning								
% currently using modern method	8.2	5.3	12.0	11.0	N/A	10.2	10.8	N/A
Number of Couple Years of Protection (CYPs) achieved through family planning service provision	N/A	N/A	N/A	N/A	N/A	N/A	N/A	39,487
Health care utilization - outpatient care								
Annual health service utilisation (number and rate per capita) for curative consultations (outpatient care)	13.6	10.3	68.0	68.1	27.8	56.8	54.3	59.0

***Province Orientale was comprised of present-day Tshopo, Bas Uele, Haut Uele, and Ituri provinces.**

Equataur/Nord and Sud Ubangi	2013/14 DHS Equateur*	ASSP baseline survey Nord Ubangi	 Control areas in Sud Ubangi	ASSP routine data (2014) Nord Ubangi	ASSP endline survey Nord Ubangi	 Control areas in Sud Ubangi	ASSP routine data (2017) Nord Ubangi
Maternal health							
Antenatal care							
Percentage of pregnant women who have attended at least 3 ANC visits	N/A	74.3	79.1	N/A	61.6	74.2	78.7
Percentage of pregnant women who have attended at least 4 ANC visits	N/A	34.8	48.9	NA	34.7	44.9	69.5
Malaria							
Use of an ITN by pregnant women	71.7	75.8	79.1	N/A	60.5	75.1	N/A
Household ownership of an ITN	83.7	81.6	84.8	N/A	77.8	94.5	N/A
Facility-based delivery							
At a health facility by a skilled provider	63.7	85.9	72.9	53.9	87.4	88.4	84.6
Postpartum care visit	28.8	10.4	6.9	N/A	26.3	19.5	N/A
Postnatal care visit	6.7	3.8	0.5	N/A	3.9	2.8	N/A
Child health							
Illness							
% under five with diarrhea	15.8	19.6	10.9	N/A	12.2	11.7	N/A
% under five with suspected pneumonia (symptoms of ARI)	9.5	10.0	3.5	N/A	7.4	5.4	N/A
% under five with fever	32.2	18.4	14.0	N/A	14.4	18.4	N/A
Treatment							
% with fever who received antimalarials	27.4	33.9	14.3	N/A	24.9	29.2	N/A
% with diarrhea who received ORS or RHF	31.4	28.8	21.6	N/A	28.5	28.0	N/A
% with suspected pneumonia who received antibiotics	44.7	18.8	9.5	N/A	6.2	29.0	N/A
% of children aged 12-23 months fully vaccinated	32.6	62.6	58.9	N/A	24.7	39.4	N/A
% of children aged 12-23 months vaccinated against measles	66.1	N/A	N/A	91.1	N/A	N/A	95.2
Child nutrition							
Anthropometry							
% underweight (weight for age)	19.4	22.3	23.4	N/A	20.7	23.5	N/A
% stunted (height for age)	38.2	45.5	47.2	N/A	50.3	52.5	N/A
% wasted (weight for height)	6.0	6.9	5.4	N/A	6.5	3.4	N/A
% of malnourished children who recovered	N/A	N/A	N/A	N/A	N/A	N/A	70.8
Number of children & pregnant women reached with nutritional intervention (e.g., 5 home visits for children & 3 Iron/Folic courses for	N/A	N/A	N/A	19,282	N/A	N/A	44,087
Family planning							
% currently using modern method	4.2	2.7	2.5	N/A	8.1	4.1	N/A
Number of Couple Years of Protection (CYPs) achieved through family planning service provision	N/A	N/A	N/A	N/A	N/A	N/A	41,095
Health care utilization - outpatient care							
Annual health service utilisation (number and rate per capita) for curative consultations (outpatient care)	10.5	74.9	66.2	36.0	53.5	55.9	51.4

*Notes: Equateur was comprised of present-day Nord Ubangi, Sud Ubangi, Mongala, and Tshuapa provinces.
ASSP data in Nord Ubangi (only) is representative at the province level.