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mHEALTH FOR FAMILY PLANNING IN WEST AFRICA: A NEEDS ASSESSMENT AND COSTED SOLUTIONS

January 2016

This document was produced for review by the United States Agency for International Development. It was prepared by Pamela Riley, Kylie Graff, Jessica Erbacher, and Chloé Revuz for the Strengthening Health Outcomes through the Private Sector (SHOPS) project.

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DISCLAIMER
The author's views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States government.

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ACRONYMS

AgirPF	*Agir pour la planification familiale*
ANC	Antenatal care
CBD	Community-based distribution
CHW	Community Health Workers
CPR	Contraceptive Prevalence Rate
CUG	Closed User Group
DHIS2	District Health Information Software 2
DHS	Demographic and Health Survey
GSMA	Global System for Mobile Communications Association
InSTEDD	Innovative Support to Emergencies Diseases and Disasters
IVR	Interactive Voice Response
IVR/SMS	Interactive Voice Response/Short Message Service
JSI	John Snow International
m4Change	Mobiles for change
MAMA	Mobile Alliance for Maternal Action
MCH	Maternal and child health
MCPR	Modern contraceptive prevalence rate
mHealth	Mobile Health
MNO	Mobile Network Operator
MOH	Ministry of Health
MOTECH	MOTECH Suite
MOU	Memorandum of Understanding
MSI	Marie Stopes International
SHOPS	Strengthening Health Outcomes through the Private Sector
SMS	Short Message Service (mobile phone text message)
UNFPA	United Nations Population Fund
UNICEF	United Nations International Children's Education Fund
USAID	United States Agency for International Development
USAID/WA	United States Agency for International Development/West Africa
WHO	World Health Organization
WRA	Women of reproductive age

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EXECUTIVE SUMMARY

SETTING THE STAGE

Family planning is one of the most cost-effective, high-yield interventions for improving health and accelerating development. West Africa faces persistently inadequate access, with nearly one in three women in the region reporting unmet need. Only 9 percent of married women in francophone West Africa use modern family planning methods.

The growing ubiquity of mobile phone ownership throughout the region presents an unprecedented opportunity to reach end users with health information and tools and to facilitate program management. Phone ownership in urban areas is high, from an estimated 82 percent in Niger to 92 percent in Cote d'Ivoire. To capitalize on this opportunity, United States Agency for International Development West Africa (USAID/WA) commissioned Strengthening Health Outcomes through the Private Sector (SHOPS) in 2013 to conduct a landscape analysis of mhealth (mobile health) in the region and in 2014, supported initial planning activities with mobile operator Orange to explore options for leveraging mobile technology in the region.

This report summarizes options for financing mhealth interventions to address key family planning barriers in West Africa. Using two illustrative solutions, SHOPS estimated costs and financial contributions across three sets of partners (governments, mobile operators, and USAID) over a 3-year time period for two proposed solutions. One solution is a demand generation intervention to provide recorded audio content with information and role model stories about family planning. The second is a short message service (SMS) data collection platform to improve visibility of product and service availability at the community level. To secure long-term support from a regional mobile operator, SHOPS identified drivers of engagement, including the exclusive ability to brand and market services.

OBJECTIVES AND FOCUS OF REPORT

This analysis builds on the earlier activities to better understand (1) how mhealth initiatives can address specific family planning barriers, (2) what solutions currently exist, and (3) sustainable financing options for a regional solution. These solutions support USAID's larger portfolio of interventions that, collectively, aim to generate new users of family planning and increase the contraceptive prevalence rate (CPR) across the region. The rationale for a regional mhealth approach is to aggregate demand across smaller West African economies, lower the cost per user, and attract private sector funding through shared infrastructure and processes. The scope of this report is on the six focus countries—Burkina Faso, Cameroon, Côte d'Ivoire, Niger, Mauritania, and Togo—served by the USAID/WA regional health office, with an emphasis on urban populations aligned with USAID/WA projects in those countries.

DEMOGRAPHICS

The total population of the six USAID/WA target countries is around 81 million, with approximately 45 percent of the population under age 15 and more than 60 percent under age 25. There are roughly 18.8 million women of reproductive age (15–49 years) across the six countries. Use of modern contraception in the six target countries is low, ranging from 11 percent in Niger to 16.7 percent in Togo, and 1.3 million women ages 15–24 have unmet need. Based on Demographic and Health Survey (DHS) estimates of urban populations, 42 percent of

the women with unmet need are in urban areas. Literacy rates among females 15–24 are very low. Based on these demographics, the priority population for mhealth demand generation interventions is urban females between ages 15 and 24 because of their low contraceptive use and high phone access. Secondary audiences include subpopulations within a young woman's sphere of influence, such as mothers-in-law, spouses, and health workers, as well as young urban males who have potential to contribute to increased contraceptive use.

SUPPLY SIDE ISSUES

On the supply side, barriers to the continuous supply of skilled providers and family planning commodities challenge uptake of family planning. West Africa currently has an insufficient quantity of public and private health providers for family planning services. Additional barriers to utilization of services in the six focus countries include provider biases, lack of youth-friendly services, limited method choice, and limited community engagement (AgirPF, 2015b).

West Africa also faces frequent stockouts of family planning products, largely attributed to supply chain deficiencies, including barriers to routine data and weak national logistics systems for managing commodities. The lack of a standardized system for reporting and an inability to track data in a timely way at the community level also hamper planning and resource allocation. To increase access to family planning services at health facilities, stakeholders throughout the region have prioritized community-based distribution (CBD) of contraceptives as a critical method of filling an important gap and increasing access to family planning commodities.

OVERVIEW OF MOBILE INTERVENTIONS TO ADDRESS FAMILY PLANNING NEEDS

DEMAND

This report summarizes five categories of promising mhealth applications to generate family planning demand: call centers, push message campaigns, social media, subscription services for stage-based messages, and menu-based interactive services. The report highlights country examples, lessons from the field, and available evidence for each category.

Based on the relative pros and cons of available applications, SHOPS proposes introduction of a regional on-demand interactive voice response/short message service (IVR/SMS) that provides target populations with appropriate information and messaging to address barriers to family planning use. An interactive menu-based mobile information service is well suited to be part of a broader sexual and reproductive health campaign. The objective of the service is to increase understanding about fertility, reduce myths and misconceptions about contraception, influence social norms through peer stories, and improve efficacy through access to clinic or service locations. A mobile service alone is unlikely to increase contraceptive use unless it is part of a holistic family planning strategy. It can, however, amplify other interventions in the region and help generate the knowledge and understanding that, when combined with counselling or support, can lead to increased CPR.

SUPPLY

On the supply side, SHOPS reviewed applications in the following categories: commodity tracking, case management and decision support, training reinforcement, referral, and supportive supervision. Evidence is limited regarding the effectiveness of these interventions, with a small number of evaluations demonstrating cost savings, acceptability, and improved quality of care.

To address the emerging focus on CBDs and persistent problems with reliable contraceptive supplies, SHOPS proposes an SMS data collection application for use at community distribution points (community agents, social marketing vendors, and health posts). The objective is to improve tracking of community-based distribution and use of family planning, to improve visibility of family planning supply outside of facilities, and to improve reliability of contraceptive supply with consumption data. The purpose of the proposed intervention focused on CBDs is to complement existing efforts in West Africa to strengthen contraceptive supply chain management—to align with and supplement existing government investments in family planning logistic systems.

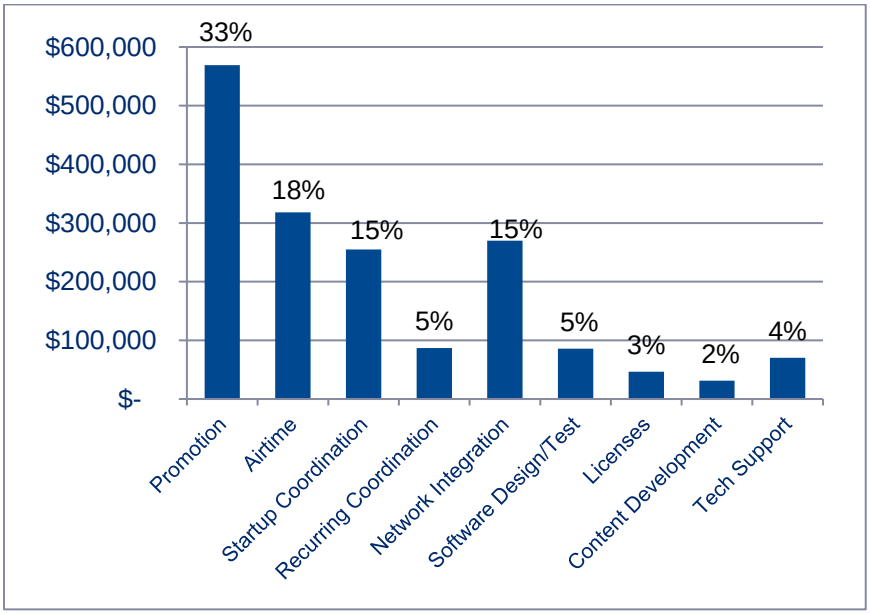
COST ESTIMATES

To highlight key cost drivers, SHOPS estimated expenses for the two proposed solutions. Over a 3-year horizon, SHOPS categorized costs as one-time start-up (e.g., software adaptation); recurring fixed (e.g., coordinator time); and recurring variable (e.g., airtime). As demonstrated in Figures 1 and 2, there are key differences between the consumer service and the data collection application.

- Consumer voice service costs more due to a higher number of users, requirement for voice channels that demand higher cost network resources, and marketing costs to advertise.
- SMS data collection service requires no time-consuming and costly network integration. The highest cost element is training to orient and reinforce providers to send the messages.

Three countries (Cameroon, Côte d'Ivoire, and Niger) were included in the demand side IVR/SMS information service, with Niger serving as the design and test country. Figure 1 provides an overview of the cost breakdown, with total costs of $1,733,060 over 3 years.

FIGURE 1. DISTRIBUTION OF COSTS FOR IVR/SMS INFORMATION SYSTEMS



IVR/SMS information service cost assumptions

Projected number of service users:

Cameroon	200,000
Côte d'Ivoire	100,000
Niger	50,000

Proportion of voice versus text: 90% IVR and 10% texts.

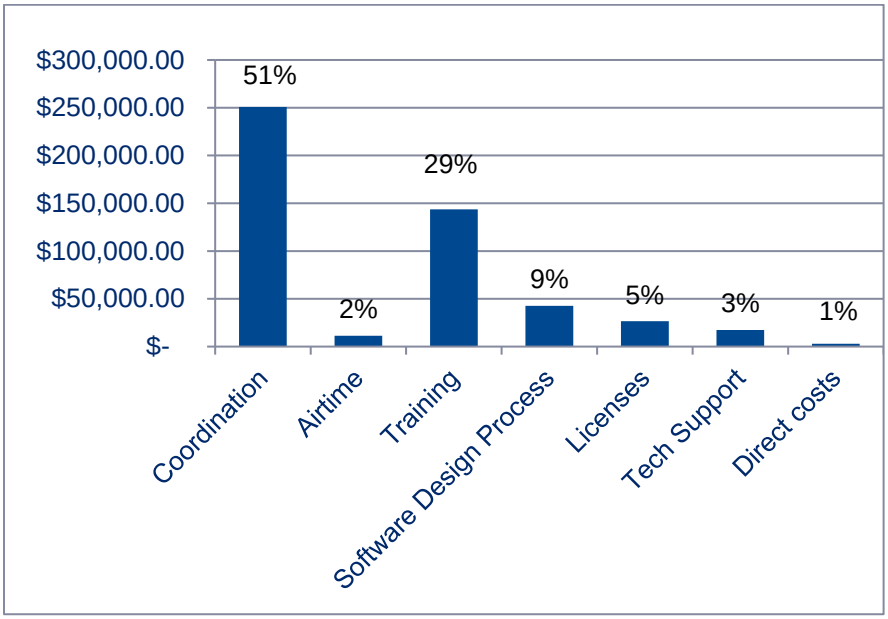
Projected number of calls/texts accessed per user: 8 minutes per year

SHOPS estimated costs based on key assumptions that, if changed, can lower costs. For example, introducing an SMS-only service would reduce costs by more than 30 percent, but an SMS-only service would likely have a smaller reach than IVR, given the significant portion of the population with low literacy skills. Other possibilities include targeting a smaller segment of the

population (lower airtime costs), using below-the-line promotion channels instead of mass media, and utilizing mobile network operator (MNO) software applications (reduces network integration costs).

For the supply side SMS data collection service, SHOPS calculated total costs for launch and deployment in all six focus countries during the 3-year period. The costs to design, launch, and scale the SMS data collection service totaled $495,300, with major cost categories shown in Figure 2.

FIGURE 2. DISTRIBUTION OF ESTIMATED COSTS FOR SMS DATA COLLECTION



SMS cost assumptions

No network integration; use Android phone gateway in each country.

Projected number of CBD service users:

Burkina Faso	500
Cameroon	50
Côte d'Ivoire	300
Mauritania	100
Niger	500
Togo	300

Transactions per CBD per year: 52

SMS per transaction: 4

PATHWAYS TO SCALE

Partnerships are critical to the long-term success of mhealth initiatives because it is inherently a cross-disciplinary activity, involving commercial, social, and public enterprises. SHOPS examined the special role of MNOs in identifying factors that promote long-term investment and support for mhealth. Key considerations for successful social sector MNO partnerships include engaging MNOs in the conceptualization and design phase, identifying partnership benefits and how to measure them, and specifying assets each party will contribute. Potential MNO partnership benefits include the ability to deepen connections with existing customers, better understand market segments, and improve relationships with a government to advance their market position and enhance their brand.

FINANCING OPTIONS

Given the differences in the two solutions, SHOPS presents options for sustainable financing separately.

IVR/SMS INFORMATION SERVICE

Table 1 highlights projected financial contributions for an IVR/SMS information service, aligned with activity costs that each partner is most likely to assume. Under this funding model, USAID provides start-up revenue for the service. Private payers cover substantial recurring costs including airtime, promotion, and network integration. SHOPS estimated government

contributions at 10 percent of coordination and promotion. A hybrid of this funding division is likely. For example, governments may cover the costs of content localization, or USAID projects may cover some portion of service promotion.

TABLE 1. PROJECTED PARTNER CONTRIBUTIONS

Total Costs	**$1,733,060**								
	USAID			**Private payers**			**Government**		
3-year total	**$484,590**			**$1,157,380**			**$91,090**		
	Year 1	**Year 2**	**Year 3**	**Year 1**	**Year 2**	**Year 3**	**Year 1**	**Year 2**	**Year 3**
	$213,794	**$175,866**	**$94,930**	**$60,732**	**$256,795**	**$839,853**	**$12,925**	**$25,610**	**$52,555**
Primary activity costs	• Coordination and strategy • Content development and localization • Software development and licensing • Tech support			• Network integration • Airtime • Promotion			• Facilitation of stakeholder buy-in • Promotion through access to In-kind channels		
	Proposed funding sources			**Proposed funding sources**			**Proposed funding sources**		
	Regional award for start-up	Family planning project budgets for recurring expenses		MNO partner	Combination • User fees • Regulatory mandated free airtime • Corporate sponsor		Existing government budgets		

There are two options for private funding—exclusive MNO partnership and no MNO partner support. Each provides different scenarios in terms of network integration, promotion, sponsorship, and other considerations**.**

SMS DATA COLLECTION

Table 2 highlights the breakdown between start-up and recurring costs for SMS data collection, with the expectation that USAID/WA funds start-up for the intervention and CBD partners would integrate recurring costs in their program budgets.

TABLE 2. SMS DATA COLLECTION BY COST TYPE

Total Costs	**$526,740**					
	USAID Start-up			**CBD Programs – 6 countries**		
3-year total	**$371,840**			**$154,900**		
	Year 1	**Year 2**	**Year 3**	**Year 1**	**Year 2**	**Year 3**
Est. cost	**$83,200**	**$161,885**	**$126,755**	**$3,500**	**$31,500**	**$119,900**
Primary activity costs	• Regional strategy and oversight • Software design • Hardware • Tech support			• Coordination in on-going years • Training • Airtime		

SHOPS designed the proposed SMS data collection intervention to be funded long term through support from health partners deploying and managing community-based distributors. If CBD

program integrate SMS training costs into their basic training and supervision programs, the need for earmarked mhealth funds from a donor decline dramatically.

RECOMMENDATIONS

Integrate the supply and demand solutions. SHOPS chose to keep the analyses of supply side and demand side solutions in this report separate in order to maximize USAID flexibility in determining its investment strategy. There are several advantages, however, to pursuing an integrated set of solutions rather than implementing stand-alone applications. Integration allows for better linkages between supply and demand, creates potential for shared costs in coordination and advocacy, and enhances attractiveness to MNOs who seek to design products for both the health workforce and the public.

Pursue a regional MNO partnership with Orange. An exclusive mobile partnership will enable USAID to reach more beneficiaries at lower cost by leveraging an MNO's strong brand, distribution network, and customer base. During Phase 2 of its mhealth strategy development, Orange Labs participated extensively in West African mhealth planning and convening activities, representing valuable in-kind contributions of expertise in needs assessment, solution design, and network services. Terms for an Orange/USAID public-private partnership agreement would document in-kind and financial contributions from each partner. Contributions from Orange would include discounts, waivers, and other cash equivalents for potential network and distribution services, such as short code fees, integration fees for network connectivity, software adaptation and documentation user requirements, dynamic charging interface, and per-minute/per-message charges. Contributions from USAID implementing partners would include funding for the network services needed as well as level of effort for outreach, content generation, government support, and promotion strategy.

Measure impact. The impact of the mhealth interventions on factors that contribute to increased CPR will ultimately determine intervention success. Rigorous independent evaluation of family planning impact is not budgeted in this analysis. SHOPS suggests considering such an evaluation through a separate mechanism to generate mhealth evidence on cost effectiveness and value for money.

1 SETTING THE STAGE

1.1 FAMILY PLANNING IN WEST AFRICA

Family planning is one of the most cost-effective, high-yield interventions for improving health and accelerating development in West Africa. It is an especially critical component of improving the health of women, infants, and children, with prevention of unintended pregnancy having the greatest impact on both maternal and under-5 mortality. Despite these potential gains, more than 220 million women with unmet need for family planning lack access to contraceptives and voluntary services. Average fertility rates across the region are roughly 5.5 children per woman, making it one of the fastest growing populations in the world. Only 9 percent of married women in francophone West Africa use modern family planning methods. This compares to 25 percent in East Africa and 53 percent in Southeast Asia. Unmet need for family planning is roughly 30 percent across the region and ranges from 16 percent in Niger to 31 percent in Burkina Faso and Togo (Ouagadougou Partnership, 2012). Nearly one in three women in the region has expressed interest in limiting or spacing births but does not use modern contraception. Implementing strategies to address this unmet need would avert an estimated 7,400 maternal deaths and 500,000 child deaths over the next decade and result in a savings of $182 million in maternal and child health (MCH) services.

In 2011, representatives from eight West African countries gathered in Ouagadougou, Burkina Faso, to discuss how best to advance the pace of family planning use and improve health outcomes. Country delegates launched the Ouagadougou Partnership and committed to accelerating family planning interventions (Ouagadougou Partnership, 2012). Priority activities include:

- Integrating population issues, including reproductive health and family planning, into national development plans for growth and poverty reduction;
- Implementing national strategies to address unmet need;
- Disseminating behavior change materials about population issues and family planning;
- Increasing the number of health professionals capable and authorized to provide family planning and reproductive health services by 30 percent; and
- Monitoring and evaluating progress regularly.

Development partners who participated in the conference made a similar commitment. Spearheaded by USAID and the French government, the partnership also includes civil society coalitions, the Bill & Melinda Gates Foundation, the William and Flora Hewlett Foundation, and the United Nations Population Fund (UNFPA). USAID/WA is working through the Ouagadougou Partnership to achieve its development objective of reducing high unmet need for family planning in West Africa, including reaching 800,000 women with family planning services.

1.2 WHY mHEALTH?

There has been a massive uptake in mhealth interventions since the early 2000s with the rapid adoption of mobile devices throughout low- and middle-income countries. An extensive body of literature highlights the numerous ways that mhealth interventions strengthen health systems, extend reach, increase equity, improve quality of services, and empower end users (Labrique et

al., 2013). Interventions can empower clients to be proactive in their health care, enabling better self-care and health decisionmaking, especially for individuals with limited access to health services. For providers, mobile tools can reduce isolation, improve diagnostic accuracy, reinforce training, and assist with case management. Through mobile applications, tasks can shift down the skills ladder by providing guidance to and monitoring lower skilled health workers, thus expanding service access. For program managers, mobiles can streamline processes, reduce waiting times for clients, improve accuracy and timeliness of data, and facilitate data-driven decisions. See Section 4, Mobile Interventions, for examples of mhealth interventions that seek to support both providers and beneficiaries.

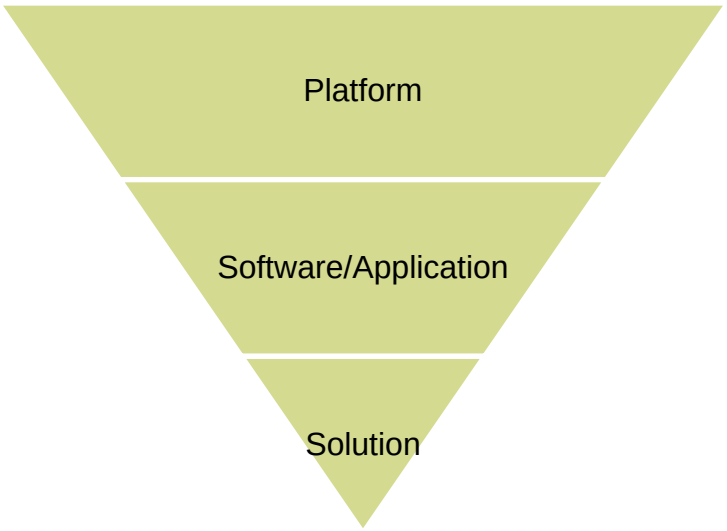
While the number of well-designed studies from developing countries is limited, evidence is starting to emerge amid strong demand for rigorous studies demonstrating mhealth cost effectiveness, cost efficiencies, and impact (Tomlinson et al., 2013). Most recently, the World Health Organization (WHO) published a toolkit designed to improve the capacity of projects to asses and implement strategies for scaling up and achieving long-term sustainability of cost-effective mhealth interventions (WHO, 2015a). Evaluations point to generally positive linkages between interventions and health outcomes, especially when combined with strong stakeholder collaboration and effective adaptation to the local context (Aranda-Jan et al., 2014). Additional evidence suggests that family planning programs are likely to benefit from reduction in stockouts through SMS reporting and improved provider adherence to treatment protocol (Lemay et al., 2012). Evaluations have also pointed to the efficacy of IVR in reaching illiterate populations with health messaging and an increase in family planning knowledge following SMS interventions. As evidence continues to build, stakeholders will be able to integrate findings into programs for optimal impact.

1.2.1 mHEALTH DEFINITION OF TERMS

Value-Added Services: Applications that make use of voice, text, or data channels to provide additional capabilities beyond basic connectivity. mHealth services are classified as value added services by the mobile industry.

This assessment uses the following hierarchy and definitions when discussing mhealth:

FIGURE 3. mHEALTH HIERARCHY



Platform: A unifying structure that makes it easier for software to integrate. In some cases, software developers create a platform so that various software programs can be integrated without writing any code. In other cases, a third party creates a platform so that software created by different organizations can better integrate.

Software/Application: A discrete technology tool with a defined set of functions. Different software and applications can run locally on a computer, mobile device, or online via a web browser. Some software and applications have a single-use case while others are adaptable and adjustable without coding for many different uses.

Solution: A particular configuration and adoption of software and applications for a very specific need. A solution exists when someone tailors software for a specific project or use case. Solutions are often branded and packaged versions of more generic software.

1.3 WHY mHEALTH IN WEST AFRICA?

Mobile technology is rapidly growing among low- and middle-income countries. A 2013 Gallup study of 23 African countries notes that more than half (55 percent) of households in the poorest income quintile had at least one mobile phone (Gallup, 2014). Mobile penetration in West Africa varies, ranging from 50 percent of households in Niger to more than 80 percent in Côte d'Ivoire. Penetration is well above these averages in urban households. The growing ubiquity of mobile phone ownership throughout the region offers an unprecedented opportunity to reach end users with health information and tools, support health care providers with education and supervision, and facilitate commodity management in an effort to increase contraceptive prevalence. mHealth is especially promising in West Africa given the massive youth population and general acceptance that young people have a greater level of interest in and innate ability with mobile technology (Sambira, 2013).

Most mhealth interventions in Sub-Saharan Africa are currently concentrated in eastern and southern countries. Interventions in francophone West Africa are more nascent and face many barriers, including a lack of resources to coordinate, regulate, and finance mhealth initiatives; limited private sector investment; and limited French-language content. Most interventions are small scale or in the pilot phase and have short-term durations, which make true partnerships with mobile operators rare. It also limits opportunity to implement sustainable, large-scale interventions. Despite these limitations, there is considerable momentum throughout the region. Stakeholders have expressed interest in better integrating mobile technology into health systems and the West Africa Health Organization supports them via their leadership role in ehealth. As the mhealth field has matured in the region, it has started to focus on integrated platforms that support a wide range of functions and applications. Platforms like CommCare and MOTECH Suite (MOTECH) are modular, allowing for easy adaptation and combination with other software platforms to perform a host of functions ranging from data collection to delivering educational content to mobile payments. There is also a growth in French-languages resources supporting francophone countries in their efforts to use information and communication technology solutions (Riley, 2014).

1.4 USAID/WEST AFRICA'S mHEALTH INITIATIVES

Building on this opportunity and momentum, USAID/WA asked SHOPS to expand on the USAID-funded landscape of mhealth in West Africa completed in 2014 to identify near-term opportunities for leveraging mobile technology to contribute to its objectives of increasing new family planning users and CPR in the region. USAID/WA anticipates leveraging these findings to strengthen existing programs in the region, including Agir pour la planification familiale (AgirPF), USAID's flagship family planning project, which seeks to increase access to and use of family

planning services in five countries: Burkina Faso, Côte d'Ivoire, Mauritania, Niger, and Togo. AgirPF supports Ouagadougou Partnership member countries and anticipates implementing activities that expand family planning information and education in underserved communities through mobile messages (AgirPF, 2015a). Other potential collaborations include the DELIVER project, which supports supply side initiatives to improve the management of drug stocks including contraceptives, and the Evidence to Action—E2A—project. For the latter, USAID supports the University Leadership for Change initiative in Niger. The initiative promotes informed choice among university students through a peer-educator approach (Evidence to Action, 2015).

The exploration of mobile applications to support family planning objectives in West Africa has occurred in three phases:

Phase 1 (October 2013–October 2014): USAID/WA commissioned an mhealth landscape analysis in 17 West African countries to assess gaps and opportunities to leverage mobile technology for health, with a particular focus on reproductive and sexual health and HIV and AIDS (Riley, 2014). The report documented the nascent stage of mhealth in most of the region but identified a number of pilots and early-stage interventions. Stakeholders validated the findings and confirmed that francophone countries faced barriers including more limited private sector investment and limited French language content. Recommendations included partnering with a regional mobile operator to create economies of scale.

Phase 2 (October 2014–June 2015): Building on report recommendations, USAID and mobile operator Orange signed a memorandum of understanding (MOU) in December 2014 with West Africa identified as the first site for development. The parties committed to sharing resources to support development of technically and financially sustainable value-added services. USAID/WA proposed Niger as the initial launch site for the design and development of a regional mhealth platform. SHOPS convened stakeholder meetings in Cameroon, Côte d'Ivoire, and Niger to obtain input on priority health issues in the region, inform mobile application development, and create a working group to steer local implementation. Participant interest coalesced around a menu-based audio information service, an SMS data collection application to track contraceptive stocks and key indicators such as new family planning users, and a mobile money application to earmark savings for health events such as childbirth.

Phase 3 (June 2015–present): During an assessment of progress, USAID/WA requested a pause in the partnership activities in order to better document which family planning needs could be best addressed with mobile technology, existing solutions that could be used in the region, and a business case for funding across the ecosystem of possible partners. Before investing in a regional solution, a more granular examination was required to estimate the number of target beneficiaries, the total cost of deploying mhealth approaches at scale, and the investment drivers and relative contribution of potential stakeholders. The scope of this effort takes a neutral perspective on the role of mobile operators.

1.5 OBJECTIVE AND FOCUS OF REPORT

This report builds on the first two phases and provides an overview of family planning needs, barriers, and opportunities and the types of mhealth interventions and technology platforms available that address both supply side and demand side barriers to increasing new users of family planning and CPR in francophone West Africa. The report then presents options and costs for introducing mhealth interventions at scale in support of Ouagadougou Partnership objectives and USAID/WA's existing initiatives in the region.

To increase the impact of limited funds, the assessment targets specific countries and populations. The geographic scope of this assessment is limited to the six priority countries served by USAID/WA: Burkina Faso, Cameroon, Côte d'Ivoire, Mauritania, Niger, and Togo. While available to all populations, interventions that generate demand for family planning specifically target the region's urban, peri-urban, and massive youth population with unmet need as prioritized by USAID/WA. To address provider barriers, the analysis targets community-based distributors of family planning commodities, as they are integral to increasing access and uptake of services. SHOPS provides further rationale for targeting these populations in Section 3, Demographics.

While considering national contexts, the strategy focuses on identifying appropriate interventions to pilot in individual countries that can ultimately extend into a regional mhealth platform. The regional approach supports economic efficiencies and assumes that aggregating demand across West African countries with smaller populations will attract development partners like telecommunications companies that have a presence in multiple countries. It also assumes that a regional approach reduces the costs of large-scale interventions by supporting shared infrastructure and addressing the dearth of francophone content. The West Africa Health Organization will be critical in supporting a regional platform because they are a major partner among regional and global mhealth implementers interested in developing initiatives beyond the national level (Riley, 2014).

1.6 REPORT STRUCTURE

The remainder of this report includes the following sections: Section 2 discusses the methodology and results framework used to identify appropriate mhealth solutions. Section 3 provides details on family planning priorities in the region and supply side and demand side barriers to modern contraception use. Section 4 highlights the breadth of mobile interventions possible with examples of implementations relevant to family planning. Section 5 outlines two proposed solutions, one for demand creation and one to strengthen supply. Section 6 provides estimated costs for the illustrative mobile solutions and pathways to scale. Section 7 provides recommendations.

2 METHODOLOGY

SHOPS used a simple cross-sectional design with data collected from a desktop review of existing literature and stakeholder interviews to compile this report. SHOPS developed findings in this report using a three-step process.

Step 1: **Identify family planning needs, promising mobile applications, evidence of efficacy, and financial considerations.** SHOPS identified, prioritized, and summarized mhealth applications that would most greatly influence CPR in West Africa. The process incorporated findings from the original mhealth landscape as well as additional research on target populations.

Step 2: Gather stakeholder input. Following completion of the mhealth landscape, SHOPS met with stakeholders in Cameroon, Côte d'Ivoire, and Niger, including representatives from implementing partners, application developers, mobile operator Orange, and the Ministry of Health (MOH). Stakeholders provided input on priority health needs, how each country currently addresses these needs, and how mobile interventions might help. SHOPS considered feedback on USAID/West Africa Regional Health Office priority strategies, including ensuring alignment with regional priorities throughout the process.

Step 3: Synthesize findings and develop a business case. SHOPS reviewed and synthesized findings from Steps 1 and 2. Additional data were then gathered on target populations—including CPR, mobile penetration, and literacy rates—to populate assumptions in the financial plan and to identify pros, cons, and efficacy of existing software applications and mhealth interventions. Based on this synthesis, SHOPS identified one demand side solution and one supply side solution that had the potential to address regional health priorities and increase contraceptive prevalence rates among target populations. SHOPS then developed detailed business cases for both interventions, which include alternative scenarios with and without a mobile operator partner.

As noted, the objective of this assessment is to map family planning needs, barriers, and opportunities with the most promising mhealth solutions. These solutions support USAID's larger portfolio of interventions that, collectively, aim to generate new users of family planning and increase CPR across the region. Our results framework envisions both supply side and demand side interventions that work in parallel. To help generate demand for family planning, this assessment looks at how mHealth solutions can increase knowledge and change attitudes toward family planning among targeted populations. On the supply side, it reviews how mHealth solutions can address some of the bottlenecks in the commodity supply chain.

3 DEMOGRAPHICS

This section identifies key beneficiary populations to target with demand generation activities and key groups to target for interventions to increase consistent access to family planning. SHOPS used 2010 estimates from the United Nations Department of Economic Social Affairs to estimate populations. Estimates of family planning populations, including estimates of unmet need and modern contraceptive prevalence rates (MCPR), were gathered from STATcompiler using data from the most recent DHS in five of the six target countries (ICF International, 2010–2014). The last DHS in Mauritania was 2000–2001 and, as such, SHOPS excluded it from this analysis.

3.1 DEMAND DEMOGRAPHICS FOR FAMILY PLANNING

3.1.1 DEMOGRAPHIC OVERVIEW

The total population of the six target countries is roughly 81 million, with individual country populations ranging from 3.6 million in Mauritania to 20.6 million in Cameroon. There are roughly 18.8 million women of reproductive age (15–49 years) across the six countries, nearly half (46.1 percent) of the total female population and a quarter (23 percent) of the population as a whole. Table 3 provides a demographic overview by country (United Nations, 2013).

TABLE 3. DEMOGRAPHIC OVERVIEW BY COUNTRY (IN MILLIONS)

Country	Total population	Women of reproductive age
Burkina Faso	15.5	3.5
Cameroon	20.6	4.8
Côte d'Ivoire	19.0	4.4
Mauritania	3.6	1.1
Niger	15.9	3.3
Togo	6.3	1.7
Total	**81**	**18.8**

Source: United Nations, 2013

3.1.2 CONTRACEPTIVE PREVALENCE

AGE

As a region, West Africa has a large youth population. Approximately 45 percent of the population is under age 15 (36.1 million), and more than 60 percent (nearly 52 million) are under

age 25. In the six focus countries, there are nearly 8 million women between ages 15 and 24 (United Nations, 2013).

Youth are an important target group for outreach and services because healthy spacing and timing of births provides an opportunity for lifelong positive reproductive health practices. Young women face barriers to access, due to cultural norms that support early marriage and pressure women to bear children early. A recent study in Burkina Faso found that 50 percent of women between the ages of 20 and 24 had married by age 18 (Pathfinder, 2015b). Nearly 75 percent of women in Niger are married by age 18 (Population Reference Bureau, 2013). Young married women and first-time mothers are more likely to have closely spaced births than older women, placing them at higher risk (Pathfinder, 2015b).

As a general trend, the youngest and oldest women in the population have the lowest CPR. Roughly half of all married women of reproductive age (WRA) not currently using a modern method are between ages 15 and 24. Estimates of married youth populations and MCPR among those populations suggest that of the 3.6 million married female youth across five countries; roughly 387,712 are using a modern method of contraception. Table 4 provides an estimated breakdown of modern method use among married female youth. Additional data on CPR by country and age are located in Appendix A.

TABLE 4. ESTIMATED MODERN METHOD USE AMONG MARRIED FEMALE YOUTH AGES 15–24

Country	Estimated population married female, 15–24	Estimated number using a modern method	Estimated number not using a modern method
Burkina Faso	831,444	84,807	746,637
Cameroon	887,603	124,264	763,339
Côte d'Ivoire	681,237	61,311	619,926
Niger	1,055,617	93,950	961,667
Togo	206,896	23,379	183,516
Total	**3,662,797**	**387,712**	**3,275,085**

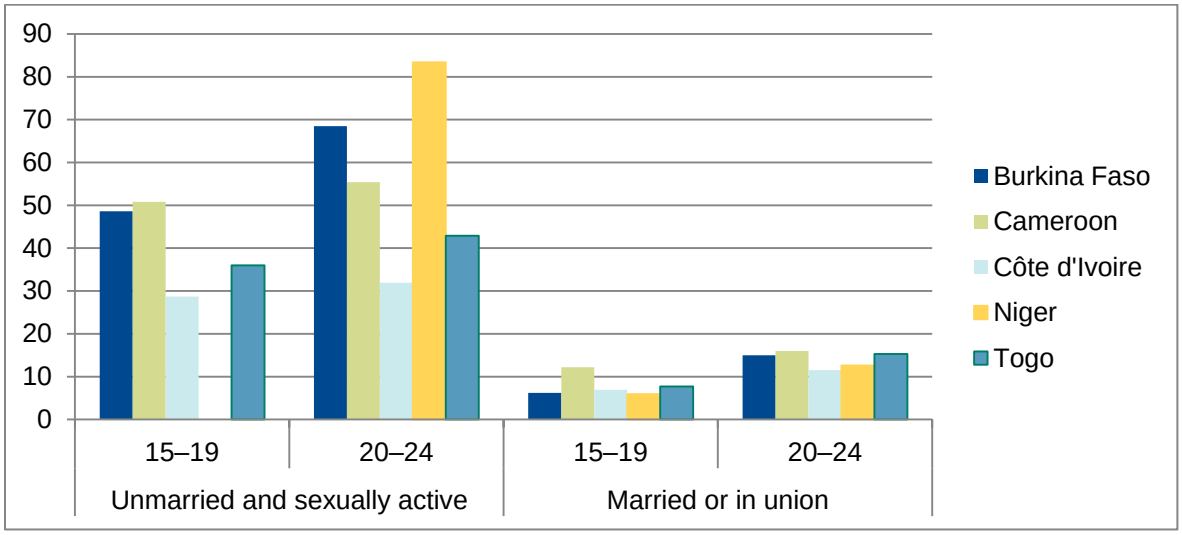
Source: ICF International, 2010–2014; United Nations, 2013

Note: SHOPS used data from the DHS to estimate the number using a modern method and number not using a modern method.

MARITAL STATUS

Marital status also has a large impact on use of modern contraception. Across the five countries for which SHOPS analyzed data, CPR is significantly lower among married individuals than those who are single and sexually active. According to the DHS, about 48 percent of unmarried, sexually active female youth in the six countries are using modern methods, with a range from 42.9 percent in Togo to 83.4 percent in Niger (ICF International, 2000–2014). By comparison, the MCPR among married women 15 to 24 is approximately 14 percent, suggesting a need to target married female youth with interventions.

FIGURE 4. MCPR AMONG FEMALE YOUTH BY COUNTRY AND MARITAL STATUS (PERCENT)



Source: ICF International, 2010–2014

Additional data on CPR among men and women by country and marital status are located in Appendix A.

WEALTH QUINTILE

The use of modern methods varies widely across income quintiles. Among women married or in union in the five analyzed countries, those who fall into the highest wealth quintile are more than three times more likely to use modern contraceptives than those in the poorest wealth quintile (23.3 percent versus 6.9 percent) (ICF International, 2010–2014). Additional data on CPR among men and women by country and wealth quintile are located in Appendix A.

EDUCATION

In most countries, the level of education a woman receives impacts the likelihood of using modern contraception. On average, women across the analyzed countries who have completed a primary education are twice as likely to use modern methods as those who have not completed primary education (18.6 percent versus 9.42 percent). CPR among women with a secondary education or higher is 28.16 percent (ICF International, 2010–2014). Additional data on CPR by country and level of education are located in Appendix A.

3.1.3 UNMET NEED FOR FAMILY PLANNING

Unmet need is the percentage of women who say they prefer to postpone their next birth by two or more years or to stop having children altogether but are not currently using any method of family planning (Gribble, 2012). As such, unmet need provides an estimate of those with greatest potential to use contraception. Using United Nations population estimates and DHS data on unmet need among all female youth, Table 5 provides an estimate of unmet need among all female youth 15–24 in five USAID West Africa target countries, both married or in union, and unmarried and sexually active. As the table suggests, information could reach 1.27 million women wishing to delay or space pregnancy.

TABLE 5. TOTAL UNMET NEED AMONG ALL YOUNG WOMEN AGES 15–24 BY COUNTRY

Country	Population	Unmet need (average)	Estimated number unmet need
Burkina Faso	1,533,788	14.8%	226,983
Cameroon	2,124,725	14.4%	305,665
Côte d'Ivoire	1,846,970	23.8%	439,990
Niger	1,424,043	12.1%	172,853
Togo	645,471	19.8%	127,859
Total	**7,574,997**	**16.8%**	**1,273,349**

Source: ICF International, 2010–2014; United Nations, 2013

Of these women, 876,924 are estimated to be married or in union. As noted, this population is especially likely to have closely spaced births, placing them at higher risk if family planning needs remain unmet (Pathfinder, 2015a).

TABLE 6. TOTAL UNMET NEED AMONG YOUNG MARRIED WOMEN AGES 15–24 BY COUNTRY

Country	Population	Unmet need (average)	Estimated number unmet need
Burkina Faso	831,444	23.2%	192,952
Cameroon	887,603	25.1%	223,204
Côte d'Ivoire	681,237	30.7%	209,454
Niger	1,055,617	16.0%	168,683
Togo	206,896	39.9%	82,631
Total	**3,662,797**	**23.6%**	**876,924**

Source: ICF International, 2010–2014

A partial rationale for the relatively low levels of unmet need in the region is the general desire among women to have large families with four or more children. Evidence from Burkina Faso, Côte d'Ivoire, and Togo suggests that the desired family size is four to five children, while women in Niger prefer eight to nine children (AgirPF, 2015a).

URBAN AND PERI-URBAN POPULATIONS

More than 40 percent (6.6 million) of the population in the six focus countries are concentrated in a few urban centers (ICF International, 2000–2014). The last four decades have seen a major increase in urban and peri-urban areas throughout the region. The latter include fringe settlements along urban areas that are oftentimes slums with limited infrastructure like health care. High urbanization rates persist, and current estimates suggest that more than half of city dwellers live in peri-urban areas. Evidence suggests that most of francophone West Africa will have greater than 60 percent of their population in urban centers by 2050; in Côte d'Ivoire, the estimate increases to 74 percent (USAID West Africa, 2015). A large youth population that is leaving rural homes for urban centers in hopes of more stable futures contributes to the large urbanization rates (USAID West Africa, 2015).

According to the most recent DHS, unmet need among urban married woman of reproductive age was as high as 33 percent (Togo). In Niger, unmet need among urban WRA (17.3 percent) was higher than that of rural WRA (15.8 percent).

3.1.4 LITERACY

Literacy rates vary widely across West Africa and range from 14 percent in Niger to 69.2 percent in Cameroon (ICF International, 2010–2014). Urban populations are significantly more likely to be literate than their rural counterparts regardless of gender or age. Table 7 presents estimated literacy rates among women ages 15 to 49 and urban literacy rates in five target countries. Current data on Mauritania are unavailable.

TABLE 7. LITERACY RATES AMONG ALL WRA AND URBAN WOMEN BY COUNTRY (PERCENT)

Country	All WRA	Urban WRA
Burkina Faso	14.5	44.7
Cameroon	22.5	52.4
Côte d'Ivoire	37.7	53.3
Niger	52.3	70.6
Togo	69.2	85.6

Source: ICF International, 2010–2014

Men are much more likely to be literate than women across the region. There is also a marked variation in literacy rates by age, with younger populations more likely to be literate than older demographics. The estimated gap in literacy varies by source. For example, the United Nations Educational, Scientific, and Cultural Organization estimates that literacy rates among female youth range from 15 percent in Niger to 76.4 percent in Cameroon (UNESCO, 2006–2012). DHS data suggest literacy among young women to be slightly higher. Using the most recent DHS data in five target countries, Table 8 details the estimated number of literate young women ages 15–24. While higher than all WRA, it suggests that well over half of these target populations in Burkina Faso, Côte d'Ivoire, and Niger are illiterate.

TABLE 8. LITERACY RATES AMONG FEMALE YOUTH AGES 15–24

Country	Total female youth population	Literacy rate (average)	Estimated number of literate (female youth)
Burkina Faso	1,533,788	33.3%	511,213
Cameroon	2,124,725	77.5%	1,646,313
Côte d'Ivoire	1,846,970	44.2%	816,036
Niger	1,424,043	22.0%	312,723
Togo	645,471	70.8%	456,851
Total	**7,574,997**	**49.4%**	**3,743,136**

Source: ICF International, 2010–2014

Additional data on estimated literacy rates by region are located in Appendix A.

3.1.5 MOBILE PHONE OWNERSHIP

Mobile phone penetration ranges from 50 percent of households in Niger to 81 percent of households in Côte d'Ivoire. The DHS also points to the fact that urban populations are significantly more likely to own mobile phones than their rural counterparts are. Across the five countries for which data are available, just over half (54.2 percent) of rural households own a mobile phone. In urban settings, mobile ownership is 87.8 percent; the average increases to 92.2 percent in the capital cities (ICF International, 2000–2014). Urban areas also have more reliable mobile signal coverage and power sources because rural areas have challenging terrain

and low density, which dampen infrastructure investments. Table 9 shows estimates of total mobile phone ownership and by urban and rural households across the six target West African countries.

TABLE 9. TOTAL URBAN AND RURAL MOBILE PHONE OWNERSHIP BY COUNTRY (PERCENT)

Country	Total mobile phone ownership (households)	Urban mobile phone ownership (households)	Rural mobile phone ownership (households)
Burkina Faso	59.2	85.1	50.6
Cameroon	67.0	87.8	46.0
Côte d'Ivoire	81.0	92.6	71.0
Mauritania	88.0	NA	NA
Niger	50.0	82.8	44.0
Togo	74.0	90.7	60.0

Source: ICF International 2010–2014

The percent of mobile phone ownership is lower than the percent with mobile phone access because families freely share phones (Aker and Mbiti, 2010). In some cases—due to cultural expectations—women may not have access to a single household phone where men control its use (GSMA, 2010). In a recent GSMA study, however, women in Niger reported that the greatest barriers to phone access and use were cost, battery charging, and network coverage, with family attitudes ranking low as a barrier (GSMA, 2015a).

Low-end phones dominate West Africa, and there is very limited penetration of smart phones and tablets, especially outside urban areas. Aside from cost considerations, low-end phones are strongly preferred because of their superior battery life in a region where electricity is only intermittently available. Internet prices are high but falling because of increased investments in broadband services. Demand for Internet-based services—including social media platforms—is estimated to grow as prices for smart phones and tablets fall.

3.1.6 SUMMARY OF POTENTIAL REACH OF TARGET POPULATIONS

Based on the above analysis, the priority population for mhealth demand generation interventions is urban females between ages 15 and 24 because of their low contraceptive use and high phone access. While it is clear that a large proportion of the 3.3 million women in this target population are currently not using a modern method, SHOPS focused on those with unmet need for limiting or spacing. Other priority populations within a woman's sphere of influence constitute secondary audiences to target. These include mothers-in-law, older women, spouses, health workers, and young urban males.

Table 10 summarizes the estimated size of key sub-segments of the population for targeted demand generation activities.

TABLE 10. DEMOGRAPHIC OVERVIEW BY COUNTRY

Country	Population WRA (in millions)	MCPR	Female population ages 15–24 (in millions)	Unmet need female youth ages 15–24 (in millions)	Urban female youth with unmet need (in millions)	Urban female youth ages 15–24 (in millions)	Phone ownership urban households
Burkina Faso	3.6	14.3%	1.5	0.2	0.1	0.4	85.1%
Cameroon	4.8	16.1%	2.1	0.3	0.2	1.1	87.8%
Côte d'Ivoire	4.4	13.9%	1.8	0.4	0.2	1.0	92.6%
Mauritania	1.1	N/A	0.4	N/A	N/A	0.2	88.0%
Niger	3.3	11.0%	1.4	0.2	0.03	0.3	82.8%
Togo	1.6	16.7%	0.6	0.1	0.05	0.3	90.7%
Total	**18.8**		**7.9**	**1.3**	**0.53**	**3.3**	

Source: ICF International 2000–2014; United Nations 2013

3.1.7 FILLING THE INFORMATION GAP

A key barrier to contraceptive use in West Africa is a lack of access to appropriate family planning information (Ouagadougou Partnership, 2012). While almost all women across the region have heard of at least one modern family planning method, a recent study found that few women in Côte d'Ivoire, Niger, and Togo were familiar with IUDs and implants (AgirPF, 2015b). Women are exposed to an abundance of misinformation and are influenced by traditional cultures that place a premium on large families and frequent childbearing. As a result, these women may choose not to use modern contraception for fear of side effects or loss of fertility. As summarized in the AgirPF baseline study (2015b), key barriers to contraceptive use for family planning are lack of awareness in the community as to the health and economic benefits, negative public perception, and religious resistance.

Evidence suggests that some segments of the target population are much more likely than others are to use family planning if given appropriate information. HOPE Consulting recently completed a behavioral and attitudinal analysis of WRA in Niger to determine which segments of the population offered the greatest opportunity to increase modern method use. The analysis found that the fear of side effects and impact to fertility is the largest and most pervasive barrier to using modern methods. It also noted that targeting specific subsets of the population could create an estimated 1 million new users of modern methods (HOPE Consulting, 2015).

The HOPE Consulting analysis identified five distinct segments, labeled Modern Elites, Healthy Proactives, Traditional Autonomists, Conservative Passives, and Sheltered Skeptics. Those classified as Sheltered Skeptics are a highly relevant target for outreach and education because they represent 54 percent of the population between ages 15 and 17. Sheltered Skeptics typically have less control over health choices—including family planning—due to their younger age, lower social status, and lack of education. They also have very low levels of knowledge about family planning, allow husbands or parents to make decisions for them, and have no outlets for discussions on family planning. Information from a trusted source offers an opportunity to broaden their mindset and encourage proactive behavior in seeking information

about their health. HOPE Consulting estimates that Sheltered Skeptics constitute 28 percent of the addressable market for contraception—a significant segment of the target population.

3.2 TARGET INTERVENTIONS TO SUPPORT CONSISTENT ACCESS TO FAMILY PLANNING

On the supply side, barriers to the continuous supply of skilled providers and family planning commodities challenge the uptake of family planning (AgirPF, 2015b). One major barrier is the lack of health providers with the knowledge and authority to provide family planning services and supplies. The region faces commodity stockouts because of supply chain issues that disrupt the consistent availability of commodities. This is especially true among areas outside of city centers, where community health workers provide services and commodities.

3.2.1 PROVIDER SUPPLY AND CAPACITY BARRIERS

Currently, West Africa has an insufficient quantity of public and private health providers capable and permitted to provide family planning services. The number of trained health professionals per 1000 population—such as doctors and nurses—is not only inadequate but is also declining in some countries (WHO, 2000–2012). Amid provider shortages, there are vast regional inequalities in access to and use of contraceptives between urban and rural populations, with rural populations generally having fewer convenient access points (Ouagadougou Partnership, 2012). In its recent baseline report of family planning services in Burkina Faso, Côte d'Ivoire, Niger, and Togo, AgirPF highlighted barriers to utilization of facility-based services, including provider biases; lack of youth-friendly services; limited method choice; and limited community engagement. Policy barriers, such as laws in Burkina Faso, also contribute to barriers by not allowing community health agents to dispense injectable contraceptives (Maiga and Lo, 2012).

To increase access for individuals who will not or cannot avail themselves of family planning services at health facilities, programs use community structures and institutions to promote the use of simple contraceptive methods in nonclinical settings. Stakeholders throughout the region have prioritized CBD of contraceptives as a critical method of filling an important gap and increasing access to family planning commodities. Task shifting the distribution and monitoring contraceptive methods at the community level accounted for much of the success of early CBD programs (Pacque-Margolis and Puckett, 2011). Offering family planning services at CBD access points can help expand the acceptability and convenience of contraceptives and reduce the costs, thereby extending use among clientele who seek contraceptives but will not use services confined to clinical settings (Ross et al., 1987, Ross and Frankenberg, 1993). For decades, CBD programs expanded access to family planning services in underserved communities in the developing world. For example, evidence in Malawi suggests that this approach can have a positive effect on CPR. Between 2004 and 2010, CPR increased from 33 percent to 46 percent and implementers attributed this, in part, to increased uptake of injectable contraceptives made available at the community level (Ouagadougou Partnership, 2012).

Limited data are available about the total number of CBD programs in the six focus countries, other than targets established by national government strategies. The scope and capacity of CBD points varies by country. Togo has a well-established community-based distribution system. The AWARE II Project successfully collaborated with two non-governmental organizations and the MOH to allow community health workers (CHWs) to provide hormonal contraceptives for the first time in an attempt to meet growing unmet need for birth spacing. Piloted in three districts, CHWs greatly increased uptake; the number of women reached by CHWs in some pilot districts was nearly eight times greater than those reached by public health

centers. Most of these new users were between 20 and 34 years old (Management Sciences for Health, 2012).

Table 11 provides estimates of the scale of CBD operations.

TABLE 11. IDENTIFIED AND PROJECTED CBD POINTS BY COUNTRY

Country	Existing CBDs identified	Projected agent increase per national plan
Burkina Faso	4516	2,701 total (2013–2015)
Cameroon	N/A	N/A
Côte d'Ivoire	2887	800 total (2015–2020)
Mauritania	215	10 per Moughataa (2014–2018)
Niger	1587	1,000 per year (2012–2020)
Togo	612	500 per year 2013–2017)

Many of the efforts currently underway to increase access through CBDs remain more aspirational than functional. As USAID and Ouagadougou Partnership partner programs introduce new CBDs, there is a need to link them effectively to the broader health system.

3.2.2 COMMODITY SUPPLY CHAIN BARRIERS

West Africa faces frequent stockouts of family planning products. A UNFPA report (2014) notes that the number of facilities reporting a stockout of at least one modern contraceptive in the 6 months prior to the survey ranged from 20.1 percent in Burkina Faso to 96.7 percent in Côte d'Ivoire. Other countries lack a sufficient selection, with access to implants, injectable contraceptives, IUDs, and condoms varying greatly by facility. In Niger, for example, only 86 percent of public health structures have injectable contraceptives, 25 percent have implants, 20 percent have IUDs, and fewer than half (44 percent) have condoms (Hope Consulting, 2015). Essential equipment, such as that needed to insert or remove implants, is also lacking in many facilities (AgirPF, 2015b).

In the countries for which data are available, the average contraceptive security index score was 47.3 points out of a possible 100. This is below the regional average for Sub-Saharan Africa (49.3) and far below the overall average of 54.5 (Douglas-Durham et al., 2015). Within that score, the six target countries had lower supply chain scores than countries in Eastern and Southern Africa. Supply chain deficiencies, including access barriers to routine data and weak national logistics systems for managing commodities, contribute significantly to these stockouts. The lack of a standardized system for reporting and an inability to track data in a timely way at the community level also hampers planning and resource allocation.

4 MOBILE INTERVENTIONS

Mobile applications offer a promising approach to overcoming barriers to family planning among target populations. Mobile applications can provide end users with the information or support required to seek out healthy lifestyle choices, including uptake of modern contraception. They can also provide health care professionals with the tools and resources required to treat patients more effectively, build skills, and track commodities supplies. While there has been a massive proliferation of mhealth interventions across Africa in recent years, few are in francophone West Africa. This section provides a general overview of the types of implemented interventions—including a general definition, key considerations, and several country examples. Like most mhealth interventions, few of these applications have undergone rigorous evaluation, and existing evidence suggests that they are more promising than proven. When available, this report includes evidence of efficacy. In so doing, the objective of this overview is to review existing applications and identify those that might best be adapted to achieve family planning objectives in West Africa.

4.1 DEMAND GENERATION APPLICATIONS

Mobile interventions offer an important complementary channel to create demand for family planning services. Mobile messages are private and personal, facilitating access for engaging individuals on sensitive topics such as sexual and reproductive health. Information on methods and service availability supports informed choice, and as a two-way medium, mobile can trigger actions including engagement in broader campaigns. For example, radio shows can direct listeners to mobile information services to address relevant topics.

Table 12 outlines some linkages between proven practices and mobile information services. The proven practices were summarized in a recent article by WHO, UNFPA, and USAID about what works in adolescent health programs (Chandra-Mauli et al., 2015).

TABLE 12. LINKAGES BETWEEN PROVEN PRACTICES AND MOBILE INTERVENTIONS

Proven practices for adolescent reproductive health interventions	Attributes of on-demand mobile information service
Comprehensive sexuality **education** positively affects behavior.	Menu format **fills the gap** on information regarding fertility, methods, and where to access services.
Information is not enough: We must address beliefs, **norms**, self-efficacy, and barriers.	**Sensitization** content is needed to address gender equality, rights, and stigma.
Dose matters: Single workshop, **one-off campaigns are not effective.**	Service designed for **sustained access** and linkages to other media.
Interventions such as youth centers and peer education have **limited reach.**	Mobile penetration is high, and youth **uptake** is higher than in older adults.
Participatory teaching methodologies are needed to build agency.	**Interactive** platform enables use of quizzes, games, and feedback.
Strong **leadership** is needed to ensure a systemic approach.	**Public-private partnerships** bring together national and community stakeholders.
Adolescents are influenced by **relationships**, families, and communities.	Content targeting **support network**, e.g., "just for men."

Source: Chandra-Mauli et al., 2015

Table 13 highlights five categories of mhealth applications used for demand generation: call centers, push message campaigns, social media, subscription services for stage-based messages, and menu-based interactive services. For each, the report includes country examples, lessons from the field, and available evidence.

The purpose of the summary is to provide an overview of mhealth applications available, with some strengths and weaknesses for each. Based on the nascent state of mhealth in West Africa and the priority focus on young urban women with unmet need, SHOPS proposes introducing a menu-based audio service as the initial regional service. Alternative options—such as call centers and push SMS campaigns—can be integrated into the platform once they have been established, enhancing their impact. The subscription service for stage-based messaging is a possible option for future deployment to integrate family planning messages into future maternal health campaigns.

TABLE 13. DEMAND GENERATION INTERVENTIONS AND LESSONS LEARNED

<table>
<tr><th colspan="2">Call centers and hotlines</th></tr>
<tr><td colspan="2">Definition: Communication center that manages incoming and outgoing telephone calls and provides patients with information about illnesses, health care resources, self-management of illness, and other health needs.
Considerations: Hotlines can help to address geographic, financial, and confidentiality barriers to health, including: supporting the needs of youth and others seeking anonymity; extending reach of care in settings with insufficient health providers; supporting continuation rates; and providing ubiquitous access to medical advice via mobile phone to eliminate misconceptions and increase uptake and continuation of services. However, the high cost of implementing hotlines often hinders their long-term sustainability.</td></tr>
<tr><td>Country examples</td><td>Field-tested evidence</td></tr>
<tr><td>Benin/Democratic Republic of the Congo: (AMBS/PS, Vodacom) Free hotline (Ligne Verte) are available through all networks and provide confidential information on sexually transmitted infections, family planning, and malaria (Brunner et al., 2014)</td><td rowspan="3">High cost to sustain hinders expansion. An assessment of Ligne Verte found it to be effective in reaching men seeking anonymity in obtaining family planning information (Corker, 2010). A recent assessment of the impact on toll-free hotlines and mobile messaging services in care-seeking behavior in Malawi noted a strong positive impact on antenatal care (ANC) initiation and skilled birth attendance, and no impact on postnatal care (Higgins Steele et al., 2015).</td></tr>
<tr><td>Sierra Leone: Marie Stopes International (MSI) established call centers linked to family planning clinics, providing training counselors to answer question about family planning.</td></tr>
<tr><td>India: (Abt) Dimpa Careline provides DMPA (Depo-Provera®) users with information on possible side effects, how to manage them, and when to return for next injection (Dalious and Ganesan, 2015).</td></tr>
<tr><th colspan="2">Push message campaigns</th></tr>
<tr><td colspan="2">Definition: One-way communication in which publisher uses a “push” technology to deliver information to mobile users without the need for subscription to messaging services. Common applications—including SMS and IVR blasts—with information, tips, and alerts about critical public health information.
Considerations: Push messaging is a potentially cost-effective, scalable method of increasing uptake and continuation rates by creating awareness and encouraging healthy/health-seeking behaviors. Messaging can address geographic and financial barriers to information, and inclusion of IVR mass messaging can address literacy barriers to health knowledge. However, push messaging does not require permission from the recipient so the sender has control over when and what messages are sent.</td></tr>
</table>

<table>
<tr><th colspan="2">Call centers and hotlines</th></tr>
<tr><th>Country examples</th><th>Field-tested evidence</th></tr>
<tr><td>Ghana: (DKT International, MSI, Grameen). Mobile messages (SMS, voice, social media) target different youth segments to increase demand for reproductive health services (Brunner et al., 2014).</td><td rowspan="3">Limited evidence to date on impact.

Project Masulileke in South Africa sent more than 685,000 messages about HIV and tuberculosis to the general public on a daily basis, generating more than 1,500 calls to the National Aids Hotline (Vital Wave Consulting, 2009).</td></tr>
<tr><td>Mali, Sierra Leone, Ghana, Uganda, Malawi: (Dutch Connect4Change Consortium). EbolaTxt provides contextualized, personal, accurate, and reliable information about Ebola through SMS (ASH, 2014).</td></tr>
<tr><td>Uganda: (Text to Change, PACE 2011-2012) used mass SMS, multimedia messaging service, and IVR, for data dissemination and collection around family planning services (ASH, 2014).</td></tr>
<tr><th colspan="2">Subscription-based stage messages</th></tr>
<tr><td colspan="2">Definition: Application that pushes personalized information to a subscribed user based on personal medical history. For example, a woman who has just delivered a baby receives targeted information about appropriate postnatal care and postpartum family planning.
Considerations: Health messaging is tailored to a subscriber and sent in stages based on a larger strategy such as staged family planning, antenatal care, or MCH services. Stage-based IVR messaging can promote healthier behavior among the non-literate.</td></tr>
<tr><th>Country examples</th><th>Field-tested evidence</th></tr>
<tr><td>Bangladesh, South Africa: (MAMA) sends SMS, voice, or data information twice weekly to pregnant women and new mothers registered on the system, with health advice tied to delivery date (Rajan et al., 2013).</td><td rowspan="2">Limited evidence to date on impact.

Qualitative research revealed higher levels of key behavior and practices promoted by the service (ANC, institutional birth, prenatal care) (Grameen Foundation, 2012).</td></tr>
<tr><td>Nigeria: (BMFG, USAID, UNF, GSMA, Grameen Foundation). Mobile Midwives delivers stage-based maternal, newborn, and child health information services, which contain health and nutrition information targeting pregnant women and new parents in local languages. Information includes alerts and reminders for care seeking (appropriate ANC visit), and information on good health practices (GSMA, 2014).</td></tr>
<tr><th colspan="2">Menu-based consumer-initiated services</th></tr>
<tr><td colspan="2">Definition: Application that uses two-way communication in which subscribers receive push messages and can select (pull) information including FAQs, quizzes, games, reminders, and interactive role model stories based on information needs.
Considerations: Tailored information sent and selected based on user need. These applications go beyond static information to generate demand and provide a call to action among users. They allow for targeted messaging to increase knowledge and understanding of key concepts, thereby addressing barriers (including among youth seeking anonymity) to increased uptake and continuation of services. Menu-based applications can also generate data on information of greatest demand to inform broader interventions.</td></tr>
<tr><th>Country examples</th><th>Field-tested evidence</th></tr>
<tr><td>Mozambique: MCenas! (Pathfinder) uses mobile intervention to reach large youth populations with sexual and reproductive health tailored to their needs. Role model stories used a participatory approach in which Pathways to Change (theory-based game) supported youth's own identification of barriers to and facilitators of behavior change. Content was developed by and for youth. Youth received SMS, role model stories, and</td><td>m4RH impact evaluation by SHOPS found significant impact on family planning knowledge but not on use of family planning over a 90-day period (Johnson et al., 2014). Evidence to Action assessed the efficacy of mCenas!</td></tr>
</table>

Call centers and hotlines	
link to hotline (Pathfinder, 2015a).	and found high acceptability of SMS, suggesting a good entry point for continued interpersonal dialogue and counseling to reinforce information (Evidence to Action, 2015).
Kenya, Tanzania: m4RH (FHI360) provides menu-based SMS information on family planning methods, clinic locations, and role model stories (ASH, 2012).	
Indonesia: (JHUCCOP) App provides on-demand family planning information, counselling thorough quizzes, FAQs, and a facility locator.	
Social media, web-based user-generated services	
Definition: Applications that seek to influence the adoption of better health behavior and knowledge by providing basic health information as well as content contributed by target population; content is community driven. **Considerations:** Social applications generate data of greatest interest and importance to users and text-to-speech functions address literacy barriers.	
Country examples	**Field-tested evidence**
Senegal: Sama Aduna Social app provides educative content including quizzes, lessons, and choose-your-own-adventure on sexually transmitted infections, family planning, and other health issues, with text-to-speech functions to address literacy.	Rigorous evaluations of efficacy not found.

Table 14 summarizes key pros and cons of the five categories for demand side interventions.

TABLE 14. PROS AND CONS FOR FIVE DEMAND SIDE INTERVENTIONS

Applications	Pros	Cons
Call centers	High touch	High cost per user
Subscription stage based	Hi dose, weekly messages	Complex registration
Push mass messages	High reach	Non-targeted
Menu based on demand	Content breadth and depth	High marketing costs
Social media	Community-generated content	Low Internet access

4.2 APPLICATIONS TO ADDRESS SUPPLY SIDE BARRIERS TO FAMILY PLANNING

The applications summarized in Table 15 focus on tools for health care providers to ensure an adequate supply of quality family planning services and commodities. SHOPS summarized five categories of applications: commodity tracking, case management and decision support, training reinforcement, referral, and supportive supervision. When available, SHOPS also provided data on intervention efficacy.

The purpose of the summary is to provide an overview of the broad range of possible interventions to improve service delivery quality and efficiency. In the following section, SHOPS proposes prioritizing a stock monitoring supply chain application as the greatest potential for impact and scale. Supportive supervision tools and decision support tools require investment in smart phones that impose challenges in procurement, maintenance, charging, and operation. CHWs and family planning distributors can introduce training reinforcement applications and referral systems at later stages once CBD is more established. Creation of routine messages to monitor stock levels and trigger resupply solves a current need and provides best entry for use of mobile in service delivery.

TABLE 15. PROVIDER-FOCUSED INTERVENTIONS AND LESSONS LEARNED

<table>
<tr><th colspan="2">Supply chain tools</th></tr>
<tr><td colspan="2">Definition: Applications used to manage the flow of products (or services) from point of origin to point of consumption.
Considerations: To ensure that essential health products such as family planning commodities are consistently available, decisionmakers need to know stock levels at health facilities and the flow of products between them. Sharing information through paper reporting can lead to incomplete data and insufficient supplies. Mobile applications can address these barriers to access and product availability, especially in hard-to-reach areas by facilitating better monitoring, managing, planning, and quantification of supply.</td></tr>
<tr><th>Country examples</th><th>Field-tested evidence</th></tr>
<tr><td>Senegal: (Intrahealth Dimagi), Customized version of CommTrack, an application that helps providers manage commodities via real-time reporting in low-resource settings (Buczyk, 2013), as LMIS to expand informed push model approach (Daff et al., 2014).</td><td rowspan="4">An assessment of cStock showed it to be accessible and feasible. An evaluation of CommTrack demonstrated feasibility as an effective solution for contraceptive stockouts and generating data for decisionmaking (Daff et al., 2014) It has ensured a more regular resupply of family planning products and increased provider-client interactions.</td></tr>
<tr><td>Tanzania: John Snow International (JSI) ILSGateway, a mobile alert and reporting system in which health workers send SMS messages with stock of 20 tracer drugs (family planning and malaria), allows decisionmakers to review aggregate data on a dashboard and use the data to ensure adequate product availability.</td></tr>
<tr><td>Malawi: (JSI, Dimagi). cStock allows community health workers to use personal phones to submit SMS with stock information, allowing community-level data to be visible to decisionmakers. cStock automatically calculates resupply needs for HSAs, transmits needs to health center via SMS, and SMS is sent to HSA when stock is available (CommCare Supply, 2015).</td></tr>
<tr><td>Ghana: (JSI) Focus Region Health Project and DELIVER partnered with Dimagi on Early Warning System to provide real-time stock status at all levels and to provide early warning of dip in supply of reproductive health commodities (CommTrack, 2013).</td></tr>
<tr><th colspan="2">Case management and decision support tools</th></tr>
<tr><td colspan="2">Definition: Application that analyzes data, including patient-specific information, to help health care providers make appropriate clinical decisions. Tools include computerized alerts, clinical guidelines, condition-specific order sets, focused patient data reports and summaries, diagnostic support, and reference information.
Considerations: Removes barriers to accessing quality point-of-care services by reducing improper clinical adherence to treatment protocols and national guidelines, including those associated with task shifting; reducing medication errors and misdiagnoses; and prioritizing high-risk clients for targeted interventions in resource-constrained settings.</td></tr>
<tr><th>Country examples</th><th>Field-tested evidence</th></tr>
<tr><td>Malawi: (MOH, Dimagi) Integrated Community Case Management application uses mobiles to capture village register information, register children, and guide adherence to standard protocol; Includes provision for supervision and supply chain applications (Shieshia et al., 2014).</td><td>No evidence of efficacy or cost effectiveness identified. More research is required.

M4Change evaluation suggests CommCare can improve delivery of health services and counseling by reducing clinical errors and increasing accountability (McNabb</td></tr>
<tr><td>Nigeria: Mobiles for change (m4Change) (Pathfinder 2012–2013) used CommCare platform to create an application that prompts CHWs with support for ANC services, and case management functionality to retrieve client records (McNabb</td><td></td></tr>
</table>

<table>
<tr><th colspan="2">Supply chain tools</th></tr>
<tr><td>et al., 2014)</td><td rowspan="3">et al., 2014). D-Tree evaluation suggests increase in follow-up. University of Alabama study noted risks of improper use of applications (ASH, 2014).</td></tr>
<tr><td>Tanzania: (Pathfinder, D-Tree) launched a community-based mobile app for CHWs to educate clients about family planning methods following balanced counseling strategy process (ASH, 2014).</td></tr>
<tr><td>Afghanistan, Burundi, India, Indonesia, Mozambique, Niger, Sierra Leonne, Sri Lanka, Uganda, Zambia: (World Vision, Dimagi, Grameen, 2008–present) are deploying MOTECH Suite, software that enables organizations to develop, manage, and monitor cost-effective mhealth applications, allowing CHWs to track clients with MCH decision support (ASH, 2012).</td></tr>
<tr><th colspan="2">Training reinforcement tools</th></tr>
<tr><td colspan="2">Definition: Applications to support continuing medical education for frontline and remote providers through access to educational videos, informational messages, and interactive exercises that reinforce skills.
Considerations: Scaling-up of education to meet overwhelming demand for human resources for health requires significant resources. These applications can remove financial and geographic barriers to clinical service quality and continuing medical education by: reducing need for expensive refresher training; eliminating the need to leave posts in rural/remote settings; tailoring training to unique cultural, ethnic, and language needs; and accelerating training of new workers.</td></tr>
<tr><th>Country examples</th><th>Field-tested evidence</th></tr>
<tr><td>Mali: Intrahealth developed SpacedEd for in-service training on postpartum family planning via SMS and IVR in French to provide current information and reduce need for retraining (Capacity Plus, 2011)</td><td rowspan="4">Rigorous evidence if impact is lacking, with studies suggesting potential rather than achievement. Evaluations confirm that mLearning is feasible and convenient (O’Donovan et al., 2014).</td></tr>
<tr><td>Senegal: (Capacity Plus) mLearning combines SMS and IVR to deliver refresher training to family planning providers, focusing on management of contraceptive side effects and counseling to dispel misconceptions (Gilroy et al., 2015).</td></tr>
<tr><td>Uganda: (Abt, Jhpiego, MSI 2010–2011). Mobiles for Quality Improvement (m4QI) pilot sent SMS to reinforce face-to-face family planning training through an SMS:Learn app.</td></tr>
<tr><td>Global: mPowering Frontline Health Workers developed ORB platform, which hosts more than 200 mobile-optimized training resources in 14 languages (mPowering, 2015).</td></tr>
<tr><th colspan="2">Referral tools</th></tr>
<tr><td colspan="2">Definition: Applications that assist in appropriately referring a person to a clinic or hospital for more complex diagnostics or treatment that is more comprehensive.
Considerations: Referral applications can reduce financial, quality, and access barriers by ensuring that medical records accompany referrals and supporting follow-up efforts to ensure that patients reach the referral facility.</td></tr>
<tr><th>Country examples</th><th>Field-tested evidence</th></tr>
<tr><td>Guinea: Health workers use mobile phones to refer patients for family planning services, or when danger signs appear for pregnant women.</td><td rowspan="3">A literature reviewed published in the Journal of Tropical Medicine and International Health in August 2015 states that mhealth for referrals is still in its infancy and its effectiveness is largely inconclusive (Agarwal et al., 2015).</td></tr>
<tr><td>Tanzania: (DTree) Application enables CHW records to synchronize with health facility systems while generating two-way referral tracking (HC3, 2013).</td></tr>
<tr><td>Haiti: (Pathfinder) mSante uses CommCare application for CHWs, including integrated MCH, family planning, and HIV services. Support includes referral/counter referral through client-tracking and record-sharing functionalities (Pathfinder,</td></tr>
</table>

Supply chain tools	
2014).	
Supportive supervision tools	
Definition: Applications allowing supervisors to track the performance of disparate workers and implement a facilitative approach to supervision that promotes mentorship, joint problem solving, and communication. **Considerations:** Supportive supervision applications can help eliminate geographic barriers to performance management through supervisory structures that can offer feedback and coaching. They can also reduce financial barriers by providing cost-efficient approaches to supervision and continuous training.	
Country examples	**Field-tested evidence**
Ghana, Malawi, and Nigeria: Abt integrated supervisory checklists onto smart phones and developed a platform to generate action plans and feedback for improved performance automatically.	Evidence of efficacy needed. One non-case-controlled evaluation found increased ability to address stockouts, identify and address provider needs, and gather real-time data for decisionmaking.
Ethiopia: (JSI) Used EpiSurveyor to install supportive supervision checklist for supervisors of health extension workers. Smart phones allowed offline data collection during supervision and improved efficiency of manager feedback (Karim et al., 2013)	
Ghana: (JSI Research and Training Institute, Grameen) Concern Community Hub Initiative (2014–2015) uses MOTECH software to strengthen CHW motivation and performance through point-of-care decision support, training, work planning, and supportive supervision (Concern Worldwide, 2015)	

Table 16 summarizes key pros and cons of the five categories for supply side interventions.

TABLE 16. PROS AND CONS FOR THE FIVE SUPPLY SIDE INTERVENTIONS

Applications	Pros	Cons
Supply tracking	Promising emerging evidence	User incentives
Case management/decision support	Enables task shifting	Requires smart phones
Training reinforcement	Cost effective	Limitations in adequate breadth of content
Referrals	Greater continuity of care	No evidence of results
Supportive supervision	Actionable data	Roll-out at scale

Stockouts of essential commodities can threaten support for and the reputation of community-based interventions. A supply chain intervention that supports simple resupply at the community level, and mechanisms that ensure appropriate and timely community logistics data to health centers and districts can promote confidence in CHWs (Chandani et al., 2014).

5 ILLUSTRATIVE MOBILE SOLUTIONS

In this section, we describe two proposed solutions, one for strengthening the supply side and one for building demand for family planning. We describe each intervention in detail, with intended benefits, beneficiary targets, steps toward deployment, and representative options for utilizing existing software applications. We present the two solutions independently rather than as an integrated set because they have diverse targets and partners. Commercial sector partners are better suited for demand side interventions while supply side interventions are better suited for ultimate integration by governments. The independent assessment provides flexibility in moving forward with one, or both, or a hybrid version of the two.

5.1 CRITERIA FOR CHOOSING INITIAL SOLUTIONS

SHOPS used the following criteria in narrowing down the list of possible interventions to those with the greatest potential for impact, scale, and sustainability.

- Clear linkage to USAID/WA family planning strategy and priorities: SHOPS prioritized the solutions that addressed key family planning barriers discussed in Section 3. To help generate demand, SHOPS focused on reaching the large youth population. SHOPS emphasized youth in urban and peri-urban areas because of the high population density. To help address increased access to quality family planning services and commodities, SHOPS prioritized strengthening linkages among community-based distributors.
- Promising evidence of impact: Rigorous cost-effectiveness evidence is lacking for the proposed solutions, but process evaluations by implementers of similar interventions indicate encouraging results (Johnson, 2014; CommCare Supply, 2015).
- Follow the Principles for Digital Development: These guidelines emphasize mhealth best practices such as reusing existing technology investments and starting with the simplest solutions.
- Focus on single-use case, with potential for future expansion: Each of the mhealth interventions presented in the preceding section could potentially be introduced in a suite of integrated applications, but a narrow focus at initial stages will lower cost and risk.
- Leverage existing base of phones: A number of supply side and demand side applications require smart phones or feature phones that are not widely used by target populations in West Africa. Procuring, distributing, and managing phones in large-scale programs is also costly.

5.2 SOLUTION: DEMAND CREATION THROUGH FAMILY PLANNING INFORMATION AND STORIES

SHOPS proposes an on-demand IVR/SMS information service that provides target populations with appropriate information and messaging to address barriers to family planning use. In a recent evidence review by the WHO, UNFPA, and USAID on adolescent sexual and

reproductive health programs, the authors emphasized the need for interventions that include participatory learning approaches, intensity of messaging, and attention to the broader spheres of influence in designing effective adolescent programs (WHO, 2015b). As noted in Table 12, mobile technologies are well suited to meet these criteria as part of a broader sexual and reproductive health campaign.

The proposed IVR/SMS service offers a menu of information that allows consumers to access the specific information they want, when they want it. Importantly, menu-based mobile content can address non-informational barriers, such as acknowledging social norms through stories on female empowerment, special channels for men, youth-created content, and clinic locations. The service content should be relevant, engaging, and actionable. Evidence points to the important role that giving voice to young women can have in societies where girls lack the space to speak out in their communities (UNICEF, 2013). Peer voices in mobile story format can influence social norms around gender equity and empower girls to make decisions about their health.

Best practices in mhealth behavior change interventions emphasize the need for integrated holistic approaches that do not rely on a single channel (Gurman et al., 2012). As noted in Section 4, multiple complementary interventions using mobiles can strengthen the impact on targeted behaviors. For example, HOPE Consulting suggests reaching target audiences through a mix of anonymous hotlines along with linkages to peers who are more proactive in their health-seeking behaviors (HOPE Consulting, 2015). Additional targeted activities such as SMS educational messages for postpartum woman can complement information services designed for the public. The following proposed intervention is a starting point and does not preclude investment in additional campaigns to promote informed choice about contraceptive use.

5.2.1 SERVICE OBJECTIVES

The aim of the service is to provide potential users of family planning with information—including a better understanding of fertility—and to help dispel myths and misconceptions about contraception. SHOPS acknowledges that such a service cannot increase contraception use on its own and needs to be part of a holistic family planning strategy. As such, it can amplify other interventions in the region and help generate the knowledge and understanding that, when combined with counselling or support, can lead to increased CPR. For example, AgirPF plans to send SMS testimonials by family planning champions to potential users and use the REDI framework to educate and empower clients. This would be part of a larger program to increase quality information and encourage health childbearing decisions (AgirPF, 2015b).

5.2.2 SERVICE DESCRIPTION AND BENEFITS

Consumers dial or send a text to a special number where they gain access to a welcome message and instructions to pick a topic by pressing buttons on their phones' dial pad. One can also design services with automatic call back after “flashing” to consumers to request a call from the software to initiate the menu interaction. A computer that connects to mobile networks hosts the content (audio recordings or text messages). The service owner(s) design, load, maintain, and monitor audio and text content through a web-based software platform that automatically links consumers to the messages of their choosing.

TABLE 17. BENEFITS AND CHALLENGES OF INFORMATION SERVICES

Proposed service benefits	Challenges
• Information tailored to specific needs through submenus of interest to particular populations. • Content flexibility and range including non-health topics from infectious diseases to livelihoods. • Format flexibility with texting for literate population (allows storing and sharing) and voice for illiterate (allows local dialects). • Built-in metrics with sharable data on service use and topics of greatest interest. Indicators include number of first-time system users, number of repeat users, length of engagement, message content in greatest demand, and failed messages. • Interactive format enables polling, games, and quizzes for deeper engagement than one-way content.	• Voice service utilizes more network resources, imposing high per-call charge. • Extensive marketing and promotion is needed to build awareness into existing project communications campaigns. • Not effective as stand-alone intervention; requires integration with a comprehensive social and behavior change communication campaign, with linkages to related outreach services, community events, mass media campaigns, peer educators, call centers, etc.

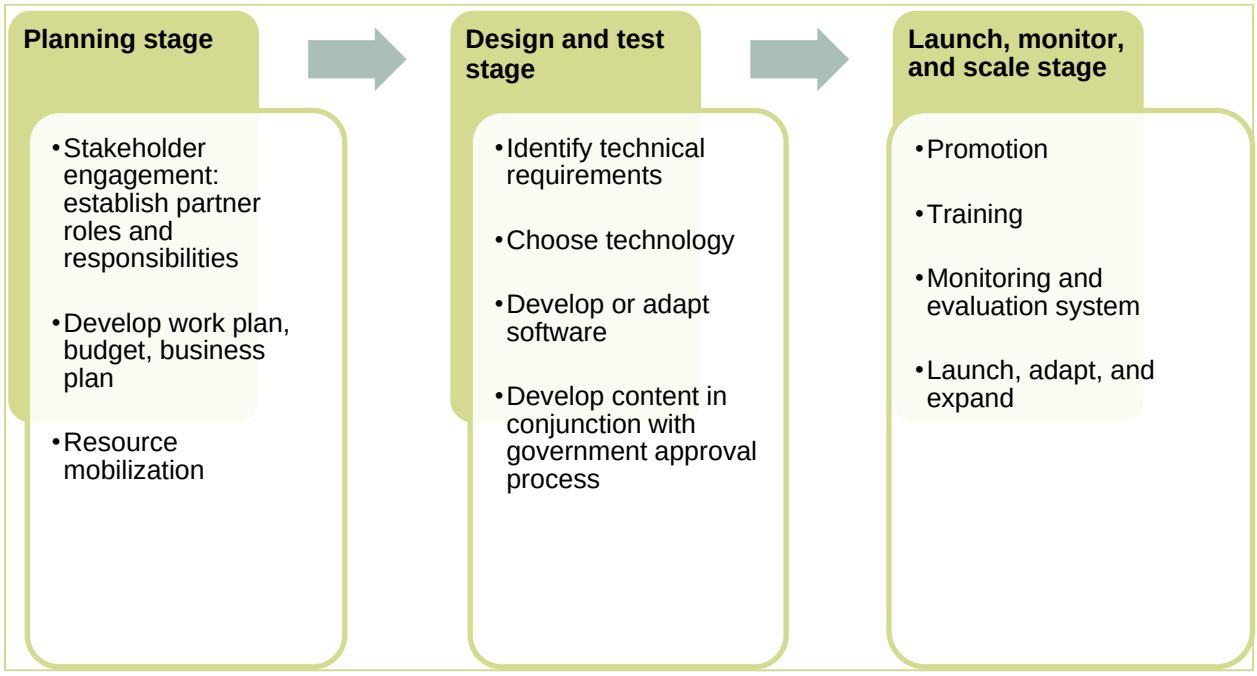
5.2.3 TIME FRAME AND GEOGRAPHIC SCOPE

SHOPS recommends a 3-year time frame with three countries as the basis for planning a regional solution. Given the novelty of a regional mhealth approach and the significant resources needed for large-scale audio services for consumers, it is prudent to start with a smaller set of countries and expand as its feasibility is established. SHOPS used Niger as the design-and-test country and Cameroon and Côte d'Ivoire as the additional launch countries in budgeting costs. SHOPS selected these countries based on the earlier stakeholder support developed in Phase 2. The 3-year period provides a solid foundation for assessing the service's feasibility, reach, and impact, with the expectation of on-going review to determine whether it meets partner expectations in terms of adequate returns on investment. Three years is an ambitious timeframe in which to reach national scales. SHOPS chose this timeframe to reflect the momentum achieved during Phases 1 and 2 with strong MOH support and partner interest in the three countries.

5.2.4 ACTIVITIES

Figure 5 lists broad implementation activities, each covered in more detail in Section 6 on Costs of Service.

FIGURE 5. ILLUSTRATIVE IMPLEMENTATION ACTIVITIES BY STAGE



5.2.5 ADDRESSABLE MARKET

Young urban females comprise the primary audience for the IVR/SMS information service. The most recent DHS data from the six focus countries estimates that more than 40 percent of WRA not currently using a modern method are between ages 15 and 24. Nearly 1.3 million of these women have expressed an unmet need for family planning (ICF International, 2000–2014). The secondary audiences for the IVR/SMS information service are the spheres of influence for the primary population (e.g., spouses, mothers-in-law, providers) and young urban males.

As highlighted in Figure 6, an estimated 3.3 million female youth ages 15 to 24 live in urban and peri-urban areas in the six focus countries. Phone access in urban areas is high, ranging from 82 percent in Niger to 92 percent in Côte d'Ivoire. A GSMA study documenting the gender gap in phone ownership found that women are 14 percent less likely than men are to own a phone, but the gap is greater in rural areas (GSMA, 2015a). Specific data are not available on phone ownership by age and gender in West Africa, so SHOPS used the DHS data on phone access to assess market size.

Figure 6 represents key populations in the six focus countries: Burkina Faso, Cameroon, Côte d'Ivoire, Mauritania, Niger, and Togo.

FIGURE 6. PRIMARY AND SECONDARY TARGET POPULATIONS (IN MILLIONS)

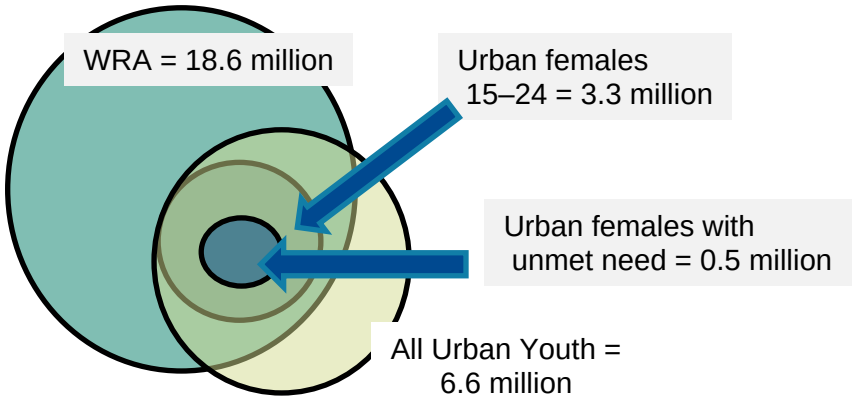


Table 18 shows the breakdown of the population by segments in the three launch countries. In the final column, SHOPS provides the projected number of unique individuals who will access the service at the end of 3 years. No data exist to anticipate the percent of the target market that will access the service and with what frequency. Variables include the level of service marketing; the quality of service usability; the breadth, relevance, and resonance of the content; and the cost to consumer. In its forecast for mNutrition service uptake in Mozambique, GSMA used a benchmark of 5 percent of its target market, assuming that blast SMS messages to build awareness were the only promotion for the service (GSMA, 2015b).

Based on available DHS data in each country, SHOPS estimates that the total addressable market of urban female youth ages 15–24 not using modern contraception across the three countries at approximately 2 million (ICF International, 2011–2014). SHOPS assumed an aggressive marketing budget to generate demand for the IVR/SMS information service and a correspondingly higher response rate of 15 to 20 percent of this market, or 350,000 unique service users. Estimates of total reach are adjustable as needed to reflect realties after service roll out.

TABLE 18. POPULATION SEGMENTATION IN THREE LAUNCH COUNTRIES (IN MILLIONS)

Country	Women of reproductive age	Females 15–24 not using modern method	Urban females 15–24	Urban females 15–24 not using modern method	Urban females 15–24 with unmet need	Projected number access IVR/SMS information	Phone ownership urban households
Cameroon	4.8	1.8	1.1	1.0	0.2	0.2	87.8%
Côte d'Ivoire	4.4	1.6	1.0	0.8	0.2	0.1	92.6%
Niger	3.3	1.3	0.3	0.2	0.03	0.05	82.8%
Total	**12.5**	**4.7**	**2.4**	**2.0**	**0.43**	**0.35**	

Source: ICF International, 2010–2014; United Nations, 2013

5.2.6 SOFTWARE OPTIONS

The following are illustrative requirements for the proposed application needed from a software vendor.

Required functionality (illustrative):

- Decision tree algorithm to enable navigation of menus with hundreds of sound files
- Integrated content management across IVR and SMS channels
- Push message option for polls, surveys, and follow-up
- Sponsorship message placement
- Data hosting
- Data security
- Access rules for updating content
- Data analytics, visualization, and dissemination
- Mobile integration and delivery
- Interoperability District Health Information Software 2 (DHIS2), other

Additional considerations:

- Licensing/rights of use
- Process for monitoring, maintenance, and upgrading
- Servers, modems, chargers, and power source

5.2.6.1 COMPARISON OF EXISING IVR SOFTWARE

The following summary describes three of the most widely used IVR applications in developing country context, with notes comparing key attributes. SHOPS developed the notes based on product websites, tech reviews, and SHOPS's experience. They are not rigorous evaluations. Software evolves rapidly, and new features are continually becoming available.

SHOPS chose these three IVR developers because they are social mission organizations that promote their services as designed for nontechnical organizations. All three want to use web browsers to build and launch IVR and SMS services with no need for software development. These are cloud-based solutions to launch decision tree programs with application protocol interfaces to integrate into multiple telecoms.

- **VotoMobile** is developed and maintained by a 3-year old Ghana-based company also called VotoMobile. Notably, the large-scale 3-2-1 programs, managed with Human Network International with Airtel in Madagascar and Malawi, use the VotoMobile technology. They have a dedicated Francophone Africa Manager and will have network integrations in by in Burkina Faso, Niger, and Senegal by Quarter 1 of 2016.
- **EngageSpark** is developed by a recently founded, Philippines-based company also called EngageSpark. While EngageSpark is less experience than the other two organizations, it has focused on creating robust application protocol interfaces that facilitate rapid integration with MNOs across a range of channels. An Ebola education campaign in Guinea-Conakry now employs EngageSpark's software.
- **Verboice** is developed and maintained by Innovative Support to Emergencies, Diseases,

and Disasters (InSTEDD). InSTEDD is a 9-year old Silicon Valley-based software and implementation group that specializes in building software for emergencies and international development. InSTEDD has regional “iHubs" in Cambodia and Argentina. Verboice is one of a large suite of software applications that InSTEDD provides for organizations to use. It is designed specifically to work with VoIP services (such as Skype) or can be installed on a local server with a dedicated phone line

TABLE 19. COMPARISON OF EXISTING IVR SOFTWARE

Feature and why it is important	VotoMobile	EngageSpark	InSTEDD Verboice
Flow builder: This is the logic for what happens when users press certain keys on their phones. User-friendly flow builders avoid the need for code to construct the pathways.	Drag-and-drop flow builder that includes randomization filter and advanced filters to move between logic trees.	No option for decision tree. Each question stands alone with options before moving to the next question.	Visual interface with multiple interface buttons to build decision tree.
Uploading audio content to the software: Usually from an audio file, but user-friendly options include the ability to record through computers or phone calls that use the phone as microphone and recording device.	Upload file or “call to record” feature to record via phone.	Upload file or record directly into the system from computer microphone.	Upload file or record through computer or text to speech.
Automatic call back after “flashing:” Allows callers to avoid call charges by hanging up and triggering initiation from the IVR system.	Yes	Yes	No
Call and content metrics: Includes calls received, failed calls, and messages accessed.	Yes	Yes	Yes

Costs for utilizing these software programs will depend on a number of factors and are generally negotiable. As noted in Section 7.2.1.1, open-source software means that the underlying code is freely available, but there may be charges to use the software. Typically, there is volume-related, per-unit cost (per voice minute or text message) that is in addition to mobile network per-unit charges. There may be additional (country-specific) fees, such as telco charges for local phone numbers that software vendors will pass through to clients. Some also may have monthly license fees that vary by country, depending on whether a vendor currently has a connection to a network or aggregator in the country. Based on a budget Abt Associates built for an IVR service in East Africa, SHOPS used the following prices as a basis for calculating annual costs in Section 6:

Software license cost per bulk SMS: $.01

Software license cost per voice minute: $.01

Software fixed license fee per month: $300

Use of MNO-developed software would likely reduce these fees but be offset by higher development costs for the software application.

5.3 SUPPLY SIDE

Many efforts to improve and modernize data collection at the national level are underway across West Africa. Currently, there is not a standardized system in place to track data across programs. Last-mile reporting improves reliability of supply where family planning practices are not well established. To strengthen family planning service delivery, SHOPS proposes an SMS-based data collection application. Such an application can obtain timely data to help prioritize family planning activities, identify areas of highest potential need, improve secure contraceptive supply, and identify issues and gaps in operations. The proposed application gives access to any community member owning a mobile device.

The application will be targeted for use at community-based distribution points, with the understanding that the efficacy of CBD programs is still nascent in many countries. As such, the application could be modified to provide timelier, more accurate data for providers across the health system. Example applications include those helping to address West Africa's frequent contraceptive stockouts; 96.7 percent of facilities in Côte d'Ivoire had stockouts of at least one commodity in the 6 months prior to a UNFPA study (UNFPA, 2014). Barriers to routine data and weak logistics systems for monitoring commodities contribute to these stockouts.

5.3.1 SERVICE DESCRIPTION

The proposed intervention focused on CBDs complements existing efforts in West Africa to strengthen contraceptive supply-chain management. These include transition to DHIS2 and automation of logistics-management systems. Ministries in the region are using communications technology to improve reporting, ordering, and monitoring at the district, regional, and national levels. The focus of the proposed intervention is to align with and supplement existing family planning logistic systems to provide real-time stock status information, improve timeliness of ordering and delivery, and prevent stockouts at the community level.

Under the proposed scenario, CBDs will send routine structured messages from personal basic phones to a number where the messages will be accessible by supervisors, affiliated public health facilities, program managers, and other stakeholders. The message will follow a strict format for each data field separated by a space or # sign (e.g., abc#124#12#78#99), with each number in the string indicating a specific indicator. The SMS data will auto-populate Excel forms linked to existing computers at participating public health facilities and NGO family planning programs for analysis and reporting. The content and frequency of the messages will be determined in consultative meetings with MOH health information systems staff and USAID partners. Illustrative indicators include family planning products received, family planning quantities used, family planning quantities on hand, and number of new adopters. Data will align with national DHIS2 framework classifications and agreed-upon family planning product codes to promote use in decisionmaking at all levels. Data quality control will include logic rules to reject submissions out of expected range. Reminders, alerts, and group messaging functions will be included to optimize data use.

5.3.2 SERVICE OBJECTIVES

The objectives of this service are to improve availability, visibility, and timeliness of family planning product and service data outside of facilities and to monitor community distribution and use of family planning products to improve preparation and response.

5.3.3 TIME FRAME AND GEOGRAPHIC SCOPE

SHOPS recommends the same 3-year planning horizon used for the IVR/SMS information service for the SMS data collection application. A longer timeframe is not prudent because the rapid pace of change in mobile services suggests that at the end of 3 years, CBD programs may be transitioning to wider use of smart phones, which provide potential for a richer set of applications. The objective of this intervention is to fill the gap in community-level service data in a cost-effective way. Given the simple design of the intervention and lower cost of SMS applications, SHOPS provided costs for rollout to all six focus countries.

TABLE 20. BENEFITS AND CHALLENGES OF SMS DATA COLLECTION BY COMMUNITY-BASED DISTRIBUTORS

Proposed service benefits	Challenges
• More timely than paper-based reporting systems. • Higher accuracy with no need for data entry and logic rules to reject data out of range. • SMS channel available on all makes and models of phones; no need to procure, distribute, or manage higher end feature phones or smart phones. • Complements current national supply chain programs (including Systems for Improved Access to Pharmaceuticals and Services and DELIVER) monitoring stock status data at the central and district levels. • Promotes a harmonized reporting system across programs and sharing among stakeholders.	• Only works with limited number of data fields because not form based. • Requires coordination and alignment with DHIS2 to ensure consistency of indicators with national stakeholders. • Processes needed to ensure CBD motivation to comply with routine SMS reporting including reminders, reinforcement, recognition, and incentives.

5.3.4 TOTAL ADDRESSABLE MARKET

Table 21 shows size estimates of key target populations for the data collection service. Family planning project work plans for the region, national FP2020 strategy reports, and other sources served as the basis for estimates.

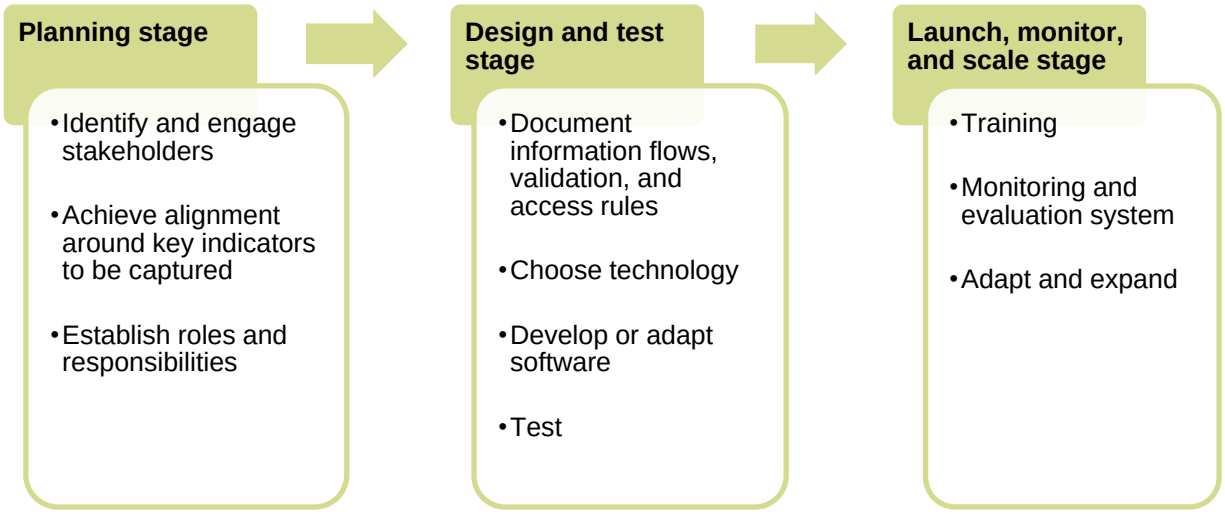
TABLE 21. IDENTIFIED AND PROJECTED CBD POINTS BY COUNTRY

Country	Existing CBDs identified	Projected agent increase per national plan
Burkina Faso	4516	2,701 total (2013–2015)
Cameroon	N/A	N/A
Côte d'Ivoire	2887	800 total (2015–2020)
Mauritania	215	10 per Moughataa (2014–2018)
Niger	1587	1,000 per year (2012–2020)
Togo	612	500 per year (2013–2017)

Over the 3-year period, SHOPS used a conservative estimate for total number of distributors enrolled and trained on the data collection pilot. These estimates reflect the early stage of community-based programs in the six countries, potential for resistance to reporting

requirements, poor signal coverage, or other technical problems in some settings. Successful participation by distributors is expected to grow with program maturity and properly structured incentives for routine reporting.

FIGURE 7. SMS DATA COLLECTION SERVICE ELEMENTS



5.3.5 TECHNOLOGY SELECTION

Required functionality (illustrative):

- SMS push and pull message platform for receiving data and sending automated reminders, confirmation, and error messages
- Ability to modify logic rules for the SMS data string
- Data hosting
- Middleware to extract, transform, and load from Excel to web
- Local phone number
- Data analytics, visualization, and dissemination
- Interoperability with DHIS2, other
- Licensing rights/open source
- Process for modifying indicator fields, query and response content

5.3.6 COMPARISON OF SMS SOFTWARE REVIEW

The following is a summary of three of the most widely used SMS data collection platforms for use with basic phones, with corresponding notes comparing key attributes. These four software programs were selected from a broader list, based on the software's ease of use, positive reputation within the mhealth community, and SHOPS staff's positive experience working the software. The reviews are not rigorous evaluations.

- **TeleRivet** is developed and maintained by a San Francisco-based corporation called TeleRivet with an office in Dar es Salaam. TeleRivet was one of the first software programs to make it easier to deploy an SMS program using a smart phone rather than a harder-to-procure SMS modem.

- **RapidPro/TextIt** is developed and maintained by a 5-year old Rwanda-based company called Nyaruka. The software is called RapidPro, but the online, commercially hosted version of the software is branded as TextIt. UNICEF also uses the RapidPro software for its large-scale SMS initiatives, and an explanation of their partnership can be found at https://community.rapidpro.io/about-rapidpro/. TextIt is now testing an IVR service as part of its platform expansion.
- **FrontlineCloud** is developed and maintained by Occam Technologies, a Washington D.C.-based firm with Nairobi-based developers. FrontlineCloud is the most recent update to FrontLineSMS, the most established SMS software in the international development community. The cloud software builds on the original PC-based service and is now available for use through the Internet browser similar to the other SMS solutions reviewed here.

Other widely known SMS data collection platforms available convert paper forms into electronic forms and create a data-management system (e.g., CommCare HQ, DataWinners, ODK Collect, Magpi, and Taroworks). SHOPS did not review these platforms for this report because they are form-based software designed for smart (Android or iPhones) or feature (Java-based) phones. Such applications can manage much richer data collection requirements but need a base of higher end phones (existing or purchased) to be deployed at scale. Given the nascent state of mhealth in the focus countries, SHOPS recommends introducing an initial solution that can leverage an existing, ubiquitous base of simple phones.

TABLE 22. COMPARISON OF SMS DATA COLLECTION SOFTWARE

Attribute and why important	TextIt (branded as RapidPro)	Telerivet	Frontline Cloud
Flow builder: This "call and response" logic defines what should happen when a user responds in a certain way and is key to its ease of use. The most user-friendly flow builders avoid the need for code and use visual guides to drag and drop boxes to form a flow chart, which allows easy modification without technology skills.	Drag and drop interface along with real-time simulator for testing	Dropdown menus with defined set of options	Click to select what type of interaction and then fill fields; defined set of interaction options
Character count: Displays character count as someone is typing to track the 160-character limit to prevent paying for additional SMS messages where possible.	Yes	Yes	Yes
Advanced content validation: Provides degrees of validation within a message to allow a program to set a minimum and maximum value separately for each number in a string. The system returns an error message for responses outside the acceptable range.	Yes	No	No
Relative scheduling: Schedule outbound messages dependent on recipient attribute.	Yes	Yes	No
Sent/received and content metrics: Provides records and information about the number of messages sent, received, and how replied to, with built-in pie or bar charts. Transmission data generated by MNOs will depend on their reliability.	Yes	Yes	Yes
Options for distributing SMS: Main mechanisms are (1) use of an Android Gateway app connected to online software in which a smartphone serves as gateway to send and receive messages; or (2) direct connection with MNOs or a mobile aggregator established in a country (e.g., Twillio, Nexmo, Clickatell). The second option is costlier but offers higher reliability.	Android Gateway app and direct connection to some aggregators (paid separately)	Android Gateway app and direct connection to some aggregators (paid separately)	Android Gateway app and direct connection to some aggregators.
Fees: Information on service costs was not provided by all vendors. Rates are negotiated.	Upfront purchase of credits; covers volume-based messages sent and received	Monthly pricing model (volume based)	$25 per month flat rate, independent of message volume

6 PATHWAYS TO SCALE

6.1 mHEALTH VALUE CHAIN: THE IMPORTANCE OF PARTNERSHIPS

Partnerships are critical to the long-term success of mhealth initiatives because mhealth is inherently a cross-disciplinary activity, involving commercial, social, and public enterprises. Partnerships allow each partner to concentrate on its key strength.

Any of the actors described below can introduce mhealth solutions on their own—purchasing the inputs needed—but partnerships create more efficient foundations for scale (GBCHealth, 2014). Successful partnerships start by identifying mutual objectives and ensuring that the partnership structure reflects each partner's interests.

USAID implementing partners

In this report, USAID implementing partners represent the key stakeholders in this category, but many additional organizations are likely to contribute and benefit from participation. These stakeholders include NGOs, faith-based organizations, International Planned Parenthood Federation affiliates, and donors supporting family planning programs. mHealth investments labeled as USAID in the costing scenarios could be reduced by sharing these costs with other actors in the region.

Government partners

These include health ministries (multiple departments), information ministries, and telecommunications regulators who offer the power to convene stakeholders, promote coordination, ensure alignment of interventions with national priorities, and provide advocacy to key constituents.

For purposes of this analysis, SHOPS did not calculate most government activities as financial contributions but rather as indirect support, which is an important antecedent for private sector investment. There is no alternative to the unique and fundamental power of governments to oversee public health content or set rules for accessing telecommunications channels. SHOPS quantified some service-specific costs related to stakeholder convening and service promotion in contribution estimates.

Technology partners

Software companies, mobile aggregators, MNOs, and technology entrepreneurs offer skills in solution design, marketing, and data management in addition to message delivery.

As the commercial partner in mhealth, technology partners will expect to cover their costs, which may occur through variety of mechanisms. Because of their foundational role as the delivery channel for mobile messages, SHOPS provided a more detailed discussion of MNOs as partners.

6.1.1 SPECIAL ROLE OF MNOs

This section looks at considerations relevant to partnerships with MNOs—specifically, the requirements for securing long-term commercial support for mhealth initiatives designed for

social impact. The mobile industry is highly competitive, with high capital costs for infrastructure, rapid evolution of underlying technology, price wars that lower profits, and high regulatory fees and taxes. mHealth initiatives with limited potential to affect MNO market position are unlikely to attract MNO time, energy, or interest apart from one-off philanthropic grants to fulfill corporate social responsibility.

MNOs will invest in initiatives that help them achieve greater profitability through new customers, higher revenue from existing customers through greater use of network services, new revenue streams that leverage existing assets and infrastructure, and fewer subscribers switching to competitor networks. These objectives are achievable by introducing services that enhance an MNO brand, provide unique content or functions that differentiate a MNO from its competitors, lower costs of providing services, or enhance MNO stature with government regulators. Services that have social impact but do not generate revenues may receive short-term philanthropic funding but not on-going investment.

SHOPS summarized key considerations for successful social-sector MNO partnerships, based on guidelines provided by WHO and the United Nations Foundation (WHO, 2015b) and GSMA (GSMA, 2015a).

- Frame and design the partnership as a strategic business opportunity rather than a philanthropic pursuit. Negotiate terms with business units, not corporate social responsibility departments.
- Identify assets both parties will contribute to the endeavor. These include cash, staff expertise, access to distribution channels, and resources.
- Engage MNO expertise during the conceptualization and design phase. For sustainable investment, the service must fulfill MNO strategic objectives, fit with their understanding of market gaps and opportunities, and be approached as a joint enterprise with flexibility on both sides.
- Identify MNO benefits and how they can be measured. MNOs need a business plan that projects costs, users, operational and economic efficiencies, and returns on investment using evidence from implementations in other markets.
- Staff the initiative with experts who understand how MNO is structured. Negotiations of MNO agreements are lengthy and require legal, financial, and technical expertise.
- Develop MOUs at the country level. Regional partnerships are complex, and roles and responsibilities must be spelled out for stakeholders at the local, regional, and global levels.
- Create a process for regular and frequent communications. Broad participation from across the organizations will strengthen buy-in and ongoing commitment.

Table 23 summarizes the value proposition for USAID and an MNO of a mhealth partnership.

TABLE 23. SUMMARY OF THE VALUE PROPOSITION OF A PARTNERSHIP

What USAID offers MNOs	What MNOs offer USAID
• Expanded client base through access to communities and outreach partners to supplement MNO distribution channels. • Market intelligence, demographic research, and segmentation studies that provide understanding of user needs. • Educational content, localization, and extensive social and behavior change communication expertise. • Credibility and trust of community leaders and contacts with other development partners. • Relationship with key government agencies. • Standardized systems for monitoring and evaluation. • Enhanced reputation with employees and customers through alignment with the social mission.	• Access to subscriber base for surveys and health service promotion. • Potential reduction in procurement costs for airtime, network integration, and billing services. • Expertise in service design and hosting. • In-house capabilities and dedicated teams to conduct above-the-line marketing campaigns. • Below-the-line marketing channels, including extensive distribution networks (agents, points of service) and services embedded on SIM cards. • Call Record Data for insights into network use, customer location, and demographic information.

6.1.1.1 ISSUE OF EXCLUSIVITY

For public health partners seeking support from MNOs, offering exclusivity—partnering with a single mobile operator in a competitive industry—involves trade-offs. A mhealth service made available through all networks in a country or region has the potential for widest reach but may not be effectively supported or marketed by any network. Following is a list of some of the pros and cons of exclusive versus nonexclusive MNO services.

6.1.1.2 THE CASE FOR M-SOLUTIONS DESIGNED FOR ALL MNOs

An IVR or SMS solution can be developed and deployed without MNO collaboration. These technologies are standardized, and numerous vendors—such as those summarized in Section 5—have designed applications for use by nontechnical partners. Owners of such services can individually negotiate connectivity terms with all mobile operators in a market. Potential advantages of nonexclusive solutions include:

- Ensuring broadest service coverage because different network operators often provide best signal coverage in different geographic areas of a country.
- Maximizing end-user choice for their preferred network, allowing consumers and health staff to take advantage of special offers and to rate packages.

Key considerations:

Government mandates: Successful large-scale initiatives that are open to all operators traditionally have strong government regulatory involvement. For example, the mobile regulatory agency in Bangladesh convened the six licensed operators to ensure their agreement to charge subscribers set rates for messages through the Mobile Alliance for Maternal Action (MAMA) service. This process was lengthy but succeeded because of strong support by the regulatory agency for the MAMA mission.

Revenue through user fees: Mobile operators will expeditiously integrate new services with revenue potential as demonstrated by the rapid growth of mobile money services across Africa. If an IVR/SMS service imposed user fees and shared them with the operators, they would have greater incentives to promote through their networks.

6.1.1.3 THE CASE FOR EXCLUSIVE PARTNERSHIPS WITH A SINGLE OPERATOR

Under this model, a single mobile operator partners with USAID to implement the service across several countries. Because mobile networks are integral to mhealth solutions and networks operate in highly competitive markets, many large-scale mhealth initiatives are single-operator partnerships.

MNO interest in a mhealth partnership will depend on the articulation of benefits that will advance their market position, generate profits, and/or enhance their brand. Potential advantages for the MNO include the ability to better understand market segments, improve its relationship with a government, and deepen its connection with existing customers.

Human Network International successfully introduced an exclusive MNO partnership model with Airtel in Madagascar for the 3-2-1 information service, which has reached more than 3 million unique users over 5 years. Consumers call or text the 3-2-1 number to access information across a range of topics, including health, nutrition, sanitation, agriculture, gender, and family planning. Airtel covers marketing, operating, and some costs of calls free to consumers because it realizes value through indirect revenues generated from improved customer retention and increased use of the Airtel network. An evaluation of the service found evidence that health and gender were the most popular content, and 3-2-1 users showed higher network loyalty rates than non-3-2-1 users. The service is built into Airtel SIM cards, which lowers marketing costs (Wills et. al., 2015). Since its inception, Airtel has donated more than 20 million minutes of free airtime.

Exclusive partnerships provide the following potential advantages:

- Potential to reach scale more quickly by streamlining time-consuming negotiations and waiting times to access short-codes for services.
- Customized assistance in processing mapping, design, usage data, and reporting; specialized billing arrangements, hosting and security protection, and enhanced technical support.
- Higher likelihood of deeper airtime discounts, in-kind and financial contributions for services that enhance their brand, increase customer loyalty, and generate revenues.
- Access to extensive retail distribution points for marketing to defray promotion costs for on-demand services, typically a significant portion of total costs.

KEY CONSIDERATIONS

Some may perceive exclusive partnerships as an unfair commercial advantage. There is a natural tension in a partnership between a social mission organization and a commercial company that can be perceived to provide an unfair commercial advantage in a competitive market. An exclusive partnership with an MNO carries risks of distorting the market by developing services with a single competitor but in the case of mhealth, those risks are low. If there is demand for particular services, it is likely that competitors will create similar services, thus catalyzing and “crowding-in” new services rather than weakening the market.

Access is possible through any network, at different rates. This model assumes certain advantages for subscribers to the partner network, such as a number of free calls to the service.

However, subscribers from any network could access the service subject to "off-network charges" set by competing operators. Varied options exist for pricing of calls. Under a "freemium" model, consumers might receive a set amount of free calls/texts to the service with linkages to other value-added services of interest. Service fees would be part of the partnership agreement.

TIME LIMITATIONS

An exclusive partnership with a MNO can be time limited with a "sunset" date, after which USAID can enter into similar agreements with competing operators in a market. This gives the exclusive partner an opportunity to be first to market and establish benefits to its brand.

6.1.1.4 CHALLENGES OF REGIONAL PARTNERSHIPS

The potential to aggregate demand across a number of relatively small but affiliated family planning projects in the region and the nascent state of the mobile ecosystem support the case for a regional mhealth partnership. However, regional MNO partnerships are especially complex. Licenses are awarded at the country level, with national licensing requirements and local partner structures. Global companies—such as those identified in the following chart—acquire partial ownership interest in multiple national licenses across the globe, thus creating economies in network equipment procurement and other capital costs. Table 24 shows the multinational MNO footprint in West Africa. Orange currently has the largest footprint in the region.

TABLE 24. MULTINATIONAL MNO FOOTPRINT IN WEST AFRICA

USAID focus countries	Ouagadougou Partnership countries	orange	MTN	Maroc Telecom	airtel
Burkina Faso	**Burkina Faso**				X
Cameroon	**Cameroon**	X	X		
Côte d'Ivoire	**Côte d'Ivoire**	X	X	X	
Mauritania	**Mauritania**				
Niger	**Niger**	X		X	X
Togo	**Togo**		X	X	
	Benin		X	X	
	Guinea	X			
	Mali	X			
	Senegal	X			

These multinational MNOs do not control local affiliates, who typically have both global and multiple local owners, independent operational autonomy, contractual voting rights, and national service requirements. Staff turnover is typically high, requiring frequent engagement to ensure partnerships are not dependent on single champions. The industry is also characterized by rapid restructuring, as owners consolidate their investments and refine their operational strategies. For example, there are news reports that Orange is currently in talks with Airtel to acquire Airtel interests in Burkina Faso, Chad, Congo Brazzaville, and Sierra Leone (Skinner,

2015). As noted in Section 8, regional MNO partners must influence activities on multiple fronts for regional services to gain traction.

6.2 ESTIMATING SOLUTION COSTS

This section estimates costs for both the IVR/SMS Information Service and the SMS Data Collection Application. Costs were categorized as one-time start-up (e.g., software adaptation), recurring fixed (e.g., coordinator time), and recurring variable (e.g., air time) and calculated by year. This assumes some regional costs for shared processes, infrastructure, partners, licensing, and knowledge dissemination and some country-level costs for local adaptation, government relations, and operational oversight.

The cost estimates provided in this report are rough projections, designed to highlight the relative order of magnitude of the cost categories as well as the assumptions that drive them. The estimates are not a definite budget, given the many uncertainties regarding final service parameters and partner commitments. See Annex B for all assumptions for the cost estimates.

6.2.1 COST CATEGORIES AND DEFINITIONS

Table 25 includes descriptions of major cost categories, with assumptions about resource requirements. SHOPS also provided additional explanations for some of the cost categories.

TABLE 25. COST CATEGORIES AND ASSUMPTIONS

Description	Resource assumptions
Coordination: Staff to manage the initiative; conduct partner outreach, negotiations, and communications; oversee project planning and operations; provide monitoring and evaluation and lead advocacy and regulatory affairs.	Part-time dedicated staff person per country, regional focal person (overlap with Niger country rollout), and local hire.
Software: Personnel to design and configure application, user testing, and technical support for modifications; vendor charges for web hosting and general license fees.	Use of free open-source software, with need for personnel to modify for specific-use cases. Vendor fees for web hosting include per unit (message or person) charges and depends on volume.
Content: Develop messages, vetting process with experts, local language translations, voice actors to record, and government approvals.	Needed for IVR/SMS information service only. Assumes extensive use of existing global repositories; includes resources for formative research with end users and ongoing modifications.
Promotion: Marketing costs for the service include development of communications strategy, segment analyses, and development of collateral materials.	Needed for IVR/SMS information service only. Assumes mix of channels including broadcast, print, SMS blasts; community events; and partner outreach.
Training: Orient CBD end users, development of training manuals, and training of trainers.	Needed for SMS data collection application only (includes periodic refresher training).
Air time: Mobile network per message charges for texts or voice calls.	Used retail rates (per minute, per text) to estimate costs at scale; bulk discounts can be achieved through negotiation per network.
Network integration: Negotiation for direct connection of IVR/SMS software to mobile networks and associated fees.	Connection negotiated with each operator; includes fees for co-location of services, security features, and minimum message volumes.

6.2.1.1 UNDERSTANDING SOFTWARE COSTS

mHealth applications utilize software that can be developed in-house or procured from third parties. This analysis assumes the use of third-party open-source vendors such as those reviewed in the previous section. The following is a description of typical software cost elements.

- Support costs:
  - Open-source software is computer code that other software developers can freely reuse. However, software licensed as open source may have significant support costs.
  - The software may not be designed for nontechnical people to use and thus require paying a programmer to modify it a particular use case.
  - The open-source software might be designed as "web based" (access it through a web browser from anywhere in the world), which is true of all the software reviewed in this report. This means that the software must be hosted on a server and made available online for people to use. Users of the software generally are required to cover the costs of hosting and maintaining the software in a monthly fee.
- Fees imposed by software vendors (including open source software):
  - Software general license. This license charge would be for the cost to use the software on a monthly or annual basis independent of the amount of use. These charges cover a vendor's service to support the software, including services and hosting.
  - Software per-unit license**.** Alternatively, software development firms charge as a function of software usage (i.e., the more you use the software, the more you pay). This is often charged based on the number of messages sent, the number of minutes used, or the number of users per month.
  - Software configuration (design and modification). Most software, once licensed or purchased, is not immediately configured for a projects-use case. Users can do this with in-house staff or hire the software firm to handle configuration with negotiated consultation fees.

For illustration purposes, using TextIt software as an example, charges would include a software license cost per bulk SMS of $.012 per text to cover the cost of hosting. Separate fees would be charged to modify the software if needed.

6.2.1.2 UNDERSTANDING MOBILE NETWORK COSTS

In order for IVR and SMS software to send and receive messages, it must establish a connection to one or more mobile networks for delivery of those messages. There are two options for connecting to mobile networks, with the following pros and cons:

Option 1: Using a smart phone as the "gateway", USAID/WA projects can purchase an Android phone with a local SIM card, download the IVR/SMS software, and immediately begin sending and receiving messages to any mobile number. This option makes sense for low-volume SMS services.

- **Pros:** Fast start-up, as it requires no negotiations with MNOs; lower costs by avoiding network integration fees.
- **Cons:** Unstable and erratic message delivery; only useful for pilots and low-volume services; higher per-message charges because it is billed at retail price.

Option 2: Direct connection to one or more mobile operators may be required. MNOs vary in their requirements, including fees for co-location of servers with MNO facilities, security features within service application protocol interfaces, and minimum message volumes. This is the option required for most IVR services.

- **Pros:** Stable delivery of messages with call delivery statistics; volume discounts for airtime charges.
- **Cons:** Requires significant level of effort to negotiate terms; recurring monthly fees in addition to airtime charges.

Option 3: Use of third-party aggregators is available in mature mobile environments. Across much of sub-Saharan Africa, tech entrepreneurs—known as mobile aggregators or mobile gateways—have created businesses that serve as intermediaries between MNOs and IVR/SMS service providers. Many MNOs are ill-equipped to handle numerous, varied, and relatively small-scale requests of the development sector, and these mobile gateways serve as middle men to more efficiently handle the network integration with all MNOs in a country as well as provide additional technical support. While prevalent in much of East and Southern Africa, at this time aggregator options in the six focus countries of West Africa are very limited, with the few aggregators that exist serving mainly large clients such as banks or airlines. Aggregators entering West Africa markets are prioritizing mobile money services which stimulate economic activity and represent largest growth potential (Mobile Accord, 2015).

- **Pros**: Eliminates need for individual negotiations with mobile operators, reducing time for service initiation.
- **Cons**: Limited availability in the six focus countries, with best options in Cote d'Ivoire and Cameroon.

6.2.1.3 MARKETING COSTS

The uptake of consumer-initiated mhealth information services is directly proportional to marketing efforts to make consumer aware of the service. Existing mobile information services including MOTECH, MAMA, mCenas!, m4RH, and OneWorld have reported that the high costs of service promotion is one of the largest barriers to scale. The first step in developing an effective marketing campaign is to develop a service marketing strategy with clearly defined customer segments to understand their information needs and the best channels for reaching them to promote the service. Channel costs and preferences across the focus countries are likely to vary considerably and require close monitoring of effectiveness to adjust frequency and content of the advertising campaigns.

6.2.1.4 COORDINATION COSTS

Substantial coordination resources are needed to manage regional mhealth services. A successful partnership with mobile operators requires staff with business, programmatic, and technical skills. Operator contracts and complex negotiations can be lengthy, and resources are needed for legal and financial staff. Communications and stakeholder engagement costs are high because multiple departments must be included. Additional coordination responsibilities include work planning and budgeting, regulatory approvals, monitoring and evaluation, and reporting.

6.2.2 COST ESTIMATES FOR DEMAND SIDE IVR/SMS INFORMATION SERVICE

This section estimates the cost of deploying an IVR/SMS information service in three countries. The costs were estimated based on the rollout schedule in Table 26. SHOPS assumed the addition of other West African countries in Year 4.

TABLE 26. INTERVENTION ROLLOUT SCHEDULE

Year 1	Year 2	Year 3
Start-up regional	Expand Niger	Sustain Niger
Design and test Niger	Launch Côte d'Ivoire	Expand Côte d'Ivoire
	Launch Cameroon	Expand Cameroon

6.2.2.1 SUMMARY OF TOTAL COSTS IVR/SMS INFORMATION SERVICE

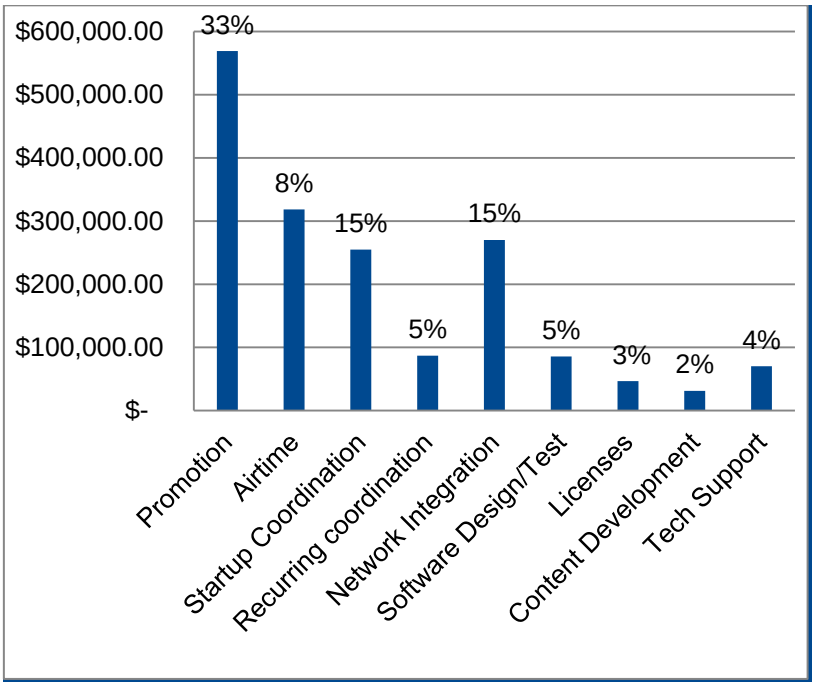
Figure 8 shows the total estimated costs by category to design, deploy, and scale a family planning IVR/SMS information service in three focus countries over 3 years. Coordination, promotion, network integration, and airtime are the largest cost drivers. Text boxes outline key cost assumptions.

The funding required for actual IVR/SMS platform development—including content development, software design and testing, and obtaining required licensing—is relatively small, accounting for approximately 10 percent of the total budget. The largest portion of the estimated budget (51 percent) is for airtime and promotional activities to generate 350,000 new users in the target population of urban female youth currently not using modern contraception.

FIGURE 8. DISTRIBUTION OF COSTS FOR IVR/SMS INFORMATION SYSTEM

Total Costs = $1,733,060

IVR/SMS Information Service Cost Assumptions	
Projected number of service users:	
Cameroon	200,000
Côte d'Ivoire	100,000
Niger	50,000
Proportion voice versus text: 90% IVR/10% texts	
Projected number of calls/texts accessed per user: 8 minutes per year	
Dedicated service coordinator 50% Year 1, 20% Years 2 and 3	
Mass media and other marketing costs on regional averages of information provided by McCann Group and Abt West Africa offices.	



Estimates of market size are a key factor in scaling a mhealth service. Based on the total addressable market for the primary target population (urban females ages 15–24 with unmet need in the three countries), the costs reflect an estimated 350,000 unique subscribers over a 3-year period.

SHOPS estimated costs based on key assumptions that are changeable to lower costs. Alternative assumptions include targeting a smaller segment of the population (lower airtime costs), favoring SMS over IVR services (lower airtime and network integration costs), use of below-the-line promotion channels instead of mass media, and utilizing MNO software applications (reduces network integration costs). Table 27 outlines alternative assumptions.

TABLE 27. ALTERNATIVE ASSUMPTIONS TO LOWER COSTS OF MOBILE INFORMATION SERVICE

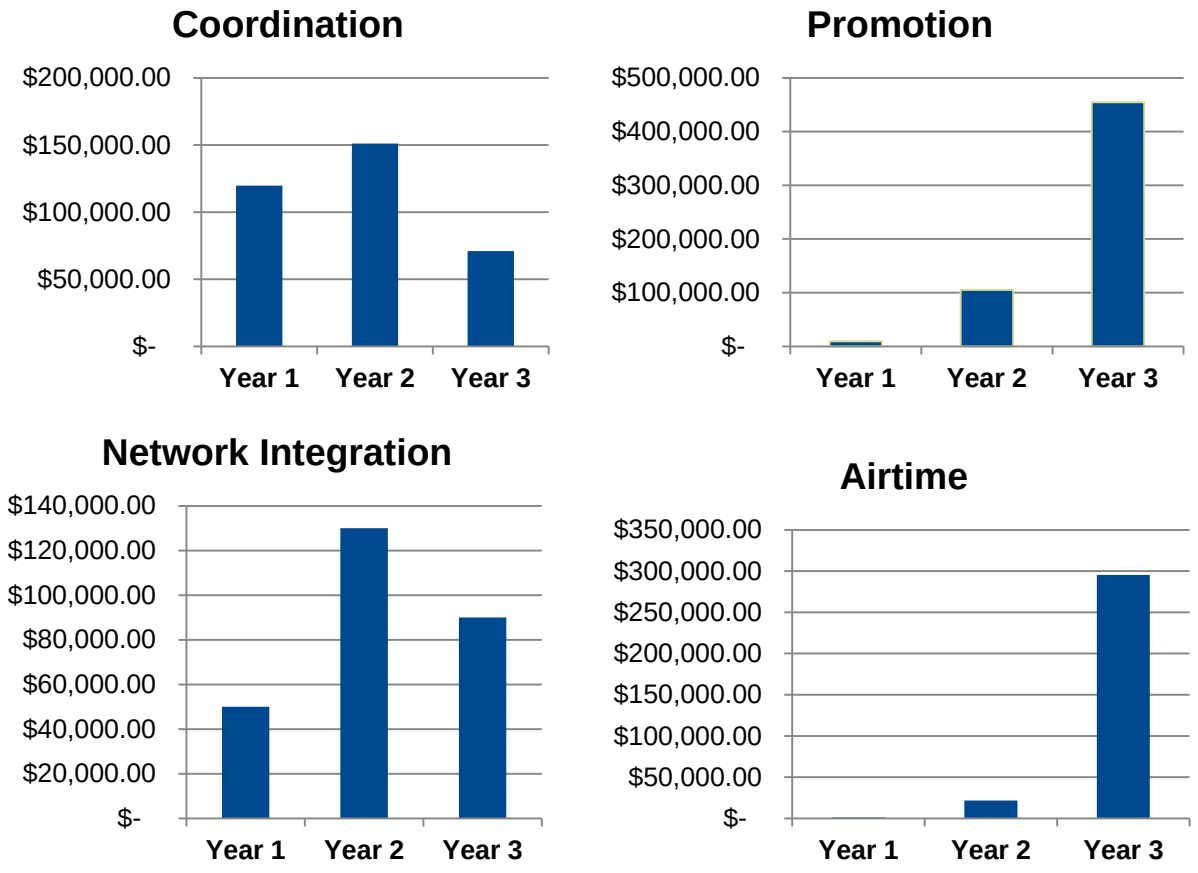
Summary of options for lowering IVR/SMS information service costs by changing key assumptions	
Lower airtime costs by offering only SMS or assuming smaller proportion of IVR users.	SMS is less costly and preferred by some segments due to its ability to store and share messages.
Lower airtime costs by targeting fewer, smaller subset of users.	More targeted segmentation with lower reach will lower airtime costs.
Lower promotion costs by avoiding high-cost mass media.	Heavier reliance on below-the-line marketing such as SMS blasts, inclusion of the service on SIM cards, community events, and outreach partners will lower marketing budgets.
Lower network integration costs by using MNO-developed software applications.	Negotiations to integrate third-party value-added service platforms will be less time consuming and lower the cost if MNO-developed IVR or SMS applications are used, as these will already by embedded in their systems.

SHOPS proposes combined IVR/SMS based on the estimated 50 percent or more of the target population who are illiterate. These estimates of illiteracy may be high, given that younger populations have slightly higher literacy rates than older populations, and urban populations have higher literacy rates than rural populations. To demonstrate the **impact on cost of offering a SMS-only service** with no IVR option, SHOPS estimates that the total cost of service for the three countries would decrease from $1,733,060 to $1,533.060. The estimated $200,000 reduction is attributed to lower airtime costs, lower network integration costs, and lower content development costs. This estimation assumes no change in the promotion budget. If SMS blast marketing were used instead of broadcast media channels, the promotion budget would be an additional $300,000 lower. However, both the elimination of the IVR option and elimination of radio and TV marketing would result in a significantly smaller reach of the service.

6.2.2.2 COST EVOLUTION

Estimates of the cost evolution over time—shown in Figure 9—reveal coordination costs declining in Year 3, while promotion and airtime costs increase. Network integration costs are highest in Year 2 when Cameroon and Cote d'Ivoire launch the service.

FIGURE 9. ESTIMATED EVOLUTION OF COSTS OVER TIME



6.2.2.3 SUMMARY OF TOTAL COSTS SMS DATA COLLECTION

This section estimates the cost of deploying an SMS data collection application for CBDs in the six focus countries. As discussed earlier, the proposed solution for increasing access to community-level data is possible without negotiation with MNOs through web applications and

quick implementation. See Annex B for cost estimates, with some key assumptions summarized in the text box. Costs estimates were based on the rollout schedule presented in Table 28.

TABLE 28. INTERVENTION ROLLOUT SCHEDULE BY COUNTRY

Year 1	Year 2	Year 3
Start-up regional	Expand Niger	Expand Niger
Design and test Niger	Launch Côte d'Ivoire	Expand Côte d'Ivoire
	Launch Cameroon	Expand Cameroon
	Launch Burkina Faso	Expand Burkina Faso
	Launch Mauritania	Expand Mauritania
	Launch Togo	Expand Togo

Figure 10 shows the total estimated costs by category to design, deploy, and scale an SMS data collection platform for CBDs in the six focus countries. The largest costs are coordination and training.

FIGURE 10. DISTRIBUTION OF COSTS FOR SMS DATA COLLECTION

Total Costs = $495,300

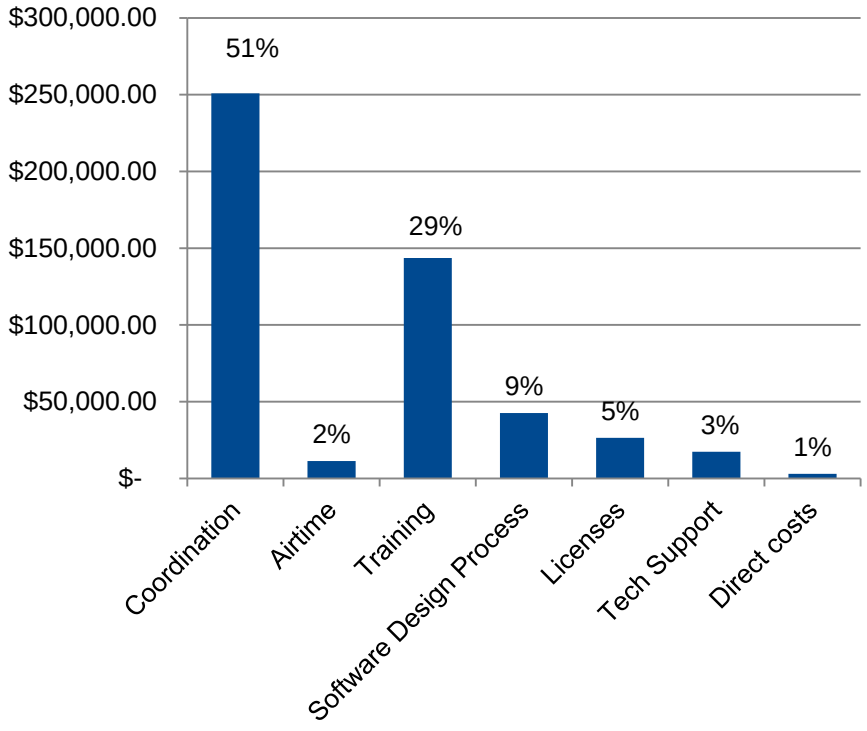
Cost assumptions SMS data collection

Set-up through local Android phone gateways in each country, no network integration

Projected number of service users (CBDs) by Year 3:

Burkina Faso	500
Cameroon	50
Côte d'Ivoire	300
Mauritania	100
Niger	500
Togo	300

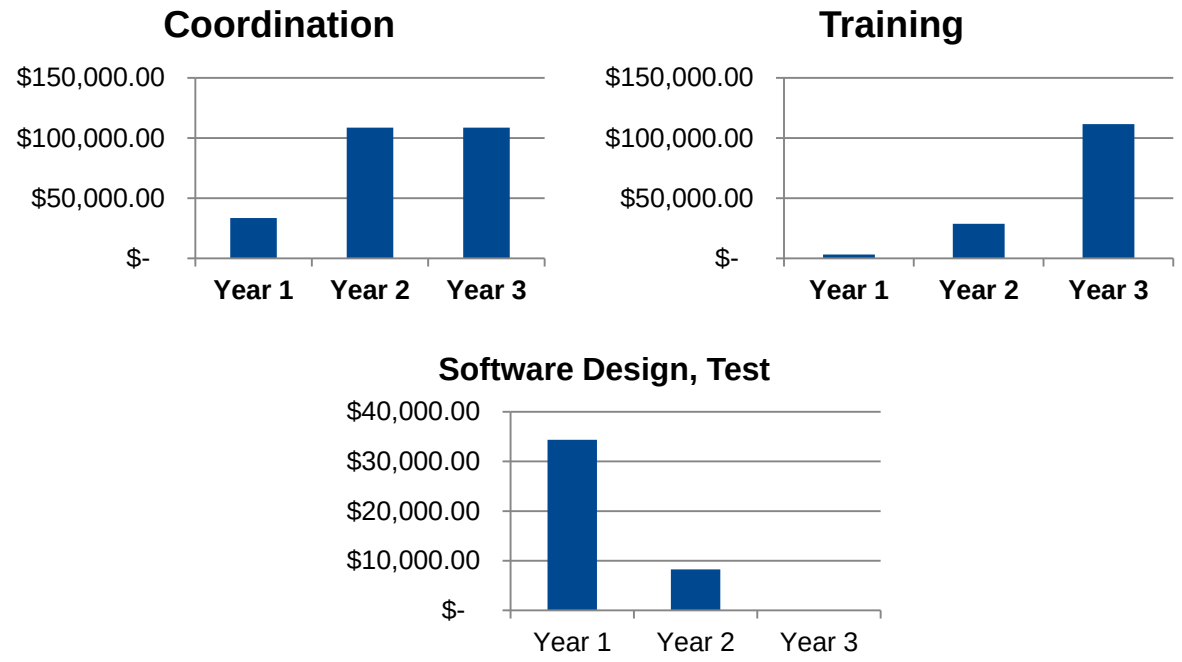
Number of transaction per CBD per year: 52



6.2.2.4 COST EVOLUTION

In the design-and-launch phase, costs include stakeholder coordination to assess existing data collection activities, reach alignment on indicators, and design and test software. As the service scales to the six countries, training is the biggest cost driver, as illustrated in Figure 11.

FIGURE 11. ESTIMATED EVOLUTION OF COSTS OVER TIME



6.3 FINANCIAL RESOURCES AND REVENUE STREAMS

This section describes proposed revenue streams to cover the costs for the service summarized in Section 6.2. Aligning mhealth costs and revenues is one of the greatest challenges to reaching scale and impact. This section makes the "business case": what options exist to finance large mhealth interventions other than foundations, grants, and philanthropy. SHOPS addressed the supply side and demand side interventions separately.

6.3.1 WHO PAYS FOR DEMAND SIDE IVR/SMS INFORMATION SERVICE

Table 29 highlights projected financial contributions from the three partners, aligned with activity costs each partner is most likely to assume. Under this funding model, USAID provides start-up costs for the service. Private payers cover recurring costs including airtime, promotion, and network integration. Private payers include mobile operators or other sources such as user fees or corporate advertising.

SHOPS estimated government contributions as 10 percent of coordination and promotion. MOH activities to support coordination include convening stakeholders, hosting meetings, facilitating coordination among departments (e.g., statistics, communications, and family planning), and with other agencies (e.g., ministries of information). Promotional costs allocated to the government assume the use of public service announcements, community events, and health facilities to promote the service. A hybrid of this funding division is likely—for example, governments may cover the costs of content localization, or USAID projects may cover some portion of service promotion.

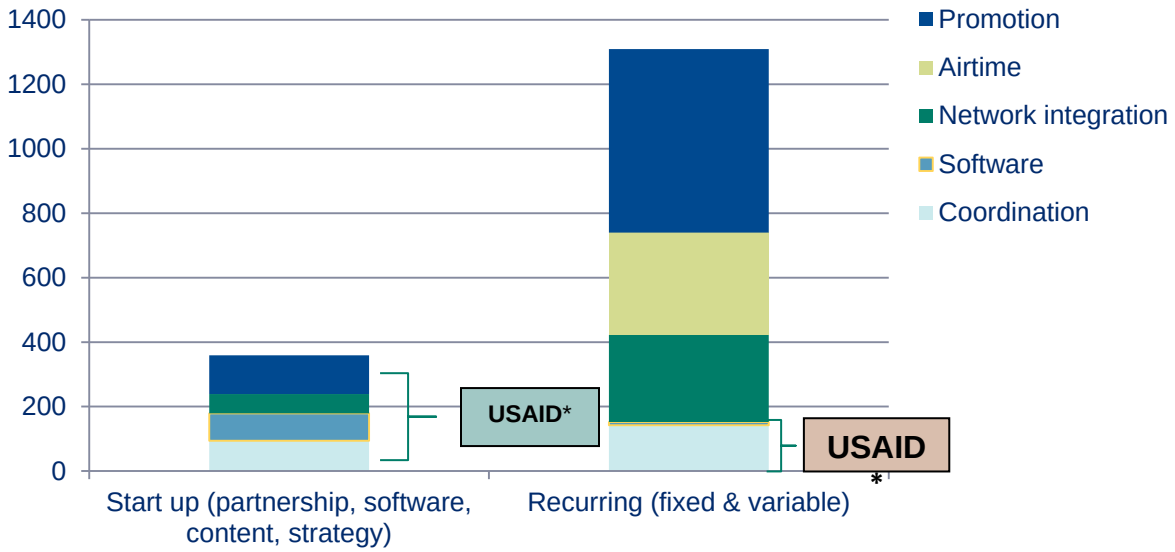
TABLE 29. PROJECTED PARTNER CONTRIBUTIONS

Total Costs	**$ 1,733,062**								
	USAID			**Private Payers**			**Government**		
3-year total	**$ 484,590**			**$ 1,157,380**			**$ 91,092**		
	Year 1	**Year 2**	**Year 3**	**Year 1**	**Year 2**	**Year 3**	**Year 1**	**Year 2**	**Year 3**
	$213,794	**$175,866**	**$94,930**	**$60,732**	**$256,795**	**$839,853**	**$12,925**	**$25,612**	**$52,555**
Primary activity costs	• Coordination and strategy • Content development and localization • Software development and licensing • Tech support			• Network integration • Airtime • Promotion			• Facilitation of stakeholder buy-in • Promotion through access to in-kind channels		
	Proposed funding sources			Proposed funding sources			Proposed funding sources		
	Regional award for start-up	Family planning project budgets for recurring		MNO Partner	Combination of: • User fees • Regulatory mandated free airtime • Corporate sponsor		Existing government budgets		

6.3.1.1.1 START-UP FUNDS

Figure 12 highlights the division between one-time start-up and recurring costs. Similar to other large-scale mhealth initiatives, donor funding typically provides a substantial portion of up-front nonrecurring costs. This seed money serves to catalyze other partners, anchor the alliance, and create momentum for collaboration of related services. For purposes of this analysis, SHOPS assumed USAID is the only donor, but the potential for additional donor support exists, such as Ouagadougou Partnership members.

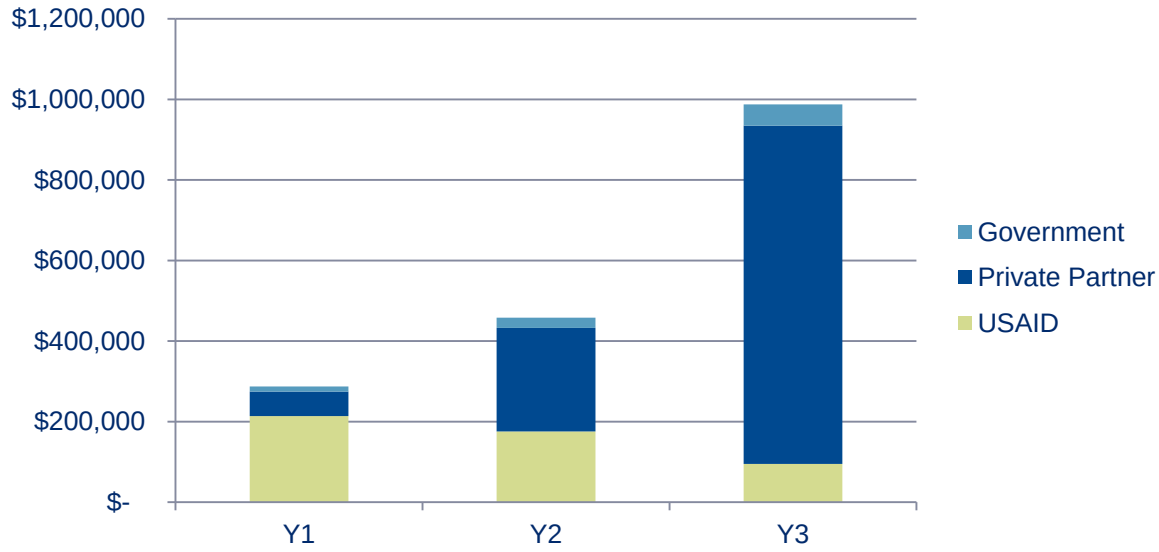
FIGURE 12. COST BREAKDOWN BY TYPE



Note: Includes estimated 10 percent in-kind government contributions.

Figure 13 further highlights the decreasing donor investment over time, as mhealth costs are increasingly born by commercial partners or other payers.

FIGURE 13. PROJECTED COST CONTRIBUTION BY YEAR



6.3.1.2 OPTIONS FOR FUNDING RECURRING COSTS

In Section 6.1.1 on the special role of MNOs, SHOPS presented trade-offs for entering into an exclusive partnership with a single mobile operator versus making service available through all mobile operators in the region. MNO partnerships can leverage substantial in-kind contributions to cover the three largest cost drivers at scale, and these partnerships represent significant value if covered in part by MNO partners in exchange for exclusive collaboration.

Network integration: These costs include MNO executive time to support design considerations, coordinate with affiliate business units, and achieve favorable terms for interfacing with network services and billing systems. Busy MNO engineering staff conducts technical back-end integrations, and ensuring that they receive priority can eliminate months of delays. These contributions would offset time and funds needed for third-party negotiations and lower recurring fees. Benefits may also include deeper engagement on MNO data sharing and analytics.

Promotion: MNO support for these costs would leverage multiple corporate distribution and marketing channels. These include promotions embedded in SIM cards; new subscriber materials; marketing through SMS, IVR, and unstructured supplementary service data channels; and inclusion on billboards, broadcast spots, and other MNO advertising.

Airtime: The premise for MNO provision of free or discounted calls for consumers of the service is that socially relevant and engaging content will enhance its brand, customer loyalty, and use of other network services.

In addition to MNO partner support, there are several other options for funding the recurring costs of a health information service—summarized in the Table 30—with pros and cons for each. These alternative revenue streams would likely occur in tandem with MNO support. For example, an MNO partner may cover a set number of calls to the service per user and then charge consumers for additional calls. Corporate sponsorship messages may be introduced to defray service costs for both MNO-branded or MNO-neutral service.

TABLE 30. ALTERNATIVE REVENUE STREAMS

User fees: Per-message charges paid by mobile subscriber to access the content	
Pros	Cons
• Emerging evidence of willingness to pay. (GSMA, 2015a; De Vroeg, 2012). • Potential for deeper engagement with paid information with higher likelihood the messages will be valued if there is a fee. • Broadens base of MNO support because it creates options for revenue sharing.	• Reduced demand for the service, as consumers will limit usage if there are service fees. • Equity concerns, with poorest least likely to pay.
Sponsorship messages: Can include branding of the service or advertising on specific menu topics	
Pros	Cons
• Corporate interest due to better tracking and targeting of sponsor messages than other media. • Aligns with corporate social responsibility and philanthropic funding.	• Sponsor interest, successful precedent not established. • Potential consumer confusion about content source.
Government mandate: Specifically for zero-rated calls	
Pros	Cons
• Aligns with social mission and public health objectives. • Provides most stable foundation for predictable budgeting for airtime.	• Weak regulatory structures and poor record of enforcement. • Multicountry initiatives; high cost of coordination and advocacy.

6.3.2 WHO PAYS FOR SMS DATA COLLECTION AT COMMUNITY DISTRIBUTION POINTS

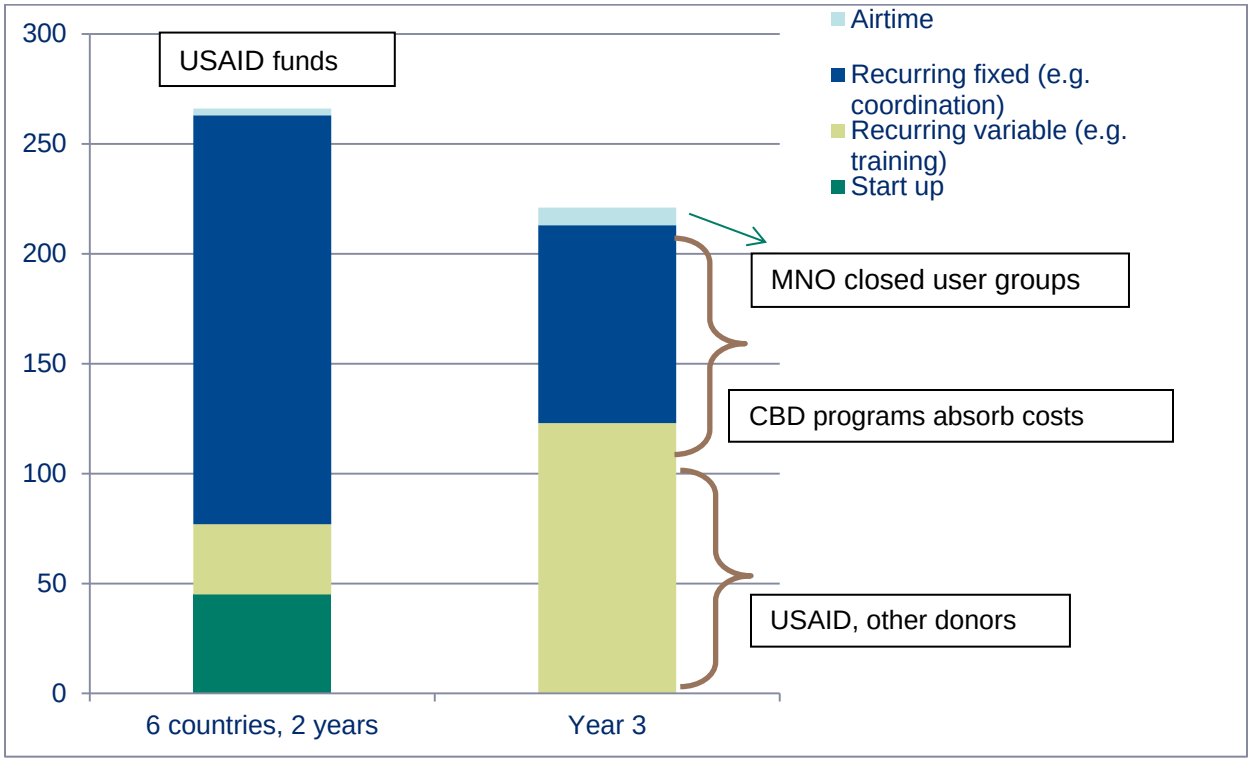
The breakdown between start-up and recurring costs for SMS data collection is shown in Table 31.

TABLE 31. SMS DATA COLLECTION BY COST TYPE

Total Costs	**$526,740**					
	USAID Start-up			**CBD Programs – 6 countries**		
3-year total	**$371,840**			**$154,900**		
	Y1	**Y2**	**Y3**	**Y1**	**Y2**	**Y3**
Est. cost	**$83,200**	**$161,885**	**$126,755**	**$3,500**	**$ 31,500**	**$119,900**
Primary activity costs	• Regional strategy and oversight • Software design • Hardware • Tech support			• Coordination in on-going years • Training • Airtime		

SHOPS designed the proposed SMS data collection intervention to be funded long term through support from health partners deploying and managing community-based distributors, as illustrated in Figure 14. These partners include USAID implementing projects, International Planned Parenthood Federation affiliates, social marketing organizations, family planning NGOs, and government partners utilizing non-facility-based service providers. As noted in Section 6.2.2.3 on SMS data collection costs, the variable cost per user (SMS and associated license costs) is negligible. Training is the largest variable recurring cost. If CBD programs integrate SMS training costs into the basic training and supervision programs, the need for earmarked mhealth funds from a donor declines dramatically.

FIGURE 14. POTENTIAL FUNDING STREAMS FOR SMS DATA COLLECTION



As the number of CBD points grows in future years, a larger base of partners is likely to assume recurring fixed costs—such as coordination—as the cost per CBD will decline. An indicator of the success of this proposed intervention is the number of CBD programs that include use of the SMS data collection service in their annual work plans.

6.3.2.1 POTENTIAL ROLE OF MNOs IN SMS DATA COLLECTION

For a number of reasons, MNO interest in partnering to provide an SMS data collection platform is unlikely for this use case.

- Proposed use of off-the-shelf, web-based applications that need no network integration limit the opportunity for MNOs to make use of assets such as hosting or data analytics.
- The anticipated low number of users of the service (average 300 per country in Year 3) limits potential for scale and likelihood of MNO interest.

Independent of a partnership, many MNOs offer discounts for closed user groups (CUGs) or fleet packages to cover the SMS costs. A CUG allows those in the identified group to send free or discounted messages to others in the group (e.g., the weekly SMS to the database managed by the service coordinator) while paying normal retail rates for calls and messages to friends, family, and others not in the group. CUGs allow MNOs to build some brand visibility and loyalty with new groups of customers. Although free calls through a CUG will have only minor impact on total data collection costs—which primarily consist of labor for coordination and training—the creation of a CUG will have other benefits for both USAID partners and MNOs. As described in the recommendations section, private payers include mobile operators or other sources, such as user fees or corporate advertising.

7 RECOMMENDATIONS

This section looks at additional important success factors and limitations in developing and sustaining mhealth solutions, with recommendations for proceeding.

7.1 INTEGRATION OF SUPPLY SIDE AND DEMAND SIDE APPLICATIONS

mHealth interventions can be designed and implemented as stand-alone applications focused on a single use case or as an integrated set of applications that address multiple programmatic objectives. This section looks at the pros and cons of developing solutions for both increasing demand and strengthening supply in an integrated fashion. The advantages of developing an integrated set of solutions include the following:

- Allows for better linkages between supply and demand side intervention—for example, closely linking promotional activities to communities with evidence of low consumption.
- Creates potential for some shared costs, especially in coordination and advocacy.
- Consistent with mhealth trend away from single-use applications toward more holistic approaches. Many of the software services reviewed in Section 6 have evolved from expertise in a particular channel (e.g., SMS) to incorporating a broader range of channels that are interoperable. A suite of applications may be more attractive to potential MNO partners who could design additional products and services for both the health workforce and the public.

SHOPS chose to keep the analyses in this report separate in order to maximize USAID flexibility in determining its investment strategy. In particular, the case for an MNO's role in sustaining a national IVR/SMS consumer service is quite different from the MNO's role in a basic SMS reporting service, which can be more easily implemented without active MNO engagement. Other advantages for implementing solutions independently include:

- Reducing complexity by focusing on single-use case.
- Providing more options for diversified partners and funding models.
- Reflecting the different cost drivers of supply side and demand side interventions.

SHOPS recommends that USAID pursue an integrated set of supply and demand side interventions. Integration allows for better linkages between supply and demand, creates potential for shared costs in coordination and advocacy, and enhances attractiveness to MNOs who seek to design products for both the health workforce and the public.

7.2 OPTIONS FOR REGIONAL MOBILE PARTNERSHIPS

As discussed in this report, MNOs can play a range of roles in mhealth applications. SHOPS highlighted two models in the illustrative solutions. For a supply side SMS data collection application, SHOPS recommends a light-touch MNO relationship, with potential for negotiated airtime discounts through CUGs to support an application developed for use with any network. For higher cost IVR/SMS information service, SHOPS recommends an exclusive partnership for

a branded MNO service. A mobile partnership will enable USAID to reach more beneficiaries at lower cost by leveraging an MNO's strong brand, distribution network, and customer base.

As noted in Section 6.1.1.2, collaborating with an MNO is challenging at a regional level due to fragmented ownership interests and weak lines of authority between headquarters and country affiliates. A regional corporate partner for a mhealth initiative must embrace the novelty and challenges of a regional approach and commit considerable efforts in the following roles:

- Serve as partnership champion across multiple global, regional, and country offices that have separate strategies, targets, and initiatives.
- Communicate extensively with local affiliate owners, management, and staff to identify competing or complementary priorities, understand and address resource constraints, and sell partnership benefits.
- Provide a focal point for development partners—including USAID, other donors, MOHs, and outreach partners—to participate in stakeholder planning meetings in multiple countries.

7.2.1 PROGRESS UNDER THE ORANGE MOU

During Phase 2 of its mhealth strategy development, the USAID mission explored a potential regional partnership with Orange based on the following advantages:

- Senior management expressed interest in exploring collaboration with the development sector.
- Orange corporate prioritization of mhealth as a strategic business priority.
- Pre-existing MOU with USAID's education bureau.
- The largest mobile footprint in francophone West Africa.

Following its signing the USAID Orange mHealth MOU in December 2014, executives from Orange Labs participated extensively in West Africa's mhealth planning and convening activities, representing valuable in-kind contributions of expertise in needs assessment, solution design, and network services. Orange Labs serves as a resource research and development arm of the global Orange Enterprises. The activities listed here constitute the equivalent of 60-plus days' cost share in coordination, stakeholder buy-in, and solution development.

- Conducted multiple meetings with Orange affiliate executives in Cameroon, Côte d'Ivoire, and Niger from marketing, network services, mobile money, and management, securing broad affiliate participation in country stakeholder meetings held in early 2015.
- Participated in solution-development activities with Niger MOH (multiple departments) and country partners separately for IVR consumer and SMS data collection solutions and provided needs assessment checklists and best practices for consideration.
- Conducted exploratory talks with open-source solution developers including TextIt and VotoMobile to assess options for utilization in partnership deliverables.
- Held weekly calls with SHOPS staff to confer on objectives, processes, budgets, and action items and assist with preparation for costed solutions.

These unfunded activities demonstrate Orange's commitment to USAID's short-term and long-term objectives for a collaborative approach that extends beyond the core business of providing network connectivity. Ministry staff in two countries made note of the fact that, prior to the Orange collaboration, they had never had the opportunity to discuss public health needs with any local mobile executives. Orange has committed to West Africa as a primary region of

interest and offers the most compelling case for exploring the risks and rewards of a regional model. SHOPS recommends that USAID/WA enter into contractual agreements with Orange for cost-sharing mobile-solution development.

Terms for an Orange/USAID public-private partnership agreement would document in-kind and financial contributions from each partner. Contributions from Orange would include discounts, waivers, and other cash equivalents for the following potential network and distribution services: short code fees, fees for co-location servers, platform hardware, integration fees for network connectivity, software adaptation and documentation user requirements, platform throughput testing, per-minute/per-message charges, call data records, system usage data and analytics, reverse billing or dynamic charging interface, and access to promotional channels including point of sale. Contributions from USAID implementing partners would include funding for needed network services as well as level of effort for outreach, content generation, government support, and promotion strategy. Additional contract terms would include solution ownership, period of performance, protection needed for proprietary information, termination clauses, service expansion considerations, milestones, and indicators to be monitored.

A master agreement between USAID and Orange could set forth vision, objectives, deliverables, and roles. The agreement should include annexes reflecting country-level agreements and local adaptation and commitments by MNO affiliates.

7.2.2 ALTERNATIVE OPTIONS FOR MNO PARTNERSHIPS

As shown in the MNO table in Section 6.1.1.2, no single mobile operator covers all six focus countries of interest. Orange, MTN, and Maroc Telecom each own interests in three countries, and Airtel owns interests in two. Under the terms of USAID Orange MOU, both parties are free to pursue similar agreements with other organizations. For example, in countries where Orange has no presence (e.g., Togo), USAID could consider exploring an IVR/SMS partnership with MNOs that have a presence there, providing a base for comparing competing versions of mhealth solutions are supported by different corporate and country interests.

7.3 MEASURING IMPACT

The impact of the mhealth interventions on health outcomes will ultimately determine the intervention's success: Does the solution contribute to an increase of CPR and new users of family planning? Rigorous independent evaluation of family planning's impact was not budgeted in the analyses of this report but should be considered through a separate mechanism to generate mhealth evidence on cost effectiveness and value for money.

The two solutions detailed in this report would measure impact in different ways. The intent of the supply side data collection application is to provide family planning stakeholders with more timely granular data on service provision at the community level. To translate into lower cost, higher quality of care—with few stockouts and increased use of products—programs must use and act upon the collected data. The process indicators (e.g., number of weekly messages received from CBDs) should be supplemented with research to evaluate changes in overall program costs, quality of care, and services delivered.

The goal of the demand side IVR/SMS information service is to increase awareness of contraceptive choices and positively influence decisions to plan, space, or delay pregnancies according to a woman's wishes. The content will address barriers to behavior change, including fear, lack of confidence, community expectations, and the influence of family and friends. An impact evaluation to measure whether the service increases use of family planning compared to a control group should supplement monitoring data on system engagement.

8 CONCLUSION

This report summarizes options for financing mhealth interventions to address key family planning barriers in West Africa. Using two illustrative solutions, SHOPS estimated costs and financial contributions across three sets of partners over a 3-year time period. SHOPS gave particular focus to options for regional MNO partnerships, due to their enormous leverage in the costs of voice services. SHOPS conceived the simpler SMS data-collection platform as an operator-neutral intervention, with some potential benefits for integrating with the more complex IVR platform. SHOPS used a 3-year time frame for the regional partnership with the expectation that successful uptake of the services will lead to replication, buy-in, or adaption by other family planning stakeholders in the region.

Mobile interventions to promote family planning in West Africa can amplify other interventions in the region. Demand creation services have an opportunity to help generate the knowledge and understanding that when combined with counselling or support, increase CPR. Additionally, improved supply tracking and timely data collection can strengthen service delivery.

ANNEX A: SUPPLEMENTARY POPULATION SEGMENTATION DATA

The tables and figures in Annex A provide additional population segmentation data. Unless otherwise specified, SHOPS made calculations using the most recent DHS data available in each country. The most recent DHS for Mauritania, 2000–2001, has limited family planning information so those data are not included in all tables.

DEMOGRAPHICS

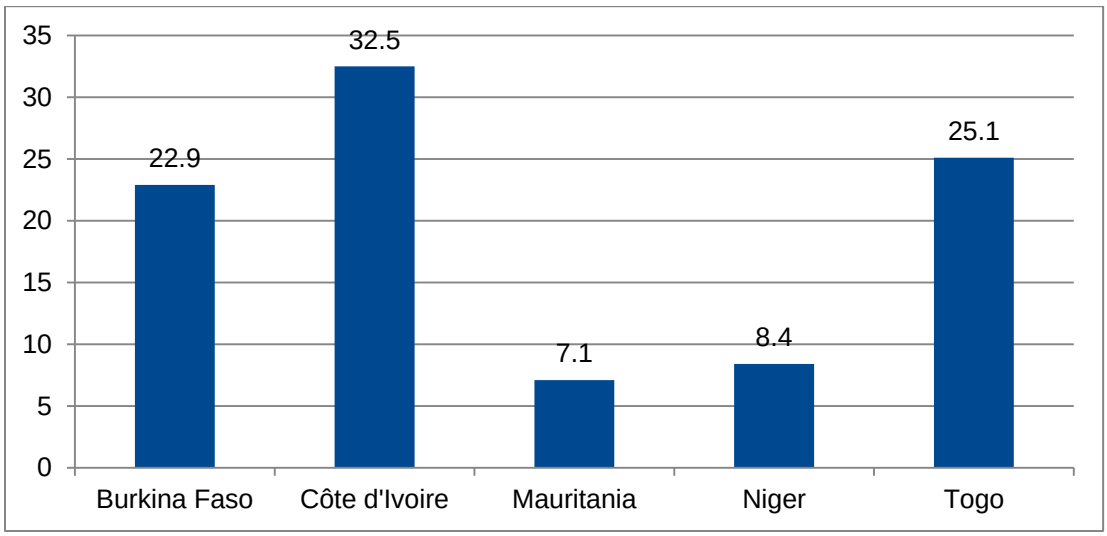
TABLE A1. YOUTH POPULATION AS PERCENTAGE OF TOTAL POPULATION BY COUNTRY

Country		Total population	Population under 15 years	Population 15–24 years
Burkina Faso	Total (in millions)	**15.5**	7.1	3.1
	Percent of total population	**N/A**	46	20
Cameroon	Total (in millions)	**20.6**	9.0	4.3
	Percent of total population	**N/A**	43	20.7
Côte d'Ivoire	Total (in millions)	**19**	7.9	3.7
	Percent of total population	**N/A**	42	19.6
Mauritania	Total (in millions)	**3.6**	1.5	0.7
	Percent of total population	**N/A**	41	19.6
Niger	Total (in millions)	**15.9**	7.9	2.7
	Percent of total population	**N/A**	50	17.3
Togo	Total (in millions)	**6.3**	2.7	1.3
	Percent of total population	**N/A**	42	20.5
Total	**Total (in millions)**	**81**	**36.1**	**15.9**
	Average percent of total population	**N/A**	**44.6**	**19.6**

CONTRACEPTIVE PREVALENCE

TOTAL

FIGURE A1. CPR AMONG MEN BY COUNTRY (PERCENT)



Source: ICF International 2010-2014

AGE

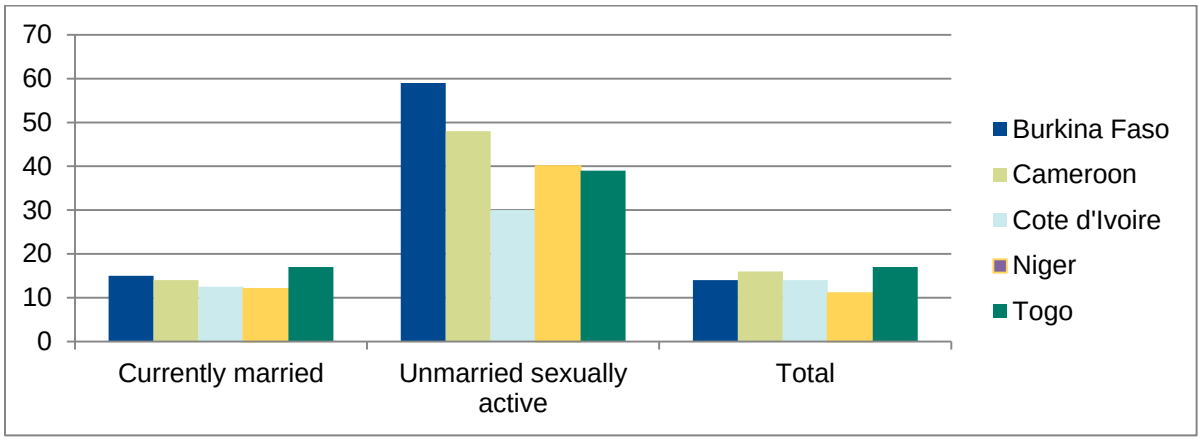
TABLE A2. MCPR AMONG WRA BY AGE AND COUNTRY (PERCENT)

Country	Total	15–19	20–24	25–29	30–34	35–39	40–44	45–49
Burkina Faso	**14.3**	5.9	17.3	17.0	17.7	16.8	15.6	9.0
Cameroon	**16.1**	12.1	22.0	19.6	16.6	16.0	12.6	8.1
Côte d'Ivoire	**13.9**	11.9	16.4	15.9	15.0	14.9	11.9	5.7
Niger	**11.0**	3.7	11.8	15.5	13.9	14.6	8.2	3.0
Togo	**16.7**	10.1	20.5	20.4	19.0	17.2	16.9	10.3

Source: ICF International, 2010–2014

MARITAL STATUS

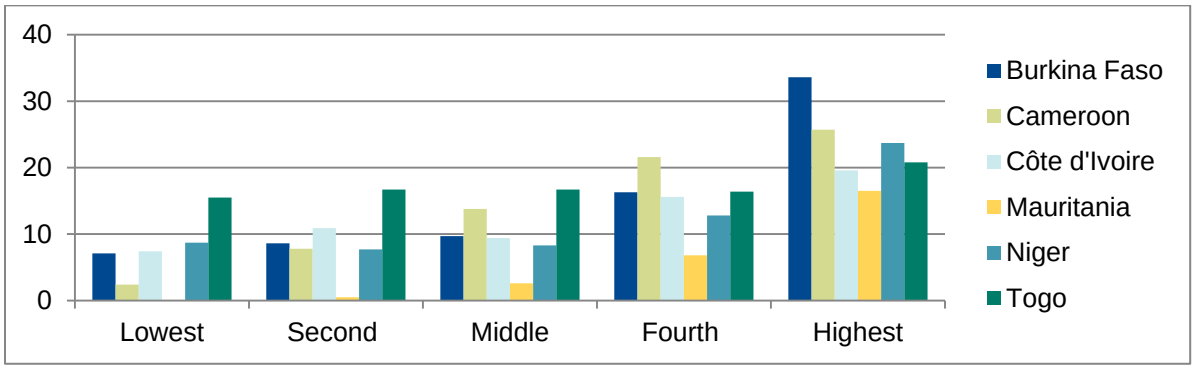
FIGURE A2. MCPR AMONG ALL WOMEN BY MARITAL STATUS BY COUNTRY (PERCENT)



Source: ICF International 2010-2014

WEALTH QUINTILE

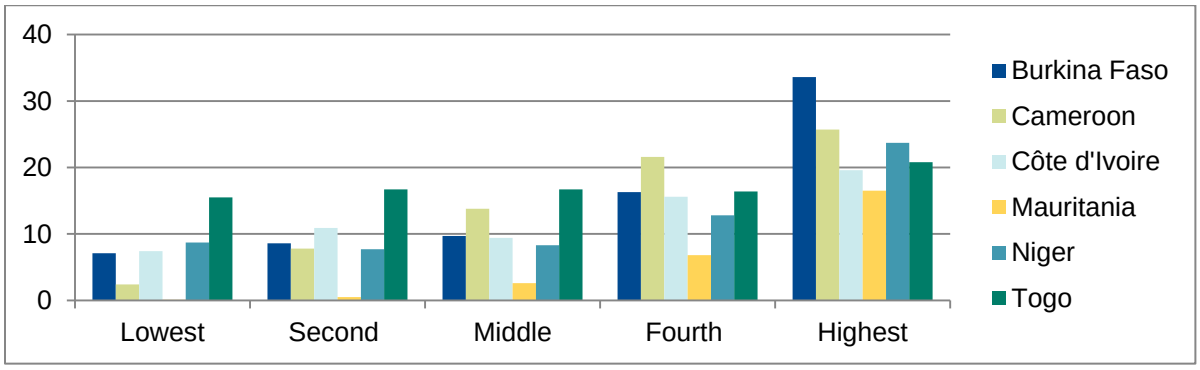
FIGURE A3. MCPR AMONG WOMEN MARRIED OR IN UNION BY COUNTRY AND WEALTH QUINTILE (PERCENT)



Source: ICF International, 2010–2014

EDUCATION

FIGURE A4. MCPR AMONG WOMEN MARRIED OR IN UNION BY COUNTRY AND LEVEL OF EDUCATION (PERCENT)



Source: ICF International, 2010–2014

UNMET NEED

TABLE A3. TOTAL ESTIMATED UNMET NEED FOR MODERN CONTRACEPTION AMONG WOMEN BY COUNTRY

Country	Population of married WRA	Unmet need (percent of WRA)	Estimated number of unmet need (total WRA)
Burkina Faso	3,154,000	24.5	**772,730**
Cameroon	3,542,000	23.5	**828,140**
Côte d'Ivoire	3,060,000	27.1	**829,260**
Niger	3,391,000	16.0	**542,560**
Togo	1,226,000	33.6	**411,936**
Total	**14,355,000**		**3,384,626**

Source: United Nations, 2013; ICF International, 2010–2014

TABLE A4. UNMET NEED AMONG MARRIED WRA BY AGE AND COUNTRY (PERCENT)

Country	Total	15–19	20–24	25–29	30–34	35–39	40–44	45–49
Burkina Faso	**24.5**	21.7	23.9	25.5	25.3	28.8	27.6	13.2
Cameroon	**23.5**	25.7	24.9	23.3	24.9	24.0	23.4	15.3
Côte d'Ivoire	**27.1**	26.5	32.6	31.6	25.3	25.5	26.1	13.1
Niger	**16.0**	13.1	18.4	16.4	16.2	13.6	18.9	14.1
Togo	**33.6**	41.6	39.5	35.3	35.1	35.7	28.3	18. 7
Average	**24.9**	**25.7**	**27.8**	**26.4**	**25.3**	**25.5**	**24.9**	**14.9**

Source: ICF International 2010-2014

LITERACY

TABLE A5. TOTAL, URBAN, AND RURAL LITERACY RATES BY COUNTRY (PERCENT)

Country	Total population	Urban population	Rural population
Burkina Faso	**22.5**	52.4	11.4
Cameroon	**69.2**	85.6	50.0
Côte d'Ivoire	**37.7**	53.3	21.1
Niger	**14.0**	44.7	7.0
Togo	**52.3**	70.6	37.0

Source: ICF International, 2010–2014

ANNEX B: COSTED SOLUTION EXPLANATIONS AND ASSUMPTIONS

The tables in Annex B provide an overview of assumptions made in estimating costs of proposed solutions. For both solutions, direct costs do not include administrative fees that are typically charged by a private company or NGO. Labor costs include an estimated overhead, which may vary on a case-by-case basis.

TABLE B1. FIELD EXPLANATION AND ASSUMPTIONS FOR IVR SMS DEMAND SOLUTION

Costs per unit		Data field explanation and assumptions
Coordination		
Coordinator staff – manager (daily rate)	$230.77	Coordinator to oversee initiative, manage partner communications, conduct negotiation, monitor, and report. Based on estimate of 50% for Year 1 and 20% for Years 2 and 3. Salary based on FSN 9 with estimated NGO loadings.
Stakeholder meetings	$1,500.00	Estimate cost per meeting ($800.00 for conference room rental, costs for refreshments for 20 people, and $500.00 for other costs such as transport and IT AV rentals)
U.S.-based project manager	$1,281.61	Fully loaded daily rate for a U.S.-based project manager
Promotion strategy	$40,000.00	Cost to develop a marketing strategy per country
Technical requirements		
Software license SMS bulk	$0.005	Based on information from VotoMobile
Software license voice bulk	$0.01	VotoMobile budget
Software license	$3,600	VotoMobile budget
Integration one-time cost	$20,000	VotoMobile budget
Integration annual cost	$30,000	VotoMobile budget
IT Tech – senior	$1,281.61	Estimated daily rate for a senior-level IT professional
IT Tech – midlevel	$776.37	Fully loaded daily rate for a mid-level IT professional
IT Tech – junior	$678.10	Fully loaded daily rate for a junior-level IT professional
Content development		
Expert short-term technical assistance	$776.37	Estimated daily rate for a content specialist
Voice actor	$337.72	Fully loaded daily rate for a voice actor for audio recordings
Sound studio rental	$1,000.00	Rental for sound studio for 3 days

Costs per unit		Data field explanation and assumptions
Promotion		
TV – short ads	$377.72	Cost per instance, based on an average of costs from Abt offices in West Africa and information from McCann Group
TV – mini program	$1,000.00	Cost per instance, based on an average of costs from Abt offices in West Africa and information from McCann Group
Radio ad – Cameroon	$31.00	Cost per instance, based on information from McCann Group
Radio ad – Côte D'Ivoire	$96.00	Cost per instance, based on information from McCann Group
Radio ad – Niger	$9.00	Cost per instance, based on information from McCann Group
Poster printing	$210.00	Cost per printing, based on information from McCann Group
Billboard rental	$222.96	Cost per instance, based on information from McCann Group
Newspaper – 1/2 page	$762.00	Cost per instance, based on information from McCann Group
Newspaper – 1/4 page	$678.00	Cost per instance, based on information from McCann Group
SMS/Voice Costs		
Assuming 90% of users choose IVR and 10% choose SMS Assuming 8 interactions per year, 6 texts per interaction and 1 minute per IVR call.		
SMS/text bulk rate	$0.0258	Rate from Niger Orange, on network http://www.orange.ne/tarificationseconde.html
Voice call – bulk year 1	$0.15	Rate from Niger Orange, on network http://www.orange.ne/tarificationseconde.html
Voice call – bulk year 2	$0.12	Bulk discount
Voice call – bulk year 3	$0.10	Bulk discount

TABLE B2. FIELD EXPLANATION AND ASSUMPTIONS FOR SMS STOCK-TRACKING SOLUTION

COSTS per UNIT		Data Field Explanation and Assumptions
Coordination		
Coordinator staff – Manager	$230.77	Coordinator based on estimate of 50% for each year; using average FSN 9 scale from two countries plus estimated loadings; Niger coordinator will also play the role of regional coordinator.
U.S. Staff member management	$776.37	Estimated daily rate for a U.S.-based IT manager.
Training		
CTC Staff time	$776.37	Fully loaded daily rate for an IT professional.
Other (food, transport, etc.)	$500.00	Other costs associated with trainings (refreshments, IT AV support and rental, transport, etc.)
Technology Costs		
Software Design Process	$687.50	Estimated daily rate for an IT professional.
Android phone	$500.00	Abt budgets.
License per SMS Y1	$0.0140	License cost per SMS based on Textit rates (rates discounted as volume increases).
License per SMS Year 2	$0.0120	License cost per SMS based on Textit rates (rates discounted as volume increases).
License per SMS Year 3	$0.0100	License cost per SMS based on Textit rates (rates discounted as volume increases).
Tableau visualization licensing fees	$7,500.00	Estimated from other budgets.
Direct Costs		
Phone, charger, etc.	$500.00	Other direct costs related to implementing the SMS program, including a smart phone and charger, modem, etc.
Charge per SMS	$0.0258	Rate from Niger Orange, used on network as example, http://www.orange.ne/tarificationseconde.html; assuming 4 texts per week per distribution point for Years 1 and 2, then to 3 texts per week in Year 3
Tech Support (on-going)		
Daily rate – U.S. based	$776.37	Loaded daily rate.
Daily rate – local	$230.77	Loaded daily rate for a local staff's on-going technical support, based on an estimated loaded rate for an FSN 9.

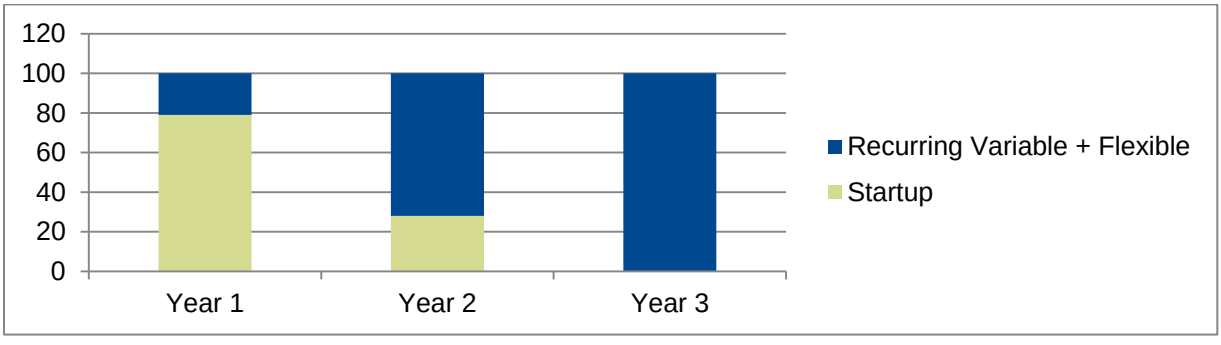
ANNEX C: SUPPLEMENTARY ANALYSIS OF COSTED IVR DEMAND SOLUTION

The table and figure in Annex C provide additional analysis of estimated costs to implement the IVR demand solution. Annex B outlines the assumptions behind each estimate.

TABLE C1. ESTIMATED TOTAL COSTS BY YEAR FOR REGION AND THREE FOCUS COUNTRIES, START-UP VERSUS RECURRING

	Year 1	Year 2	Year 3
Start-up costs			
Regional	$168,022.49		
Cameroon		$64,804.82	
Côte D'Ivoire		$64,804.82	
Niger	$60,000.00		
Recurring fixed, variable			
Regional	$3,600.00	$31,154.52	$31,154.52
Cameroon		$62,645.77	$505,264.10
Côte D'Ivoire		$62,645.77	$281,420.50
Niger	$55,828.13	$172,216.67	$169,498.56
Rounded totals:	**$287,450**	**$458,270**	**$987,340**

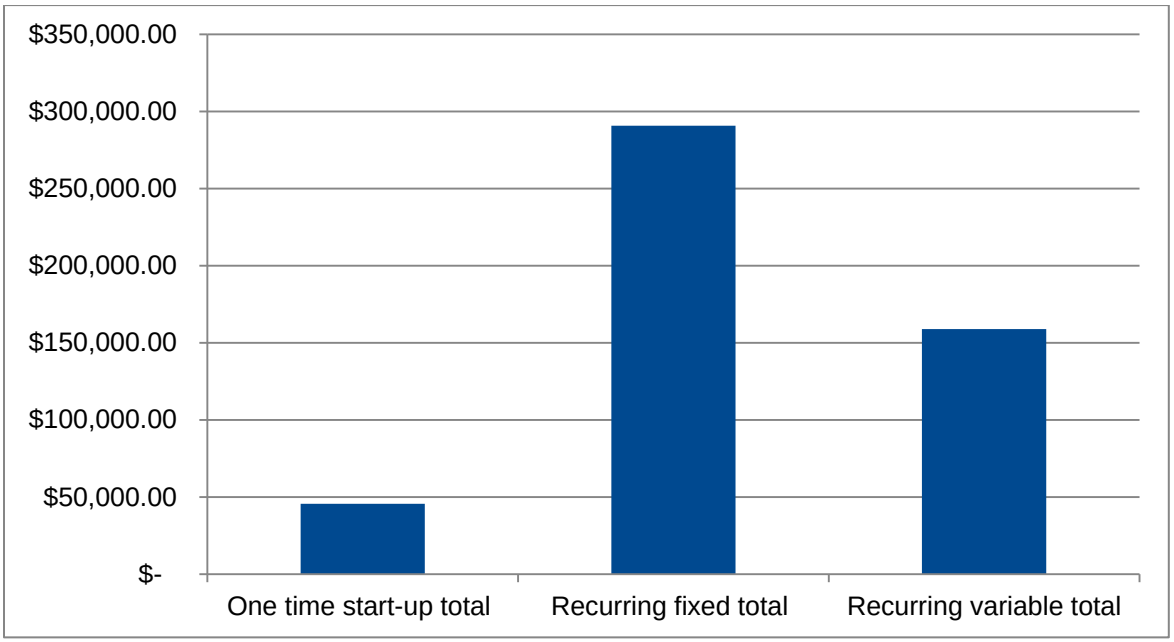
FIGURE C1. START-UP VERSUS RECURRING COST PROPORTIONS BY YEAR



ANNEX D: SUPPLEMENTARY ANALYSIS OF COSTED SMS STOCK-TRACKING SOLUTION

The figure in Annex D provides additional analysis of estimated costs to implement the SMS stock-tracking solution. Annex B outlines assumptions.

FIGURE D1. ESTIMATED START-UP AND RECURRING COSTS (FIXIED AND VARAIBLE)



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