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mHEALTH IN WEST AFRICA: A LANDSCAPE REPORT

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TABLE OF CONTENTS

Acronyms ..... **iii**

Acknowledgments ..... **v**

Executive Summary ..... **vii**

1. Introduction and Background **1**

1.1 What Is mHealth? 1
1.2 Global mHealth Landscape 2
1.3 mHealth Is a Subset of eHealth 3
1.4 What Is the State of Evidence on mHealth? 3
1.5 Why Is mHealth a Consideration in West Africa's FP and HIV Programs? 4
1.6 Role of WAHO 5
1.7 Key Concepts 5

2. Methodology **7**

3. Findings: mHealth in West Africa **9**

3.1 Overview of West Africa mHealth 9
Summary of Key Findings 9
3.2 West Africa Mobile Industry at a Glance 9
3.3 Five Mobile Operators with Significant Regional Presence 11
3.4 General Findings on West Africa mHealth 13
3.5 West Africa mHealth Experience Represents a Continuum of Activities 14
3.6 Why Has mHealth Lagged in West Africa? 15
3.7 Regional Trends Influencing mHealth Growth in West Africa 18
3.8 Illustrative mHealth Applications in 17 West African Countries 20
3.8.1 Mobile Money 20
3.8.2 Data Collection 22
3.8.3 Consumer Applications 26
3.8.4 Health Worker Support 30

4. Recommendations **35**

4.1 Pathways to Partnerships 35
4.1.1 Form a National mHealth Technical Working Group 35
4.1.2 Work with Mobile Regulatory Authority 36
4.1.3 Make Use of Global mHealth Resources 37
4.2 Partnership Opportunities 37
4.2.1 Develop a Strategic Partnership with a Regional Mobile Operator 37
4.2.2 Initiate a Mobile Money Partnership 39
4.2.3 Negotiate Closed User Group Agreements 40
4.2.4 Support Regional French-Language Health Education Platform 42

5. Conclusion 45
Annex A: mHealth Resources 47
Annex B: Country mHealth Snapshots 51
Annex C: Sources for Section 3.5 Data Tables and Country Snapshots 71
Annex D: Interview List 77
Bibliography 87

LIST OF TABLES

Table 1: Categorization of mHealth Activity Level x
Table 2: Illustrative Data Collection Applications 24
Table 4: Illustrative Use of Health Worker Applications 31
Table 5: Orange mHealth Applications and Implications for HIV and FP Programs 39

LIST OF FIGURES

Figure 1: Typology of mHealth Interventions 2
Figure 2: Basic Phones Versus Smartphones 6
Figure 3: Mobile Penetration and Internet Use in West African Nations (2012) 10
Figure 4: Five Mobile Operators with Significant Regional Presence 11
Figure 5: Continuum of mHealth Activity Level by Country 15
Figure 6: Categorization of mHealth Activity Level 15
Figure 7: Total Number of mHealth Activities in West and East Africa 16

ACRONYMS

2G	Second Generation (mobile communications)
3G	Third Generation (mobile communications)
AfD	Agence Française de Développement
Agir-PF	Agir pour la planification familiale
Apps	Applications
AOR	Agreement Officer's Representative
ART	Antiretroviral Therapy
BCC	Behavior Change Communication
BMGF	Bill and Melinda Gates Foundation
CGAP	Consultative Group to Assist the Poor
CHAI	Clinton Health Access Initiative
CHW	Community Health Workers
CRS	Catholic Relief Services
CSO	Civil Society Organizations
CSR	Corporate Social Responsibility
CUG	Closed User Group
DFID	Department for International Development
DHIS2	District Health Information Software 2
DHS	Demographic and Health Survey
ECOWAS	Economic Community of West African States
GHS	Ghana Cedi currency code
GHS	Ghana Health Service
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
GSMA	Global System for Mobile Communications Association
HIS	Health Information Systems
HMIS	Health Management Information System
IC4D	Information and Communications for Development
ICT	Information and Communication Technology
IFC	International Finance Corporation
IICD	International Institute for Communication and Development
IMF	International Monetary Fund
ISP	Internet Service Provider
IT	Information Technology
ITU	International Telecommunication Union
IVR	Interactive Voice Response

K4H	Knowledge for Health
LCS	Licensed Chemical Seller
MARP	Most-at-Risk Populations
MCH	Maternal and Child Health
MDG	Millennium Development Goals
MFI	Microfinance Institution
mHealth	Mobile Health
mLab	Mobile Applications Laboratory
MNO	Mobile Network Operator
MOH	Ministry of Health
MVP	Millennium Villages Project
NGO	Nongovernmental Organization
ORS	Oral Rehydration Solution
PACTE-VIH	Prévention et Prise en Charge du VIH/SIDA en Afrique de l'Ouest
PDA	Personal Digital Assistant
PPP	Public-Private Partnership
PSP-One	Private Sector Partnerships-One Project
RAES	Réseau Africain pour l'Education, la Santé et la Citoyenneté
RHO	Regional Health Office
RFP	Request for Proposals
SHOPS	Strengthening Health Outcomes through the Private Sector
SIM	Subscriber Identity Module
SMS	Short Message Service (mobile phone text message)
SOML	Saving One Million Lives Initiative in Nigeria
S/RH	Sexual and Reproductive Health
SSA	Sub-Saharan Africa
TCO	Total Cost of Ownership
TWG	Technical Working Group
UHC	Universal Health Care
UNDP	United Nations Development Program
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
USSD	Unstructured Supplementary Service Data
VAS	Value Added Services
UN	United Nations
WAHO	West African Health Organization
WHO	World Health Organization

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EXECUTIVE SUMMARY

BACKGROUND

Many of the sub-Saharan Africa mhealth activities featured in various mhealth compendiums, databases, conferences, and high-visibility partnerships are located in the eastern and southern African countries. Less information has been available about mhealth opportunities and barriers in West Africa. The United States Agency for International Development West Africa Regional Health Office (USAID/WA) commissioned the Strengthening Health Outcomes through the Private Sector (SHOPS) project to conduct a landscape analysis of mhealth in West Africa with two objectives: (1) assess current applications, stakeholders, trends, and barriers in the use of mobile technologies to improve health outcomes (mhealth) in the West Africa region; and (2) identify promising mhealth public-private partnerships (PPPs) for its two flagship projects addressing regional program needs in HIV (*Prévention et prise en charge du VIH/ Sida en Afrique de l'ouest*, or PACTE-VIH) and family planning (FP) (*Agir pour la planification familiale*, or AGIR-PF).

This report provides an overview of mhealth activity in the West Africa region, including the 15 Economic Community of West African States (ECOWAS) countries and two additional focus countries for USAID's West Africa Mission: Benin, Burkina Faso, Cameroon, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo. Of particular interest to USAID/WA are partnership opportunities for AGIR-PF which seeks to expand access to and use of family planning services in urban and peri-urban areas of selected cities and PACTE-VIH which seeks to improve quality of and access to HIV services for key populations.

mHealth is the use of mobile technology to improve health outcomes. The term mhealth encompasses a broad range of applications supporting both supply-side and demand-side health activities. For the purposes of this report, these categories were further divided into services targeting beneficiaries, services targeting health workers, and services used by health program managers. mHealth is a sub-set of a broader category of services known as ehealth which encompasses any transfer of health resources electronically including computer systems, databases, and internet access and dissemination.

mHealth matters to HIV/AIDS, sexual and reproductive health, and family planning programs because mobile networks and phone ownership have penetrated communities underserved by\ health services and provided access to underserved populations. mHealth tools offer solutions to long-standing HIV/AIDS and SRH/FP program challenges by including more consistent and cost-effective data collection, engagement with beneficiaries often lost to follow-up, and support for over-burdened health workers. Partnerships matter to mhealth because sustainable large-scale interventions require resources from a cross-sector of stakeholders such as public health officials, telecommunications companies, application developers, researchers, and community organizations. Effective mhealth partnerships are critical to effective health outcomes.

METHODOLOGY

The study was performed using a simple cross-sectional design with data collected through a combination of key informant interviews (in-person and by phone) as well as desk research

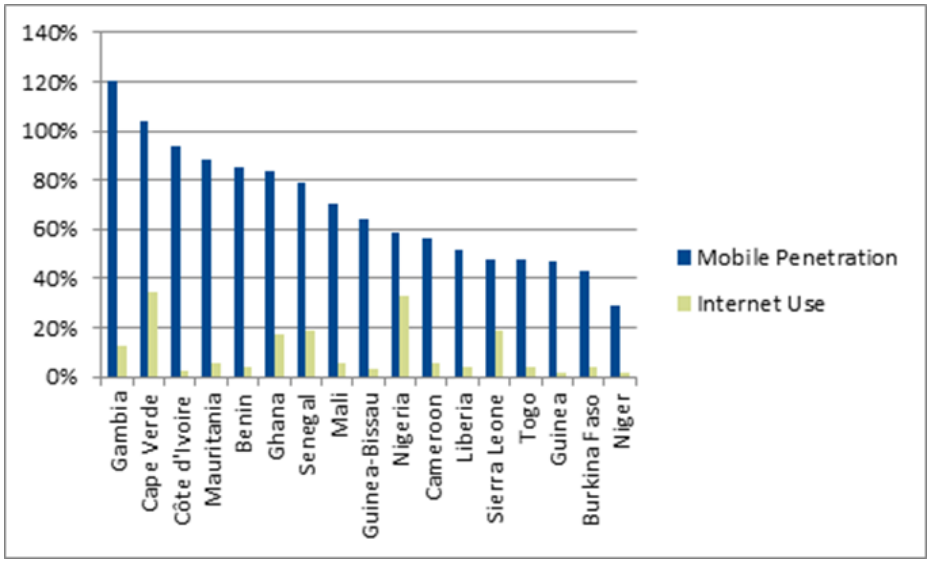
conducted between November 2013 and April 2014. Stakeholders contributing their insights and experiences included government officials, mhealth implementers, software companies, mobile operators, donors, USAID Mission staff, and global mhealth experts. A complete list of key informants is located in Annex D, and a list of sources for mhealth applications is located in Annex C.

FINDINGS

West Africa Mobile Industry

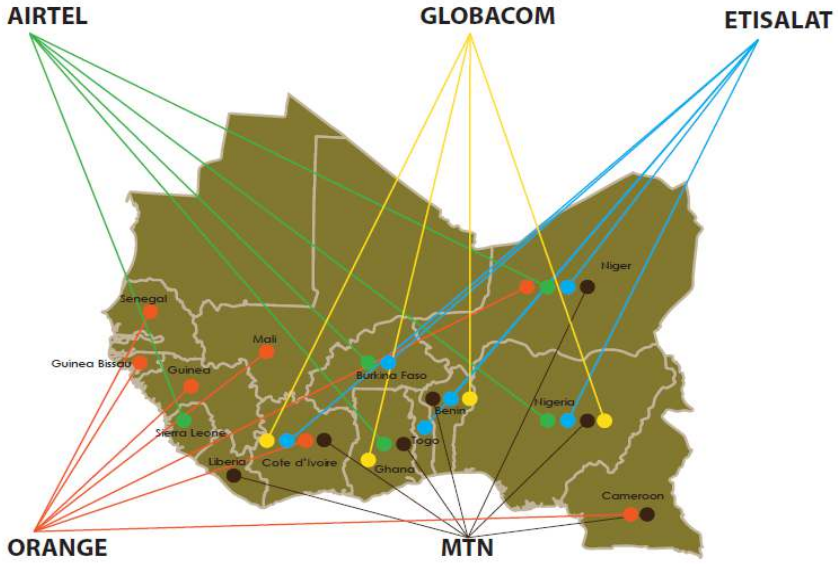
The West Africa mobile industry is highly competitive with at least two private providers in each country and an average penetration of 69 percent across the region. Mobile subscriptions are growing at a rate of 18 percent per year. Low-end phones dominate with limited penetration of smartphones and tablets, especially outside of urban areas. As shown in the Figure 1, mobile penetration varies from 29 percent in Niger to 120 percent in Gambia.

MOBILE PENETRATION AND INTERNET USE



Five mobile operators have significant presence in the region with licenses in at least four countries. This provides opportunities for partnerships that span across national borders.

FIVE MOBILE OPERATORS WITH SIGNIFICANT REGIONAL PRESENCE



West Africa mHealth

The 17 West African countries reviewed for this report represent varying levels of mhealth investment and experience with most being at a very nascent stage of activity.

CONTINUUM OF mHEALTH ACTIVITY LEVEL BY COUNTRY

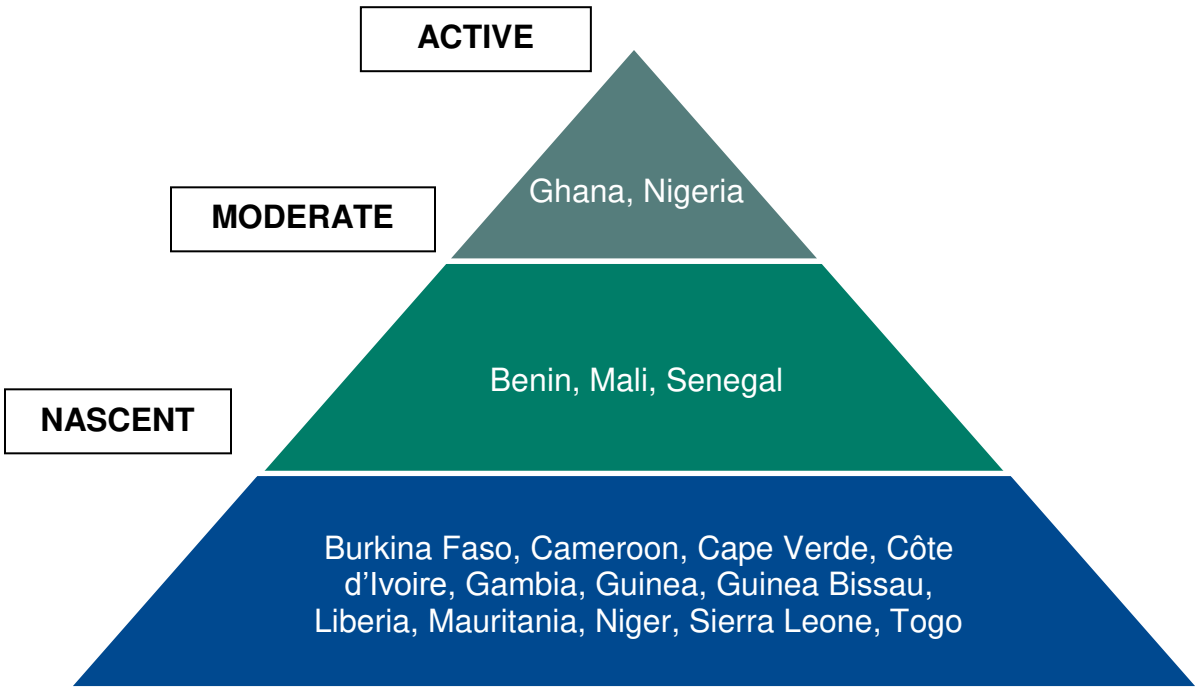


TABLE 1: CATEGORIZATION OF mHEALTH ACTIVITY LEVEL

Level of mHealth Activity	Category Description
ACTIVE	High number and breadth of planned and current interventions, large presence of mobile value added service (VAS) companies, emergence of iHubs and mLabs, larger scale private sector initiatives, multi-sector initiatives
MODERATE	Recent momentum in mhealth applications, growing variety of interventions including research trials, private sector interest, growth in information and communication technology (ICT) incubators and training opportunities
NASCENT	Lower number of pilots and partners in development; generally limited presence of application software developers, electric supply/charging stations erratic

Limitations, barriers, and gaps include:

- Even in the most active countries, most interventions are small-scale and donor-funded with no financial model for long-term sustainability or real sense of country ownership.

> "*Our country received Global Fund monies to develop a mobile platform to connect regional directors for organizing HIV response. Once the funding ended, the system is not used.*"
>
> MOH staff, Burkina Faso, March 2014

- Mobile operator partnerships are funded primarily through foundations or corporate social responsibility grants without integration in business units.
- mHealth evidence is lacking, especially around cost and cost effectiveness.
- MOH stakeholders support mhealth initiatives but lack resources and capacity to coordinate and finance.

> *"We must rely on government partners to fund the training of their workers in tools we develop, but often there are no resources to do this."*
>
> Orange interview, November 2013

- Countries may have mhealth or ehealth strategies, but many draft plans have not been validated or operationalized. Enabling policies are needed in some cases to address barriers such as policies prohibiting any unsolicited SMS.
- Gaps in signal coverage are a problem in many areas and cause frustration with technology projects.

> *"Our agents became frustrated in Bamako when network dropped messages and data was lost."*
>
> Pesinet interview, March 2014

Why has mhealth lagged in West Africa?

Compared to other regions in sub-Saharan Africa, especially South Africa and the East African countries of Kenya, Tanzania, Uganda, and Rwanda, the West Africa region is less active. Informants suggested the following reasons for this situation:

- **East Africa's early success fuels its continuing dominance.** Once a regional presence was established in the mid-2000s through the creation of mobile innovation labs, mhealth developers saw East Africa as a lower-risk, lower-cost foothold to find ICT talent, pilot innovations, and bring new applications to scale. East Africa's technology sector was also greatly boosted by investments in fiber optic cable along the Eastern Africa corridor.
- **mHealth remains an English-centric community, creating barriers for francophone Africa.** There are hundreds of mhealth websites, databases, newsletters, journals, message mboards, training manuals, listservs, and applications manuals available in English, and only a portion has been translated.

> *"Our organization needed a critical mass of partners in West Africa in order to justify the costs of translating CommCare application, instructions, and web support into French."*
>
> Dimagi Field Manager West Africa, November 2013

- **Many barriers to mhealth adoption are not unique to West Africa, but they reflect economic burdens of the region.** Literacy barriers, including ICT literacy, are high. With limited evidence of mhealth impact in developing countries, governments are cautious about investing limited health funds.

Four regional trends are providing momentum for mhealth in West Africa

- **WAHO's leadership in ehealth**: Through WAHO's ehealth strategy and support for harmonized health information platforms and standards such as District Health Information Software 2 (DHIS2) and open source Human Resources Information Solutions (iHRIS), ministries are building greater capacity to drive mhealth activities linked to broader health system needs.
- **Growth in common platforms:** As the mhealth field has matured, the community has begun to coalesce around integrated platforms that support many functions and applications. Examples include ChildCount+, CommCare, Magpi (previously Episurveyor), DataWinners, and MOTECH. Many of the initiatives identified in West Africa use similar software which can lead to economies of scale and more rapid knowledge transfer.
- **Growth in French language resources:** There are a growing number of NGOs devoted to increasing the capacity of organizations in francophone countries to use information and communications technologies for development (ICT4D) objectives. These organizations are developing training manuals, tools, and message content in French for mhealth initiatives.
- **Escalation of mhealth in Nigeria:** As the region's economic center, Nigeria has recently attracted significant global investment with potential to impact the greater ECOWAS community. Examples include the ICT4SOML partnership and the GSMA Pan African mHealth Initiative.

Illustrative mhealth initiatives in West Africa:

The SHOPS team identified more than 100 mhealth interventions across the 17 countries including multiple initiatives even in the countries identified as nascent. The activities were grouped into four categories of applications with most relevance to HIV and FP programs.

- **Mobile money:** Mobile money services have been authorized throughout the West Africa region and provide promising partnership opportunities for health partners and mobile operators. The integration of financial and health services offers potential revenue streams to fund health information and may greatly improve the reach of health insurance for the informal sector.
- **Data collection:** Program management applications are the most common mhealth use cases, including registries and vital events tracking, electronic medical records, disease surveillance, data collection and analysis, and supply tracking systems to reduce stock-outs. These applications improve coordination of national, regional, and local stakeholders through shared access to a common database. The applications can also lower costs and increase quality of data collection for more timely analysis and decision-making.
- **Consumer applications:** mHealth interventions are frequently utilized for community mobilization, awareness raising, education, and demand creation. Most of the currently implemented mhealth applications are stand-alone interventions that send SMS messages or offer a hotline into which clients can call with questions. The anonymity of mobile messages is particularly valued by stigmatized populations.
- **Health worker support:** Healthcare provider tools have been developed to improve efficiency and quality of care including point-of-care decision support, remote consultation and supervision, peer support groups, case management software, job aids, and other training resources. Mobile tools enable health workers to see more clients by reducing time for case management and reporting and improving quality of counseling and diagnostic skills.

For maximum impact, mhealth initiatives require national leadership, donor coordination, and well-designed partnerships that provide benefits to all participants. Wise implementation of mhealth strategies and investment in regional partnerships can result in stronger HIV and FP programs with greater reach, lower cost, and higher quality.

USAID/West Africa has a window of opportunity to work with WAHO, regional institutions, and other donors to catalyze change in the current mhealth implementation landscape. To harness the potential of mobile technologies, WAHO guidance is needed to help countries set the vision, manage the process, develop and operationalize plans, provide tools for developing ICT capacity, and ensure platforms align around national standards and health priorities. The trends, gaps, and opportunities highlighted in this report are intended to provide a starting point for such actions.

RECOMMENDATIONS

Effective partnerships are critical to designing and financing effective and durable mhealth interventions. WAHO's leadership is essential to creating a forum and framework for national governments to drive these partnership efforts. Absent country ownership, mhealth projects will remain tangential to broader health system reforms. Through WAHO, MOHs and their partners can come together to address common needs regarding ICT capacity-building tools and agree on key indicators and standards around which to develop solutions. In partnership with WAHO,

USAID missions or projects can act as "neutral brokers" to facilitate dialogue between industry, government, and civil society organizations for mhealth activities.

Pathways to partnerships

PACTE-VIH and AGIR-PF are familiar with the mhealth applications described in this report, and they are actively planning and piloting uses of mobile technology. These include pilots to target beneficiaries with mobile awareness messages and educational content, use SMS for commodity tracking and reporting increase awareness, and assist providers with client follow-up. For these efforts to achieve impact at scale, cross-sector partnerships will be needed to develop, grow, and sustain these solutions.

> *"We are interested in partnerships with mobile operators and mhealth developers; how do we get started?"*
>
> MOH staff, Senegal, November 2013.

mHealth experts and stakeholders in the West Africa region emphasized three pathways or critical steps to developing effective partnerships.

- **Create a national mhealth Technical Working Group (TWG):** Convening mhealth stakeholders in a structured forum serves to establish leadership, organize partners, identify areas of duplication and collaboration, align investments with national health priorities, and energize activities. USAID projects can serve as neutral brokers to convene and host under the leadership of health ministries. Working in partnership with WAHO, USAID/WA can support development of TWGs by providing opportunities for sharing processes and progress of national activities.
- **Work with mobile regulatory authorities to explore funding options for large-scale public health initiatives:** Mobile operators pay high levels of taxes and fees including contributions to universal service funds designed to subsidize services in geographic regions where there is no market incentive to do so. Under leadership of the MOH, USAID partners could work with government regulators to develop incentives for operators to subsidize mhealth charges in exchange for universal service fund distributions or other tax incentives.
- **Make use of global mhealth resources and guides:** There is a growing body of mhealth best practices, websites, and webinars to guide development of effective solutions and partnerships. One example is mHelp, a new initiative of the mHealth Alliance. It connects stakeholders with qualified local consultants who can provide assistance across technical areas from mhealth training to working with mobile operators (mHELP 2013).

Partnership opportunities

Mobile operators are involved in many mhealth pilots and interventions documented in this report, funded primarily through foundations or corporate social responsibility (CSR) grants. The recommendations below are designed to create mhealth partnerships with greater potential for scale by providing clear contributions from and benefits to all partners. WAHO, USAID/West Africa, and other regional institutions can help guide partner negotiations by identifying public and development sector contributions, bringing in other program partners to aggregate demand and drive scale, and developing shared metrics. The specific companies and organizations highlighted are illustrative; USAID implementating partners under guidance of the MOH could issue requests for proposals (RFP)s to identify interested operators.

- **Initiate a partnership focused on mobile money opportunities:** Mobile money services have potential to subsidize mhealth content as a bundled service, and mobile money providers are seeking partners which access those in need of financial services such as savings, credit, and insurance. Etisalat WEENA program (Togo, Côte d'Ivoire, Benin, and soon Niger) provides micro-loans to rural female entrepreneurs and is seeking expansion partners with opportunities for marketing health information or products.
- **Negotiate closed user group agreements:** Closed user groups are common "calling plans" that can reduce costs for communications among group members such as health professionals or beneficiaries within a network. USAID partners could work with Switchboard, an NGO that has pioneered agreements in Ghana, Liberia, and Tanzania which demonstrates how mobile operators can realize financial returns from providing free calls between in-network users while charging retail prices for calls to friends and family.
- **Support development of a regional digital health education platform in French:** To promote knowledge-sharing objectives, USAID/WA could catalyze funding for a shared mobile-accessible information repository on sexual and reproductive health. Under WAHO leadership, MOHs would provide oversight for local adaptation and final content approval. One model would be the My Question My Answer database developed by OneWorld UK, a nonprofit organization with a regional presence. A single regional hub for mobile content shared among a broad array of partners would lower per-user costs of content development, training, monitoring, marketing, and mobile operator negotiations.

1. INTRODUCTION AND BACKGROUND

Mobile phone penetration has greatly increased across sub-Saharan Africa (SSA), and West African countries are no exception. Through applications classified as mhealth, mobile technology offers a powerful tool for improved access to health programs, upgraded service delivery, enhanced quality of care, and greater health system efficiency. With their widespread availability and versatility, mobile phones are attracting attention as public health resources. As of year-end 2013, there were more than 6.8 billion subscriptions globally, with 89 percent penetration (subscriptions divided by population) in the developing world (International Telecommunication Union 2013).

Many of the sub-Saharan Africa mhealth activities featured in various mhealth compendia, databases, conferences, and high-visibility partnerships are concentrated in eastern and southern African countries. Less information has been available about mhealth opportunities and barriers in West Africa. USAID West Africa commissioned this report in order to develop a better understanding of the current status of mhealth in West Africa and what actions it could take to initiate and leverage public-private partnerships (PPP) in mhealth to support regional programs. Through field funding to USAID' Strengthening Health Outcomes through the Private Sector (SHOPS) project, USAID/WA seeks to support its regional strategies in HIV and family planning (FP).

For USAID's West Africa Mission, this report provides an overview of mhealth activity in West Africa, including the 15 Economic Community of West African States (ECOWAS) countries and two additional focus countries: Benin, Burkina Faso, Cameroon, Cape Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo. Of particular interest to USAID/WA are opportunities for its two flagship projects, Agir pour la Planification Familiale (AGIR-PF) which seeks to expand access to and use of FP services and Prévention et prise en charge du VIH/Sida en Afrique de l'ouest (PACTE-VIH) which seeks to improve the quality of and access to HIV services.

1.1 WHAT IS mHEALTH?

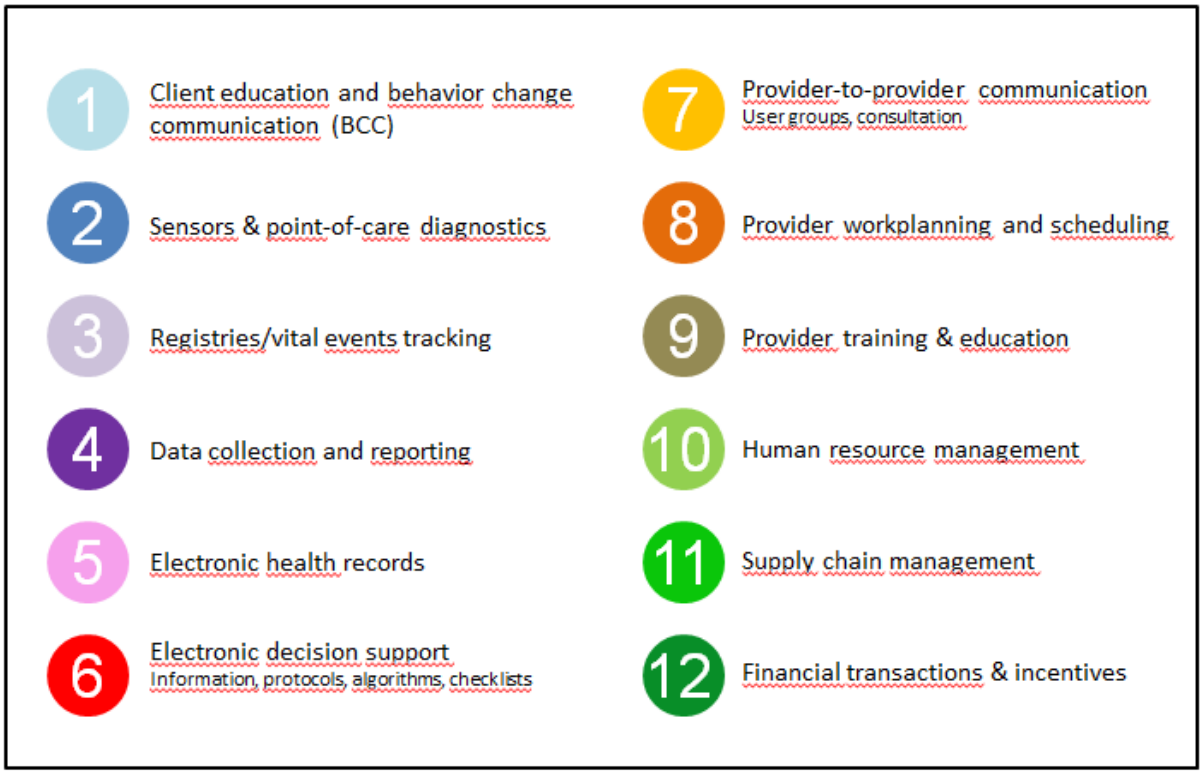
mHealth is the use of mobile technology to improve health outcomes. From telephone calls during emergencies, to text message appointment reminders, to tablets that facilitate video consultation, mobiles are a public health resource that can help address many of the persistent and pervasive challenges facing health systems in developing countries.

Mobile information can empower clients to be proactive in their health care, enabling better self-care and health decision-making, especially for those 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 be shifted down the skills ladder by providing guidance to and monitoring lower-skilled health workers, thus expanding service access. For program managers, mobiles can increase cost efficiency by streamlining processes, reducing client waiting times, improving accuracy and timeliness of data, and facilitating data-driven decisions.

The term mhealth encompasses a broad range of applications supporting both supply-side and demand-side health activities. A recent taxonomy of mhealth applications across the reproductive health continuum listed 12 common categories (Figure 1). For the purposes of this report, the categories were further grouped into services targeting beneficiaries, services targeting health workers, and services used by health program managers.

- Services targeting **beneficiaries** include applications such as SMS reminders for appointments, hotlines for health counseling, or cash for health emergencies delivered via mobile money.
- Services targeting **health workers** include applications such as recorded messages on health topics that health workers play for clients, refresher messages that reinforce new skills introduced during training sessions, or medical record software that improves follow-up services.
- Services targeting **program managers** include supervisory tools designed to strengthen monitoring, SMS reports on medication inventories to prevent stock-outs, and data collection tools to register births and deaths.

FIGURE 1: TYPOLOGY OF MHEALTH INTERVENTIONS



Source: Labrique 2013

1.2 GLOBAL mHEALTH LANDSCAPE

mHealth has captured the attention of the public health community. In 2008, a group of stakeholders recognized mhealth's potential to address health system challenges in low- and middle-income countries and, in response, joined forces to create the nonprofit mHealth Alliance (www.mhealthalliance.com). The mHealth Alliance now includes more than 300 members

committed to mobilizing the effective integration of mhealth into global health practices and programs.

The Global System for Mobile Communications Association of Mobile Operators (GSMA) (www.gsma.com), the trade association representing GSM mobile operators worldwide, includes more than 800 operators in 220 countries. To meet the needs and interests of its members in low- and middle-income countries, GSMA has developed extensive resources through its initiatives and Mobile for Development website in order to spur the use of mobile services by underserved populations in emerging markets. Among its resources is an mHealth Tracker that catalogues the mhealth interventions deployed in every country in the world.

Large-scale donor projects have also made their mark in catalyzing interest in mhealth. WHO conducted a global mhealth survey of 114 member states to document initiatives and barriers to mhealth implementation (WHO 2011). The Mobile Alliance for Maternal Action (MAMA) (www.mobilemamaalliance.org) is a partnership of USAID, Johnson & Johnson, the mHealth Alliance, the UN Foundation, and BabyCenter that delivers health messages to new and expectant mothers in developing countries, including Bangladesh, India, and South Africa. The alliance's free and adaptable messages are used by 161 organizations around the world.

These and many other players in the mhealth arena share common objectives: to test and scale up best practices, build the mhealth evidence base, and find sustainable business models to ensure mhealth's maximum reach and impact.

1.3 mHEALTH IS A SUBSET OF EHEALTH

mHealth is a subset of a broader category of services known as ehealth which is defined as the transfer of health resources by electronic means. eHealth encompasses Internet access and dissemination and any health-related activities carried out over distance by means of information communication (World Health Organization 2014). One example of an ehealth platform is the District Health Information Software 2 (DHIS2), an open-source software and data warehouse used by 30 countries to report, analyze, and disseminate health data. The West African nations of Gambia, Ghana, Liberia, Nigeria, and Sierra Leone have adopted the DHIS2 standard. To maximize impact and reach and promote data sharing, mhealth applications that capture, transmit, store, or analyze data should be integrated into national ehealth backbone architectures.

1.4 WHAT IS THE STATE OF EVIDENCE ON mHEALTH?

Compared to many public health interventions, the use of mobiles to address health system challenges is a relatively new development. To guide their investments in proven high-impact interventions, ministries, donors, partners, and program managers ask, "Where is the mhealth evidence?" The answer is that evidence is still emerging amid strong demand for rigorous studies demonstrating mhealth cost effectiveness, cost efficiencies, and impact (Tomlinson et al. 2013). To date, the number of well-designed studies from developing countries is limited (Philbrick 2013).

Fueled by the excitement about mhealth, many studies are now underway. The K4Health project has developed an mhealth evidence database that encompasses more than 6,000 studies conducted in both developed and developing countries, searchable by health domain, target user, location, quality of design, and other categories (K4Health). The studies which include both peer-reviewed and grey literature are evaluated for rigor against specific criteria.

Existing evidence of mhealth's impact suggests that HIV and FP programs are likely to benefit from reductions in stock-outs through SMS reporting (Lemay 2012) as well as from improved

provider adherence to treatment protocols (Zurovac et al. 2011). However, the evidence is in short supply regarding mhealth programs designed to reach and serve the most-at-risk populations (MARP) in low-resource settings (Thirumurthy 2012). Nonetheless, information in developed countries suggests that the privacy and anonymity of text messages is acceptable and promising.

As evidence is developed and disseminated, mhealth stakeholders will be able to integrate the emerging evidence into their programs and apply new insights to best practices. Some initial findings thus far point to, first, generally positive health-related outcomes when mhealth interventions are linked to strong stakeholder collaboration and effective adaptation to local contexts (Aranda et al. 2014) and, second, modest benefits from health care provider support interventions and SMS appointment reminders (Free et al. 2013). The West Africa mhealth community should both contribute to and benefit from new studies to address mhealth evidence gaps.

1.5 WHY IS mHEALTH A CONSIDERATION IN WEST AFRICA'S FP AND HIV PROGRAMS?

The USAID West Africa Mission's regional strategies for FP and HIV are designed to support improved service delivery including commodity supply and capacity building to sustain programs. USAID WA's two flagship projects in the region, described below, seek to achieve substantial gains in these two health areas:

Agir pour la planification familiale seeks to increase access to and use of FP services in five focus countries: Burkina Faso, Côte d'Ivoire, Mauritania, Niger, and Togo. Its technical approaches include the following: improved quality of FP services by establishing Centers of Excellence; the delivery of FP services to underserved communities; the education and empowerment of clients and grassroots advocates; and building the capacity of local organizations to use appropriate technology and tools. Planned interventions include the expansion of FP information and education in underserved communities through mobile messages. Mobile campaigns integrated into broader behavior change communication strategies can extend message exposure and help change norms. AGIR-PF has signed an agreement with software developer Dimagi to access mobile tools that will help track contraceptive stock-outs and assist with client follow-up.

AGIR-PF is designed to support the member countries of the Ouagadougou Partnership for Repositioning Family Planning in Francophone West Africa, which pledged to reach an additional one million women and couples with family planning methods by 2015. The partnership coordinates partners' commitments, including resource mobilization. The recommendations in this report seek to generate cost-sharing opportunities among mhealth partners in order to advance the partnership's objectives.

Prévention et prise en charge du VIH/Sida en Afrique de l'ouest is building the capacity of focus countries Burkina Faso and Togo to prevent and treat HIV and AIDS. The project goals are to address critical gaps in HIV programming, particularly among female sex workers and their clients as well as men who have sex with men (MSM). Two of the project's objectives are especially well-suited to mhealth solutions: improving the quality of interventions reaching MARPs and increasing access to timely data on interventions targeted to MARPs. Specifically, mobile messages have resulted in the increased use of HIV hotlines (PopTech 2013) and increased adherence to medication (Huang et al. 2013). Messages and have also spurred peer support (SHM Foundation 2009). In addition, mobile data collection can strengthen monitoring and evaluation systems by improving data quality and lowering costs (Labrique 2013).

In an effort to encourage service use, PACTE-VIH is currently developing and testing SMS and voice messages targeted to individuals identified as MARPs by partner organizations. The findings and recommendations in the present report are designed to support PACTE-VIH's use of mhealth applications that build on sustainable regional platforms, partnerships, and strategies.

1.6 ROLE OF WAHO

As the specialized health agency of ECOWAS and leading health authority in West Africa, the West Africa Health Organization (WAHO) is responsible for establishing health standards in the region. WAHO is especially active in ehealth, and it developed a 2010 Regional eHealth Strategic Plan validated by all nine ECOWAS ministries of health. In that plan, WAHO mapped the linkages among mobile transmission technologies, national data centers and health information systems, and health-specific applications. WAHO also facilitated several member countries' adoption of DHIS2, a free platform that functions as a national health information system for purposes of data management and analysis. System integration and related training are underway in Senegal and other Francophone countries to permit the monitoring and evaluation of health programs as well as data exchange and access across departments and levels of countries' health systems. Regional mhealth activities require the design and operation of a health information system and the development of health standards.

WAHO has yet to set forth an mhealth strategy per se, although it develops limited mhealth activities focused primarily on mobile applications to reduce maternal mortality (in Benin and Guinea). WAHO has documented its activities internally for review by ECOWAS member states (WAHO 2013). At the same time, WAHO's Strategic Plan for Development of Cyber Health in ECOWAS countries 2011–2013 highlights the importance of the integration of mobile technology and handheld devices to streamline data collection and create a robust health information system. The strategic plan features a project that calls for the development of a pool of mobile devices that can be used nationwide in any WAHO country. WAHO is a major partner among regional and global mhealth partners interested in developing initiatives whose reach extends beyond those launched by bilateral programs in a single country.

1.7 KEY CONCEPTS

EHEALTH

The World Health Organization defines ehealth as the "transfer of health resources and health care by electronic means." eHealth aims to deploy resources for health by taking advantage of connected health information systems (using Internet and telecommunications), providing health workers with education and training opportunities, or using technologies in health systems management.

mHEALTH

mHealth refers to the use of mobile communication technologies to improve health outcomes by taking advantage of fast-growing mobile network coverage. mHealth offers innovative approaches to confronting common health care problems such as accessibility, effectiveness, and cost.

END-USER

The end-user is the service beneficiary as opposed to other mhealth stakeholders (developers, mobile operators, or regulatory bodies). End-users are the population for which applications are developed and that will use the technology.

MOBILE DEVELOPER

Mobile developers are the individuals creating the software used in mobile devices. Mobile developers are at the core of the creation of mobile applications (also known as mobile apps or apps) that provide mobile users with a diverse range of services.

MOBILE MONEY

Mobile money refers to financial transactions that use a mobile phone to store value virtually in an account associated with a SIM card or mobile account. Such payment has been rapidly growing, especially in low- and middle-income countries, leveraging large and ever-growing mobile phone coverage in order to bridge the gaps in financial services for those without bank accounts. Mobile money is also commonly referred to as mobile payments or mobile wallets.

MOBILE OPERATOR

A mobile operator is a company licensed by a government authority to provide mobile phone services to subscribers. Mobile operators may or may not own the physical infrastructure associated with wireless communication.

PLATFORM

A platform is the technical solution that allows for the deployment of mobile services on a network. Diverse types of platforms support a range of services used in mhealth.

SMARTPHONE

A smartphone is a mobile telephone with computer-like capabilities. It allows for customizable applications programed by developers. It includes high-speed multimedia functions such as video, a web browser, GPS, and a touch screen with a virtual or physical key board, and it can perform several functions at once. The line between smartphones and “basic or feature phones” is blurring, as some lower-end phones are being introduced that can send email and access the Internet. Basic differences between the two types of phones are highlighted in Figure 2, but a variety of devices exist with mixed features.

FIGURE 2: BASIC PHONES VERSUS SMARTPHONES

BASIC PHONES	SMARTPHONES
In wide use Lower cost Long battery life Limited data storage	Can transmit high volumes of data Touch or physical keyboard Video and graphics capability Has Internet capability

2. METHODOLOGY

The methodology used in this report involved a simple cross-sectional design with data collected through a combination of key informant interviews (in person and by phone) and a desk review conducted between November 2013 and April 2014. The desk review consisted of scanning existing mhealth databases, websites, compendia, newsletters, listservs, and resources.

STEP ONE: PLAN

USAID/West Africa, recognizing the need to develop a better understanding of the region's mhealth landscape, asked SHOPS to prepare a scope of work to conduct a regional scan of the telecommunications industry and health opportunities in the 15 ECOWAS countries plus Cameroon and Mauritania. With the scope of work finalized in October 2013, SHOPS identified consultants and staff with the requisite qualifications to conduct field visits (taking advantage of a macro-level private sector health assessment conducted at the same time in six countries in the region).

STEP TWO: LEARN

The study began with a background review of grey literature, published policy documents, and websites as well as with the development of data collection instruments for the consultants' in-country use.

Key websites and source documents included the following:

- The mHealth Alliance (http://mhealthalliance.org). The mHealth Alliance (funded by the Rockefeller Foundation, Vodafone Foundation, and UN Foundation) is a worldwide group of mhealth stakeholders that use technology to improve health outcomes. The website is an online repository of mhealth resources.
- The WHO eHealth Observatory (http://www.who.int/goe/publications/goe_mhealth_web.pdf). Jointly with the International Telecommunication Union, WHO has developed resources on the impact of ehealth on women and children's health in developing countries, including an mhealth survey in 2011.
- GSMA's mHealth Tracker (www.mobilehealthlive.org/mhealth-tracker). GSMA is the trade association of GSM mobile operators, representing more than 90 percent of mobile operators worldwide. GSMA's Mobiles for Development website features an extensive database of reports, analyses, and resources, including a catalogue of mhealth interventions by geographic location.
- World Bank (http://www.worldbank.org/ict/IC4D2012). Through its extensive InfoDev program, the World Bank has been a leading force behind the development of mhealth strategies and approaches to leverage mobiles for development.
- K4Health mHealth Evidence Database (https://www.mhealthevidence.org). The Knowledge for Health (K4Health) project functions as a platform for documentation of health knowledge management and experiences. The mhealth evidence subsection inventories and assesses the rigor of mhealth research studies.

From these and other sources identified during the desk review, SHOPS compiled an inventory of mhealth applications which set the context for the key informant interviews. The bibliography and Annexes A, C, and D provide a complete list of resources.

SHOPS also conducted in-person interviews in the following countries: Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Ghana, Mali, Mauritania, Niger, Senegal, and Togo. Informants represented a range of organizations, such as the following:

- Government. MOH officials and staff; representatives of other agencies, including ICT departments; and representatives of mobile regulatory agencies as well as WAHO officials
- Implementing organizations. Representatives of primarily local and international NGOs, ICT project managers, and health experts planning to use mobiles in their programs
- Software companies. Mobile value-added service (VAS) providers and application developers
- Mobile operators. CSR departments, business units, and headquarter staff
- Donors. USAID Mission staff and representatives of the Bill and Melinda Gates Foundation and Merieux Foundation

Annex D provides a complete list of informants. SHOPS interviewers used a semistructured interview guide to inquire about existing applications, opportunities, and barriers to mhealth in West Africa. Interviewers posed open-ended questions to elicit a broad range of opinions about and insights into enabling factors and constraints and to explore new threads.

STEP THREE: ANALYZE

SHOPS staff synthesized the resultant data to identify common themes that emerged from the literature and the interview responses. They took verbatim notes of the interviews and reviewed the notes for areas of agreement and divergence in response to the interview questions.

STEP FOUR: SHARE

Drawing on the initial research and stakeholder interviews, SHOPS shared preliminary findings at a March 2014 discussion with USAID West Africa implementing partners for their concurrence. SHOPS presented final findings and recommendations at a dissemination event in May 2014 in Accra, Ghana. The event brought together more than 60 participants from the region representing ministries of health, private sector organizations, WAHO, development partners, and USAID country offices. mHealth developers and mobile operators also participated in the dissemination event, showcasing specific interventions in the region.

STEP FIVE: ACT

SHOPS produced a final report reflecting the insights and comments of contributing stakeholders.

The country snapshots and illustrative mhealth applications in West Africa reflected in the present report are not an exhaustive catalogue of existing mhealth interventions in the 17 countries of interest. Rather, the report provides a high-level scan of activities and opportunities in the region and offers recommendations for catalyzing promising approaches through public-private partnerships.

3. FINDINGS: mHEALTH IN WEST AFRICA

3.1 OVERVIEW OF WEST AFRICA MHEALTH

SUMMARY OF KEY FINDINGS

- Informants acknowledge the dominance of eastern and southern Africa in the development of mhealth applications which was fueled by early successes in those regions.
- Most barriers to mhealth expansion are not unique to West Africa and include low ITC literacy, lack of evidence, and the need for sustainable business models.
- West African countries have the mobile infrastructure in place and the political will to capitalize on it; mhealth momentum is building.
- All 17 countries are deploying or developing mhealth interventions in four key categories: beneficiary education, health worker support, program management, and mobile money.
- Increasingly, regional stakeholders support mhealth expansion, including French-language resources and ICT capacity building.

3.2 WEST AFRICA MOBILE INDUSTRY AT A GLANCE

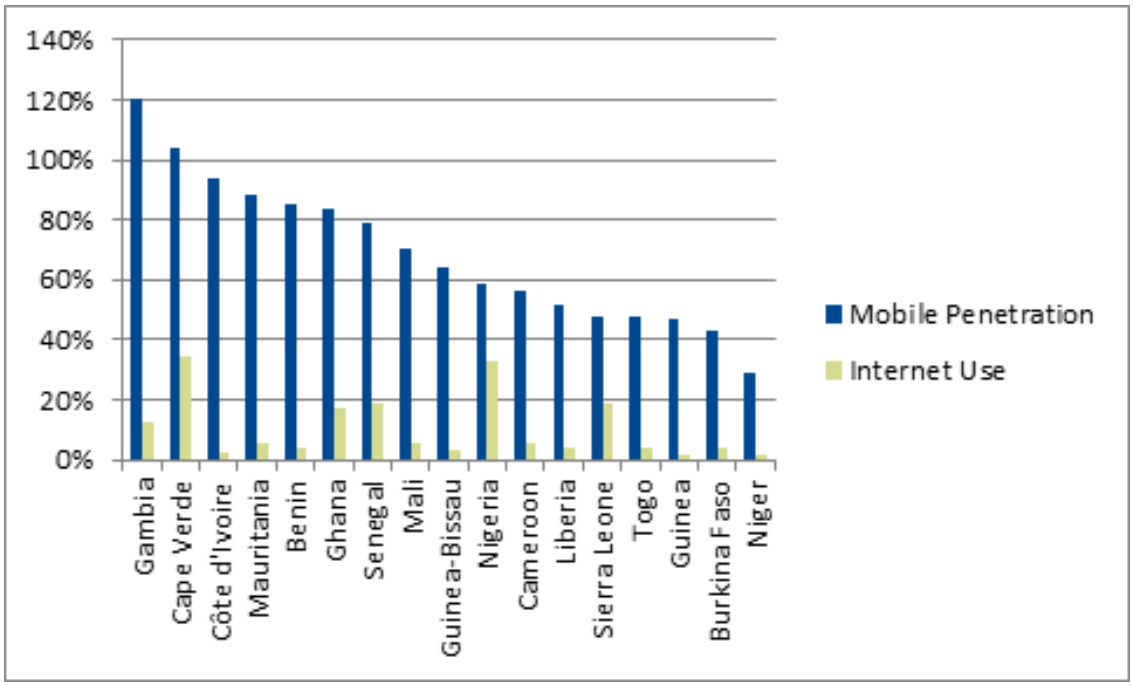
The 17 West Africa countries featured in the present report are all reaping the benefits of a privatized mobile industry, with a large number of licensed operators ensuring price and service competition. As shown in Figure 3, mobile penetration in West Africa has reached substantial scale and far exceeds Internet access (defined as the estimated number of people using the Internet from any device, (including mobile phones) out of the total population in the last 12 months). Increased competition has meant a reduction in service prices and the wide availability of basic low-cost phones. The introduction of prepaid services to align with the spending realities of low-income populations has made mobile services available even for the very poor. With the completion of fiber optic infrastructure, including the Africa Coast to Europe (ACE) fiber optic cable network, Internet services in West Africa will likely grow more rapidly than in the past.

Setting the Stage: Mobile Industry Stakeholders

- **Mobile operators.** Companies (private or state-owned) licensed to build or lease networks that provide mobile services directly to consumers and businesses
- **Mobile value-added services.** Organizations (for-profit or nonprofit) that develop software applications for mobile networks such as ring tones, games, bulk SMS, or Interactive Voice Response (IVR) applications
- **Mobile equipment vendors.** Companies that manufacture network hardware and consumer phones
- **Mobile regulators.** Agencies that enforce mobile operators' licensure terms, including price regulation, network reliability requirements, geographic coverage, and service plans

Overall, the penetration rate (subscriptions per 100 people) is an average 69 percent across the 17 countries, with a total of 103 million subscriptions and an annual growth rate of 18 percent (GSMA and Deloitte 2012). It should be noted that the percentage of unique users is lower than the subscription rate because many people take advantage of deals offered by competing networks and acquire several SIM cards. At the same time, the percentage of users with access to a mobile phone is substantially higher than the subscription rate because many family members share phones, thus extending the reach of a mobile subscription.

FIGURE 3: MOBILE PENETRATION AND INTERNET USE IN WEST AFRICAN NATIONS (2012)



Source: GSMA and Deloitte 2012.

Below is a summary of the key findings on mobile access and use in West Africa:

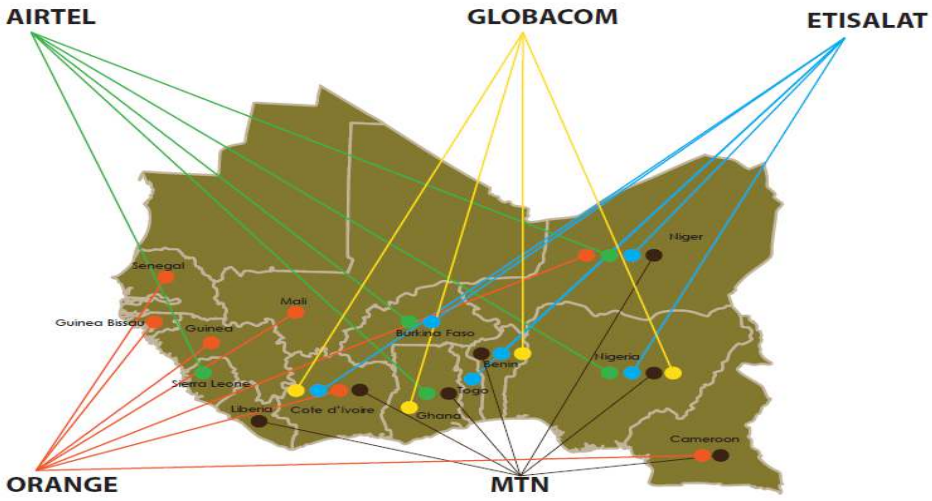
- Low-end phones dominate, with limited penetration of smartphones and tablets, especially outside urban areas. Aside from price, low-end phones are well-suited to the West Africa context because of their superior battery life in a region with intermittent availability of electric power.
- Internet prices remain high but are falling as a result of increased investment in broadband services, especially the undersea ACE system. The demand for Internet-based services (including social media platforms such as Facebook) will grow as prices of smartphones and tablets fall. SMS and voice services dominate; these services are available on all phones and thus achieve maximum reach through the installed base of basic phones.
- Typical of countries across the globe, service coverage is better in urban areas than in rural areas where challenging terrain and low density undercut the financial return on mobile operators' investments.

3.3 FIVE MOBILE OPERATORS WITH SIGNIFICANT REGIONAL PRESENCE

Each of the 17 countries of interest has at least two licensed mobile operators, and many have five or more. The country snapshots in Annex B list the operators licensed in each country and their estimated market share. The industry is dynamic and characterized by frequent mergers, acquisitions, and other changes in ownership structures.

Figure 4 depicts the five mobile operators licensed in several West African countries. The providers' strong regional presence offers opportunities for mhealth partnerships that extend beyond national borders.

FIGURE 4: FIVE MOBILE OPERATORS WITH SIGNIFICANT REGIONAL PRESENCE



Orange

Based in France (previously France Télécom), Orange is the main Francophone operator and a key stakeholder in West Africa. Orange operates in seven West African countries and reaches 123 million customers worldwide. Orange Money, the company's mobile money service, operates in 13 African countries and earned Frost and Sullivan's "Telecom Company of the Year in Africa" award in 2013. It has been a member of the mHealth Alliance since 2010 and supports development of innovative solutions through Orange Labs, its research department.

Airtel

Airtel (or Bharti Airtel, Limited) is an Indian cell phone operator and the world's second-largest mobile provider. It operates in 16 African countries, five of which are located in West Africa, and reached close to 51 million subscribers in Africa as of December 2011. Airtel has developed mobile money products (not yet launched in West Africa) as well as mhealth services, especially in India, including a 24-hour hotline.

Glo Mobile

The Nigeria-based Glo Mobile, a branch of Globacom Limited (or Glo), is the only West Africa-based operator with a presence in more than three countries in the region. Glo is a multinational carrier licensed in six countries in West Africa, although it currently operates in only four of them. Globacom started operations in 2003. It currently reaches 28 million

subscribers and has been developing innovative services and partnerships such as Glo Medicare which provides customers with health-related information, and mobile money services with Ecobank.

Etisalat

Etisalat is based in the United Arab Emirates and currently operates in five West African countries. It has a strong presence in mhealth and, with other donors, operates projects directed to realizing Millennium Development Goals; one such project is Mobile Baby Services that is undergoing implementation in Nigeria. For that project, Etisalat received the "Best Mobile Health Innovation" award from GSMA in 2011. Etisalat (Moov) has also been developing mobile money in several West African countries.

MTN

MTN is a South Africa-based telecommunications company that currently operates in seven West African countries, four of which have introduced MTN mobile money services. MTN has approximately 204 million subscribers and accounts for the largest footprint in Africa. MTN has been vocal about its interest in mhealth and has been developing activities and partnerships across the continent.

3.4 GENERAL FINDINGS ON WEST AFRICA mHEALTH

Even in West African countries with high levels of mhealth activity, most interventions are in the pilot stage. As is the case in Africa's other regions, most mhealth activities in West Africa are small-scale donor-funded initiatives with no financial plan for long-term sustainability. National partners have not assumed ownership and have not yet undertaken systematic evaluations.

> *"Our country received Global Fund monies to develop a mobile platform to connect regional directors for organizing HIV response. Once the funding ended, the system is not used."*
>
> MOH staff, Burkina Faso, March 2014

MOH stakeholders support mhealth initiatives but lack the resources to coordinate, regulate, and finance them. Integration of mhealth into the broader health system's infrastructure is a long-term process that requires vision, planning, stakeholder engagement, and system management. Governments are approached with many proposals and lack the capacity to manage them.

The most common interventions are IVR services, call centers, and SMS reporting. The rapid rise in the use of smartphones and tablets will likely have a major impact on the health sector over the long term, but most applications rely on basic phones. Implementers report that use of the most familiar and simple technology keeps costs low for hardware, training, and support.

Setting the Stage: mHealth Applications

West African mhealth initiatives use a variety of widely available tools, including both proprietary and open-source software applications. Many are designed to be free or low cost and deployed without the need for advanced technical skills. The applications provide a range of SMS, voice, or data formats. Some application developers active in West Africa include the following:

- **Rapid SMS.** Developed by UNICEF, Rapid SMS is a free toolset for building SMS data collection services. Currently used for ChildCount+ registration activities in Côte d'Ivoire, Guinea, and Senegal.
- **Magpi (previously Episurveyor).** Developed by Datadyne, Magpi permits data collection and the creation of outbound SMS and audio messages, with both paid and free versions. It is currently used by the DELIVER project in Ghana, Liberia, and Nigeria.
- **Frontline SMS.** Developed by the NGO of the same name, it offers a suite of products, including FrontlineSMS Credit which helps integrate SMS with mobile money, and FrontlineSMS Radio, which permits DJs to interact live with their audiences. Currently, it is used in Benin and Nigeria.

> *"My advice is to focus on voice messages. Literacy rates are low in many West African countries, and text messages can be a barrier even for health workforce."*
>
> Interview with Helen Keller International staff, March 2014

Mobile operators are active partners in many pilot projects funded primarily through foundation or CSR grants. Projects' short-term duration makes true partnerships with mobile operators a rare occurrence. In addition, the lack of coordination among donor projects, often characterized by inflexible indicators, inconsistent baseline measures, and the absence of value-for-money standards, militates against sustainable partnerships.

> *"We must rely on government partners to fund the training of their workers in tools we develop, but often there are no resources to do this."*
>
> Interview with Orange representative, November 2013

Policy barriers include lack of mhealth strategies and enabling regulations. Several countries have developed draft mhealth/ehealth strategies to guide their activities, but they have yet to operationalize those strategies. Other countries have promulgated policies that inhibit the ability to leverage mobiles for public health messages.

> *"Policies such as those in Burkina Faso that prohibit unsolicited SMS messages to [be] distributed to mobile subscribers need exceptions for public health."*
>
> Interview with PSI, February 2014

Gaps in phone signal coverage are a problem in many areas. CHWs may resist the use of mobile tools because of the frequent absence of signals and loss of data. Charging phones is also a challenge in areas characterized by frequent power outages.

> *"Our agents became frustrated in Bamako when network dropped messages and data was lost."*
>
> Interview with Pesinet, March 2014

3.5 WEST AFRICA mHEALTH EXPERIENCE REPRESENTS A CONTINUUM OF ACTIVITIES

Results of the SHOPS study revealed various levels of mhealth investment and experience across the 17 countries of interest. For purposes of highlighting the diversity of contexts, the SHOPS assessment team divided the 17 countries into three mhealth categories: active, moderate, or nascent (Figure 5). These rough divisions reflect the total number of identified mhealth activities and key informants' associated opinions. Ghana and Nigeria are the most active; their relatively mature mhealth ecosystems encompass several mobile software companies (also known as SMS aggregators, SMS gateways, or mobile VAS providers) and a considerable number of larger-scale initiatives. Ghana and Nigeria's negotiations with several operators have enabled mobile VAS providers to streamline the introduction of mhealth services and offer services such as large-scale interactive text platforms, airtime top-ups, and IVR platforms.

FIGURE 5: CONTINUUM OF mHEALTH ACTIVITY LEVEL BY COUNTRY

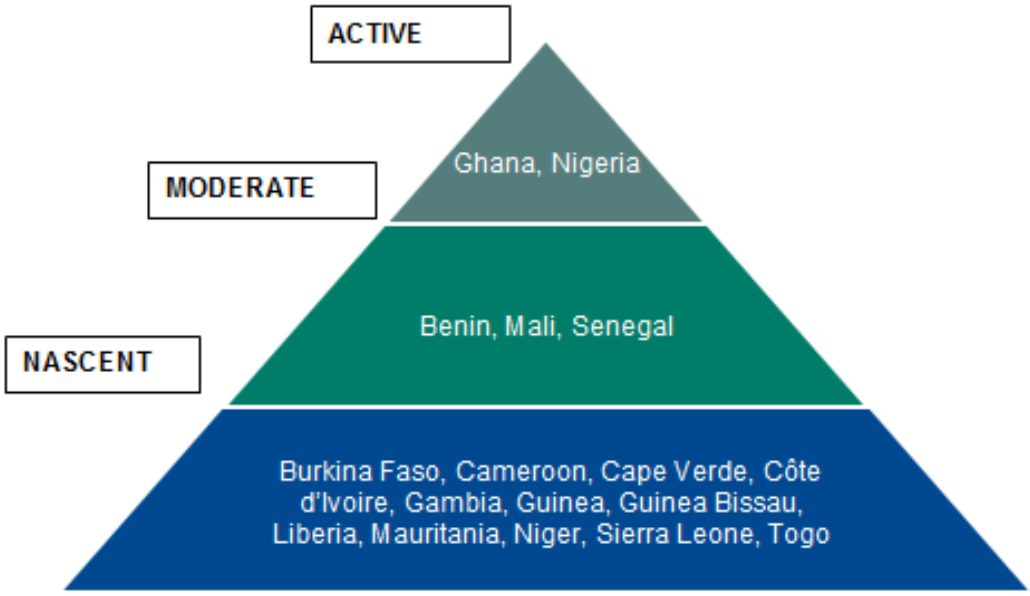


FIGURE 6: CATEGORIZATION OF mHEALTH ACTIVITY LEVEL

Level of mHealth Activity	Category Description
ACTIVE	Considerable number and breadth of planned and current interventions, large presence of mobile VAS providers, emergence of iHubs and mLabs, large-scale private sector initiatives, and multisector initiatives
MODERATE	Recent momentum in mhealth applications; growing variety of interventions, including research trials; private sector interest; growth in ICT incubators; and training opportunities
NASCENT	Small number of pilots and development partners, generally limited presence of application developers, and lack of/unreliable electric supply/charging stations

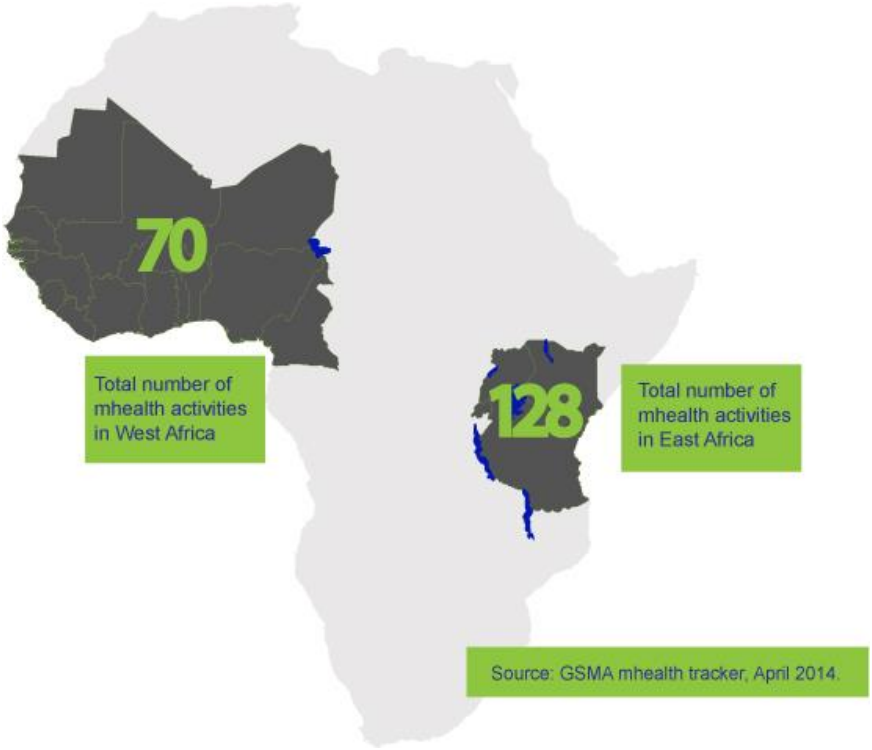
3.6 WHY HAS mHEALTH LAGGED IN WEST AFRICA?

Virtually all informants interviewed for the report acknowledged that West Africa is less active in leveraging mobile technology for health programs than countries in eastern and southern Africa. A review of several databases documenting mhealth activities in SSA confirmed informants' reports.

- USAID's mHealth Compendium Volumes 1–3 (African Strategies for Health Project 2012-2013) identified 84 projects in SSA, of which 16 (or 19 percent) were located in West Africa, primarily in Ghana and Nigeria.

- An mHealth Working Group database, which catalogues both peer-reviewed and grey literature on mhealth and provides a searchable database for identifying high-impact evidence-based practices (K4Health), showed that the 17 West African countries accounted for a total of 40 reported studies compared to 41 in South Africa alone and a total of 89 for the four eastern Africa countries of Kenya, Rwanda, Tanzania, and Uganda.
- GSMA's mHealth tracker highlighted the disparity in mhealth activities between eastern Africa and West Africa, with just 70 projects identified in the 17 West Africa countries compared to 128 in only four eastern Africa countries (GSMA).

FIGURE 7: TOTAL NUMBER OF MHEALTH ACTIVITIES IN WEST AND EAST AFRICA



The above reference points reflect the consensus that mobile applications are more likely to be piloted and tested first in eastern Africa and then replicated in other African countries. When asked why eastern and southern Africa had been more active in mhealth, informants' responses pointed to the following three themes:

EASTERN AFRICA'S EARLY SUCCESS FUELS ITS CONTINUING DOMINANCE

Johannesburg and Nairobi are economic powerhouses ranked among Africa's most competitive mobile markets. In the mid-2000s, global organizations set up offices in South Africa and Kenya, influenced by interventions such as the World Bank Group's InfoDev program which was a collaboration between the government of Finland and Nokia. InfoDev created mobile application laboratories or mLabs in Johannesburg and Nairobi. The mLabsare technology-neutral platforms for developing technical skills. They connect entreprenuers interested in creating mobile solutions that address social needs. mHealth developers saw eastern Africa as

> *"We have participated in more than 70 projects in 17 countries, but only one program in West Africa has reached out to us in Nigeria."*
>
> Founder, Text to Change, December 2013

a lower-risk, lower-cost foothold for identifying ICT talent, piloting innovations, and bringing new applications to scale. Once mhealth developers established a regional presence, they turned to nearby countries such as Tanzania and Uganda. As noted by the founder of Text to Change, "We have participated in more than 70 projects in 17 countries, but only one program in West Africa region has reached out to us in Nigeria." The lower volume of mhealth organizations, initiatives, and experiences in West Africa deters newcomers from establishing a base in the still fledgling ICT4D industry.

mHEALTH REMAINS AN ENGLISH-CENTRIC COMMUNITY, CREATING BARRIERS FOR FRANCOPHONE AFRICA

Mobile applications are available in hundreds of languages, and message content, training manuals, and mhealth resources lend themselves to translation into any language. However, translation is a costly process, and the vast majority of mhealth resources, tools, and platforms are developed first for English speakers. Dozens of the mhealth websites, databases, newsletters, and journals reviewed for this report are available only in English. Mobile applications such as Mobile Medic and FrontlineSMS are available in French versions, but even a French-language version will take implementers only so far. Often, message boards and online communities that support services are limited to English, as are instructions for additional software interfaces that can be integrated with mhealth platforms. As noted below, the availability of French-language mhealth resources is increasing, but language barriers have constrained the growth of West African mhealth communities.

> "*Our organization needed a critical mass of partners in West Africa in order to justify the costs of translating CommCare application, instructions, and web support into French.*"
>
> Dimagi field manager, November 2013

MANY BARRIERS TO mHEALTH ADOPTION ARE NOT UNIQUE TO WEST AFRICA

Barriers to realizing the full potential of mhealth persist across the global south and contribute to the challenges of forming mhealth partnerships in West Africa as well. Mobile interventions require financial investments which many cash-poor health systems do not have. Other barriers include:

> "*We know the technology is available, but who will mobilize and train the people. That is the chief mhealth barrier.*"
>
> IICD staff member, February 2014

- **Limited evidence of mhealth efficacy and cost-effectiveness.** mHealth evidence reviews have documented the lack of rigorous studies evaluating the impact of mhealth in developing countries (Aranda et al. 2014). Before ministries of health can be expected to support mhealth applications, they need data demonstrating impact and cost efficiencies. As stated by one MOH informant, "We need data to show impact and savings to make investments." One factor limiting the number of impact evaluations is the rapid pace of change in the mobile sector. Rigorous longitudinal studies are costly, and new technologies such as lower-cost smartphones may make today's interventions obsolete.
- **Lack of enabling policies or preponderance of policies that inhibit effective mhealth applications.** Countries lack a common set of measures tied to health priorities for alignment with mhealth projects. Interoperability and information sharing will not become a reality until countries promulgate relevant policies and publish health indicators (Mechael 2010). Prohibitions on bulk SMS through mobile operator databases, particularly in the case of public health education, also constrain mhealth applications.

- **Literacy barriers, including ICT literacy.** A significant proportion of the population in greatest need of mhealth services has never sent a text message or used a phone other than to make calls. Several global initiatives are under way to expand access to phones and provide ICT training to populations that would benefit the most from mhealth services. One example is GSMA's mWomen initiative which focuses on increasing women's use of life-enhancing value-added services in developing countries.
- **Limited access to electricity to charge devices.** Gaps in reliable power sources have led to the development of solar chargers and portable charging stations, but mhealth projects face challenges in keeping batteries charged. The longer battery life of low-end phones is one reason that smartphones and other higher-functioning devices are not practical in low-resource settings.

3.7 REGIONAL TRENDS INFLUENCING mHEALTH GROWTH IN WEST AFRICA

Despite the factors noted above, West Africa evidences considerable mhealth momentum. Virtually all MOH staff interviewed for this report expressed a strong interest in more effective use of mobile technologies in health systems. Several West African countries including Cameroon, Nigeria, and Senegal have established new mobile technology hubs. In related activities, Mobile Monday chapters have formed in Ghana, Nigeria, and Senegal (Rao 2011). These informal networks link mobile industry innovators to other mobile communities to share ideas and foster cross-border applications through virtual and live networking events. Once an ecosystem of local developers is established, the developers create applications tailored to the local context.

Other factors that are influencing the momentum of mhealth in West Africa follow:

- **WAHO's leadership in ehealth.** Through WAHO's ehealth strategy and support for harmonized health information platforms and standards, MOHs now enjoy enhanced capacity to link mhealth activities to broader health system needs. WAHO has facilitated several countries' adoption of DHIS2, and it is supporting integration within their health information systems as well as supporting DHIS2 training in Senegal and other Francophone countries. DHIS2 permits data exchange and access across departments and levels of the health system and provides a common backbone for mhealth data collection activities.
- **Growth in common platforms.** As the mhealth field has matured, it has started to coalesce around integrated platforms that support a wide range of functions and applications. Examples include ChildCount+, CommCare, Magpi (previously Episurveyor), DataWinners, and MOTECH. Many of the initiatives identified in West Africa use similar software that can potentially translate into economies of scale and rapid knowledge transfer. The platforms are modular, allowing for easy adaptation and combination. Increasingly, interventions combine functionality from various software platforms to perform a host of functions, including data collection, messaging of reminders, the delivery of educational content, symptom trackers, and mobile payments.
- **Escalation of mhealth in Nigeria.** As the economic powerhouse of West Africa with 48 percent of the region's population and 33 percent of its GDP (World Bank 2014), Nigeria has attracted significant global mhealth investment. Nigeria alone has over 30 millon mobile devices in use, two-thirds of which have Internet access. Large multistakeholder investments are expected to generate a regional set of initiatives, experts, and lessons learned that will influence the ECOWAS community.

- **ICT4SOML.** Within the framework of Nigeria's Saving One Million Lives (SOML) initiative, international partners are working with the MOH to create an mhealth ecosystem that integrates mobile applications into the broader health system and contributes to the scale-up of access to essential commodities for women and children. A major activity under SOML is ICT4SOML, which is a technical working group led by the government of Nigeria in partnership with the mHealth Alliance, GSMA, Intel, World Bank, BBC World Trust, and other stakeholders to scale up the use of ICTs in health. Important outputs are a national health ICT strategy, a coordinating mechanism for an mhealth inventory and emerging activities, and assessments of new mhealth proposals.
- **eHealth Africa.** ICT NGO provides assistance in the design and management of mhealth applications under the MOH's direction in partnership with WHO, BMGF, UNICEF, and many others. Initiatives include construction of the Emergency Operations Center in Bauchi State to improve health data collection and, in Kano State, health and nutrition surveillance with the use of tablets and open-source data collection software.
- **m4Change.** In partnership with the MOH led by Pathfinder International and Dimagi, m4Change equips CHWs with decision-support software to improve the quality of antenatal care services, strengthen supportive supervision, and provide SMS reminders to mothers to encourage facility-based births and ANC visits. Currently, to encourage safe childbirth, the partnership is integrating mobile money to facilitate conditional cash transfers through Nigeria's SURE-P program.
- **mLearning for CHWs.** In partnership with Nigeria's MOH, the Clinton Health Access Initiative (CHAI) is developing mobile training to complement in-service training on life-saving commodities for various cadres of reproductive, maternal, newborn, and child health workers. The initiative will launch in 2014 and adapt current training programs for a mobile platform.
- **Growth in French-language resources:** A growing number of NGOs are working to increase the capacity of organizations in Francophone countries to use information and communications technologies for development (ICT4D) objectives. These NGOs are developing training manuals, tools, and message content in French for mhealth initiatives and providing capacity-building resources for community and national initiatives. Examples include the following:
    - Réseau Africain pour l'Education (RAES) (www.onraes.org), a Senegal-based NGO with the goal to use ICT to strengthen education, health, and good citizenship in Africa.
    - International Institute for Communication and Development (IICD) (www.iicd.org), a Dutch NGO operating in Burkina Faso, Ghana, and Mali, has a mission to help low-income people create opportunities by using ICTs through design and implementation.
    - Additional forums include the Health Information for All (HIFA) French-language database that focuses on health policymaking in Francophone countries. HIFA's French forums could serve as a repository for Francophone country mhealth research studies and policies. Funding for French mhealth resources may also be available from the Fund Francophone des Inforoutes created to promote development of French digital applications and libraries.

3.8 ILLUSTRATIVE mHEALTH APPLICATIONS IN 17 WEST AFRICAN COUNTRIES

The considerable breadth of mhealth applications (past, existing, and planned) in West Africa involves varied partners, scopes, and health areas. The examples below come from stakeholder interviews and the desk review, but they are not exhaustive. They are organized into four categories of applications selected for their relevance to HIV and FP program needs.

- **Mobile money.** Mobile money is not traditionally considered "mhealth" but rather "mfinance" because mobile payment services are available for all financial transactions and not generally tailored or limited to health applications. As the examples below demonstrate, however, the use of mobile money in health is growing. It helps fund other mhealth applications and may be a factor in West Africa's advances in mhealth.
- **Health data collection.** The most common mhealth applications in West Africa are used for health data collection and transmission. Broadly defined, health data collection extends to program management applications such as registries and vital events tracking, electronic medical records, disease surveillance, service statistics analysis, and inventory tracking systems that improve decision making.
- **Consumer applications.** Direct consumer services improve access to health care through applications such as appointment reminders, awareness messages, personalized health information, behavior change communications, help lines, medication alerts, and resource databases.
- **Health worker support.** Health care providers have access to a range of applications to improve quality of care, such as point-of-care decision support, remote consultation and supervision, peer support groups, case management software, job aids, and other training resources.

3.8.1 MOBILE MONEY

Mobile money enables the use of mobile phone accounts for the electronic deposit, transfer, and withdrawal of funds. Mobile money expands users' access to financial services such as savings and insurance and provides users with a secure way to store and transport funds, pay bills, and send money to family members. Mobile money applications in the health sector can strengthen health programs by replacing cash flows with efficient and transparent transactions. Examples of use cases include the payment of per diems for program training, the implementation of pay-for-performance schemes, the promotion of health savings accounts, and improved voucher programs. The integration of financial and health services offers potential revenue streams to fund mhealth information services.

The 17 countries featured in this report have all authorized mobile money services, with some services introduced just months ago. The policies governing mobile money services vary from country to country, and some policies are in the early stages of implementation. None of the countries has yet achieved the scale of Kenya's mPesa payment system which benefited from several factors including a dominant mobile network operator, a supportive regulatory environment, an extensive agent network built over a five-year period, and high levels of financial literacy. When asked about barriers to mobile money growth in West Africa, informants offered several hypotheses, including the followlwing:

- Lax enforcement of 'Know Your Customer' requirements on behalf of mobile operators poses a challenge because identity verification is critical to financial transfers.
- Consumers remain skeptical of mobile money's value, especially in collective-minded cultures characterized by savings groups rather than by the model of the individual savings account.

Nonetheless, growth in mobile money applications has been rapid in some countries, and mobile money platforms are a critical tool for introducing health insurance to the informal sector in order to gain its support of universal health care. Airtel in Sierra Leone and MTN in Ghana have unveiled insurance initiatives that use mobile money platforms. Collecting small cash premiums via mobile money accounts provides the operational efficiencies needed for large-scale insurance programs. The integration of mhealth into mobile financial services also translates into new business models potentially capable of sustaining the financing of health messages and services. For example, modest user fees for health information may gain acceptability when combined with mobile savings accounts. Consumers who store and receive funds on their phones may be willing to pay for telemedicine services, mobile health games, or other premium mhealth applications.

Below are some initiatives under way or in the planning process in West Africa that may benefit HIV and FP programs:

Tigo MicroEnsure Microinsurance Ghana. In Ghana in 2010, MicroEnsure partnered with Tigo to pilot insurance products for underserved populations. The introduction of life insurance helped pave the way for more complicated health insurance products such that mobile insurance products have now expanded to Senegal and Tanzania. Many aspects of Tigo's insurance services are phone-based, including service registration, premium payments through airtime deductions, account updates, claims submission, and payment. Tigo helps market and distribute its products and subsidizes premium payments for high-use customers (http://www.microensure.com).

Implications for HIV and FP programs. For mobile operators seeking to offer health insurance products as part of their service packages, health programs offering health education and preventive care may be attractive content partners. Transaction revenues from mobile money can be used to cross-subsidize health information as consumers may be more willing to pay for financial services than health content. Appointment reminders, timely test results, medication adherence messages, and health advice can motivate improved health behaviors, reduce risk for insurance providers, and increase loyalty for mobile operators. AGIR-PF and PACTE-VIH could consider piggybacking onto confirmation messages related to mobile payments or using platforms for subsidized BCC channels.

Conditional Cash Transfer Program Nigeria. As part of a government subsidy linked to energy revenues and aimed at reducing maternal and newborn deaths, the government of Nigeria is providing cash transfers to women as an incentive to complete antenatal care visits, give birth in clinical settings, and immunize their children. Implementing partners Pathfinder and Dimagi are piloting the use of mobile money services to improve the efficiency of the cash transfer process. Specifically, the project will use the services of a third-party mobile money provider that is connected to several mobile networks (Interview with Pathfinder 2014).

Implications for HIV and FP programs. Performance-based cash incentives may be introduced in a variety of program activities by, for example, rewarding program partners for the submission of timely data or providing bonus payments to partners that achieve improvements in specified quality indicators. HIV and FP programs that introduce cash incentives to improve

quality of services should consider mobile money options as a means of reducing administrative costs, limiting risks of leakage, and improving transparency.

Youth Reproductive Health Messaging Ghana. DKT International, Marie Stopes International, and Grameen Foundation are launching a partnership in Ghana to increase youth demand for reproductive health services called No Yawa. Mobile messages in SMS and voice format will target a variety of youth segments linked to social media and mass media campaigns. Negotiations are underway with a youth-focused mobile operator to explore bundling No Yawa's content as a VAS with the operator's mobile money products (Interview with Grameen Foundation 2013).

Implications for HIV and FP programs. No Yawa's proposed partnership with a mobile operator is a useful example of a business model that incentivizes a mobile company to market health services. A mobile company could offer free health messaging services to subscribers who open mobile money accounts, thereby providing sustainable funding for message content. For mobile operators and health partners, combining financial services and health information in a single package can provide economies of scale related to registration of users, marketing, and formative research.

Etisalat Mobile Baby Nigeria. Mobile Baby is a suite of services that enables midwives and birth attendants to identify and act on obstetric emergencies to prevent maternal deaths. The application includes communication of symptoms to clinic-based providers, ultrasound capability for remote diagnoses, mobile money to facilitate emergency transport, and decision-support protocols in several local languages. Etisalat and other corporate partners donate equipment and training services, local government partners maintain the system, and Etisalat generates revenues through SMS and data services. Etisalat Mobile Baby is currently available in Nigeria and planned for introduction through its West African affiliates.

Implications for HIV and FP programs. Mobile Baby's integration of mobile payments for transport represents an important use case for increasing access to services. To reduce barriers to care, HIV and FP programs seeking to subsidize access to care through vouchers or other demand-side financing might consider including transport vouchers delivered via mobile money.

3.8.2 DATA COLLECTION

Among the most common use of mobiles in West Africa are data collection applications for surveillance, tracking supplies and service statistics, monitoring program results, enumerating health events, and conducting health surveys. Transmission modalities include voice, SMS, and data channels. Table 2 presents examples of mobile data applications in health programs from each of the 17 countries.

Mobile data collection can offer significant benefits over paper forms, including more timely data, improved data quality with software that prevents data entry errors, immediate feedback to those providing the data, and instant analysis to improve decision-making. By reducing costs of printing, data entry, physical transport, and storage of paper records, mobile data collection has the potential to save health programs money. However, rigorous cost effectiveness analyses are needed to demonstrate these savings. The case study from USAID's DELIVER project highlights one stock tracking application.

Case Example: USAID | DELIVER Stock Tracking

USAID's DELIVER project led by John Snow Inc. has instituted mobile-based reporting in several West African countries to improve the management of drug stocks. Starting in Ghana in 2009 under the leadership of the Ghana Health Service, DELIVER worked with DataDyne's Magpi (previously Episurveyor) platform to institute the End User Verification Exercise, a quarterly report on malaria drug stocks to prevent stock-outs, reduce waste from expired drugs, and more efficiently manage timely delivery of products where needed. Liberia, Nigeria, and other SSA countries use the platform to reduce time and costs of data entry and analysis (http://deliver.jsi.com/dlvr_content/resources/allpubs/logisticsbriefs/MalLogHigh_ImpMonSupHFL.pdf).

DELIVER also partnered with Dimagi and the Ghana Health Service to develop an SMS stock tracking system in which 200 providers send a structured text every week to a toll-free short code. The system covers 20 health commodities related to FP, HIV, and malaria to report how much is available and how much has been received. Participants include all levels of the health system from national medical stores to rural health outposts. The program has expanded to cover all of Ghana's ART sites (http://www.commtrack.org/static-resources/docs/case-studies/commtrack-ews.pdf).

Implications for HIV and FP Programs

Mobile stock tracking systems such as DELIVER's interventions demonstrate mhealth's potential for addressing challenges in HIV and FP programs, including the following:

- Adaptable data collection platforms that use existing low-end phones
- Automatic feedback to CHWs to increase reporting compliance
- Coordination among national, regional, and local stakeholders through shared access to a common database

TABLE 2: ILLUSTRATIVE DATA COLLECTION APPLICATIONS

Illustrative Data Collection Applications[1]		
Benin	1	VaxTrac (partners include MOH, Gates, UNICEF, WHO) is launching a mobile data collection suite of tools in 2014 to improve a vaccine information management system, integrate health records, improve stock management, and develop cold chain performance monitoring.
	2	Medic Mobile's Kujua software has been deployed in pilot to synchronize communication and recordkeeping between participating hospitals, clinics, and district management sites.
Burkina Faso	3	JSI is partnering with the MOH to introduce daily stock-out reports.
	4	WHO, UNICEF, and UNFPA are planning to use RapidSMS for sentinel reporting of maternal deaths in Kaskuy health district starting in 2014.
	5	BURCASO's Gates Foundation funds will be used to pilot mobile data collection in 34 sites.
	6	JSI and Dimagi will replicate a Senegalese platform to monitor malaria cases and track malaria commodities in six villages in Kaya district.
Cameroon	7	WHO, CDC, and MTN are implementing a nationwide "SMS for Life" disease surveillance platform for malaria statistics.
	8	Greenmash is collaborating with health partners to provide a mobile medical supply chain platform.
	9	CHAI is working with the MOH to install SMS printers to strengthen early infant diagnosis by speeding results transfers from labs to health faciliaties. Shortened testing times will allow doctors to prescribe ART more quickly to infants in need.
	10	ACMS and partners provide training to over 200 health chiefs and community health workers for phone-based data collection on families visited, stocks of oral rehydration salt, and Artemisinin-based Combination Therapy medicines.
Côte d'Ivoire	11	UNICEF is registering births using mobiles through the Môh ni Bah campaign in collaboration with the Ivorian youth minister. Agents utilize SMS or the Môh Bi Nah mobile app to present information on new births recorded by village chiefs.
	12	iTECH is providing electronic lab reporting services through the University of Washington.
	13	Helen Keller International is supporting the Directorate of Information, Planning and Evaluation in a pilot to collect epidemiological and nutrition data in collaboration with Microsoft and Axxend.
The Gambia	14	Vodafone and Pfizer launched an SMS platform for disease surveillaince and stock-out reports on 20 medications at all 50 clinics in Gambia, five hospitals, and six central and regional medical stores.
Ghana	15	The MOVE-IT project employs surveillance agents to report the occurrence of vital events in three districts in the northern region via SMS notifications. The data are confirmed and linked to a national database for analysis.
	16	DELIVER project in partnership with the MOH has implemented an SMS stock tracking system since 2011. Currently, 200 providers send structured texts to a short code. Providers report stocks of 20 FP, HIV, and Malaria commodities.
	17	FioNet provides mobile-enabled devices to interpret and transmit rapid diagnostic Tuberculosis test results to Ghana Health Service.

[1] Sources are listed in Annex C, organized by number.

Illustrative Data Collection Applications[1]		
	18	Since 2011, Millenium Villages Project has utilized ChildCount+ mobile platform to support PMTCT services.
Guinea	19	A voice-based data collection platform for surveillance and service statistics which includes stock management has received 46,000 calls.
	20	African Friends of Guinea project and Dimagi use SMS reporting for neglected tropical diseases. CHW registers data to create an early warning system.
	21	RapdidSMS platform is being piloted to provide clients with numbers of taxis for emergency transport.
Guinea Bissau	22	MTN supports a closed user group to manage oversight of vaccination statistics at district and regional levels.
Liberia	23	UNICEF is supporting MSW mobile-facilitated birth registration in health facilities and through community agents, instantly sharing data with the county registration office which in turn prints birth certificates.
	24	The LAUNCH project funded by ACDI/VOCA, JSI, and Magpi uses mobile data collection to monitor health indicators and improve timeliness of delivery of nutrition supplements.
	25	Global Strategies for HIV Prevention uses mobiles to improve reporting, inventory management, distribution, and forecasting for their remote health programs.
Mali	26	The ATN Plus project supported SMS collection of service delivery data for the national health information system.
	27	UNFPA has supported a SMS commodity tracking system in two regions.
	28	Ma Santé project has trained more than 100 CHWs in the use of mobile phones for daily data collection in poor neighborhoods of Bamako with IWG and mHealth Alliance funding.
	29	UNFPA is working in partnership with FrontlineSMS and Datadyne to report births and deaths in Mali using verbal autopsy.
Mauritania	30	An SMS surveillance program in partnership with UNICEF began in 2014 to monitor maternal and neonatal deaths and track contraceptive stocks using a RapidSMS platform.
Niger	31	Orange is working with WHO on a medical stock management system with three objectives: manage at-risk pregnant women through registration, follow up during pregnancy with appointment reminders and referrals, and track drug supplies. The project is still in the planning phase to assess needs and develop a budget.
Nigeria	32	The National Primary Healthcare Development Agency is instituting MADEX data collection system facilitated by monitoring and evaluation officers with tablets.
	33	A mobile-enabled routine data collection system for Health and Demographic Surveillance System (HDSS) was set up in rural communities in Zamfara State in 2012. Activities included training interviewers and rehabilitating health facilities with solar panels to ensure power supply.
	34	The Delivery Team Topping Up (DTTU) system installed by the DELIVER Project in Nebonyi and Bauchi states uses laptop-based software to track inventory of 24 commodities during delivery resulting in timely forecast information.
	35	The SMART project used SMS printers to create a feedback loop between rural clinics and diagnostic labs to reduce the turnaround time for infant HIV test results.
	36	GxAlert, developed by Abt Associates, is a national alert system currently scaled up to 69 sites, built to send via text or email rapid TB test results to a national TB database to speed reporting times.

Illustrative Data Collection Applications[1]		
	37	The ChildCount+ platform, developed by the Millinnium Villages Project has since 2011 registered births and tracked health events in 686 local government areas using a simple SMS platform that also provides follow-up alerts.
Senegal	38	The MOH and Intrahealth launched Mobile Medic for data collection of service statistics in 2010. Eventually, the program will scale to six regions and 500 facilities.
	39	The VOICES project supports epidemiological data collection and training.
	40	Project DJOBI improves maternal and child health using phone-based data collection through mutuelles (insurance agents).
	41	UNICEF is rolling out ChildCount+, its birth registration program.
	42	NGO RAES is integrating data collection on malaria cases through mobiles with an expected reach of 100,000 people.
Sierra Leone	43	Catholic Relief Services is conducting household malaria surveys on iPhones, including biomarker testing.
	44	Monitoring and evaluation officers improved compliance with health information system surveillance reporting using financial incentives and solar-powered laptops.
	45	UNFPA in partnership with FrontlineSMS and Datadyne reports births and deaths using verbal autopsy.

3.8.3 CONSUMER APPLICATIONS

> *"Call centers address needs of youth who fear judgment about their sexual activity from providers."*
>
> Marie Stopes International, December 2013

A second category of interventions, documented in Table 3, are applications which target consumers such as campaigns to mobilize communities, raise awareness about health risks, and create demand for health services by sending messages to subscribers across specific geographic areas. Other applications focus on existing clients or subscribers with customized messages based on their demographics, health status, or other personal characteristics. SMS is the most utilized format, but recorded audio messages and hotlines linking consumers to live counselors are also documented. Increasingly, consumer applications are integrated into health worker tools that link diagnosis and treatment with automated follow-up mobile communications to strengthen linkage with care.

Case Example: MOTECH Mobile Midwife

Drawing on extensive formative research undertaken in 2008, the Grameen Foundation, in partnership with the Ghana Health Service and others, developed the MOTECH suite of applications. Among MOTECH's applications is the Mobile Midwife service which provides stage-based messages to pregnant women and new mothers to promote healthy behaviors. CHWs enroll mothers (and their family members) in the service. Content includes information and advice about nutrition, birth preparedness, the importance of ANC and immunizations, use of bed nets, family planning, and breast-feeding. The service also provides appointment reminders. The service is in scale-up from two to five districts in Ghana. Negotiations with mobile operators are exploring whether sponsored messages and a fee-based option for wealthier urban women could subsidize the messages for poorer rural women. At present, the service is undergoing evaluation to determine its impact on health outcomes and service utilization.

A version of Mobile Midwife is now under development in Nigeria in partnership with GSMA and Airtel.

Among the detailed lessons learned in MOTECH case studies are (1) the importance of linking phone-based education to the broader health system through integrated health worker applications for case tracking, referral, and skill building; (2) a strong preference for voice services in the local language versus text messages; and (3) limited familiarity with interactive voice response systems and thus the need for simple navigational steps (Grameen Foundation 2012).

Implications for HIV and FP

Recorded voice/SMS messages tailored to local conditions and personalized for specific subgroups offer a complementary option for BCC campaigns designed to address local myths, promote clinical services, increase knowledge, and establish new norms and attitudes. The development of alternatives to the subscription model of Mobile Midwife could address the role of stigma and discrimination in accessing S/RH services. Message platforms to which people can initiate service may enhance the sense of anonymity and privacy. The versatility of open-source mobile software platforms such as the MOTECH suite can be easily adapted to add features that include medication/contraceptive adherence reminders or sharing of test results.

TABLE 3: ILLUSTRATIVE CONSUMER APPLICATIONS

Illustrative Consumer Applications[2]		
Benin	46	PRISE-C project partnered with Dimagi to provide CHWs guided counseling on FP methods in two districts where 30 percent of those who received counseling adopted a FP method.
	47	ABMS/PSI has a free hotline available through all operators for information on STIs, FP, malaria, diarrhea, and violence against women.
	48	An HIV-specific toll-free emergency number was established to assist in the reporting of new cases.
Burkina Faso	49	A study conducted with 210 mothers confirmed that the women could receive text and voice messages and that they would provide their numbers for vaccine reminders if available.
	50	PSI affiliate PROMACO has established a free telephone number which users can call for information on HIV.
Cameroon	51	Orange is launching a low-cost hotline in 2014 which will enable consumers to ask anonymous advice from nurses and doctors about FP, STDs, and HIV.
	52	Orange and Text to Change offered an HIV mobile phone quiz in 2011 to increase knowledge of the infection.
	53	MORE CARE launched a study in November 2013 to compare the efficacy of SMS versus phone call reminders to improve attendance at medical appointments of HIV-exposed children.
	54	UNFPA is conducting a randomized control trial to evaluate the impact of phone access for pregnant women for health advice.
Côte d'Ivoire	55	Helen Keller International is piloting with Dimagi software to enable sponsors to support beneficiary children with a phone-based message to encourage vaccinations.
The Gambia	56	Drexel University project with FrontlineSMS used SMS messages to improve dental health practices and enhance vaccine inventory control.
Ghana	57	MOTECH is a suite of mobile applications developed by the Grameen Foundation in partnership with Ghana Health Service. Mobile Midwife provides weekly stage-based voice messages for healthy pregnancy and newborn care.
	58	SHARPER Project implemented by FHI360 aims to reduce HIV among high-risk populations with four platforms including a health counseling service called Text Me! Flash Me!, daily SMS reminders for ARTs, and SMS tips through "My Turn" service.
	59	mPedigree offers consumers a way to check the authenticity of their medicines by texting the package code to a free number to determine whether the drugs are legitimate or counterfeit.
	60	The No Yawa project led by DKT and partnering with MSI and Grameen Foundation is providing reproductive health messages for youth in SMS and voice format integrated into social media and mass media story lines.
	61	Vodafone launched Healthline 255 in 2013 to offer medical advice to callers. So far, more than 900 calls have been received.
Guinea	62	RAES offers "Sunukaddu" in which young people are trained to use digital media which is distributed through a web portal to raise awareness on topics related to reproductive health.

[2] Sources are listed in Annex C, organized by number.

Illustrative Consumer Applications[2]		
Guinea Bissou	63	Mobile SMS was used to alert citizens during an emergency.
Mali	64	InfoAdo was launched in April 2013 by One World, RAES, and Malian Association for the Protection and Promotion of the Family. The service offers a free SMS Q&A platform targeting youth with information about FP, HIV, and S/RH.
Niger	65	A UNFPA activity implemented by Pathfinder provided 20,000 solar SIM cards to refugees in camps with Flooz mobile money accounts (Etisalat service). Through this CSR donation, the partners will track how refugees spend funds within the camp to guide future interventions.
Nigeria	66	mPedigree drug authentication platform using SMS is available through all network providers.
	67	Spoxil is a similar drug authentication application allowing consumers to text package codes to a database to determine if drugs are genuine and report fakes to a hotline.
	68	Mobile Baby, a partnership of Etisalat, Qualcomm, D-Tree, and WHO, launched in 2011. The service includes messages for pregnant mothers (in Hausa, Igbo, and Yoruba) as well as software tools for health workers, and it integrates mobile payments for emergency transportation.
	69	Nigerian Urban Reproductive Health Initiative uses mobiles in six cities to reinforce broader demand-generation campaigns for FP services including radio prompts to "text your FP questions," SMS reminders for community events, and SMS client satisfaction surveys.
	70	Education as a Vaccine implements My Question My Answer service to provide free texts or calls to a sexual and reproductive health counselor.
	71	A toll-free number to support pharmacovigilence for reporting adverse reactions to anti-malarial drugs was established.
	72	UNFPA provided mobile phones to survivors of Obstetric Fistula to track and improve their survival.
Senegal	73	Marie Stopes collected more than 3,000 phone numbers of young people and broadcast SMS with information on reproductive and sexual health leading to hundreds of HIV screening tests and consultations.
	74	Helen Keller Institute is using SMS and voice messages to remind mothers of the importance of Vitamin A.
	75	Orange and Sonatel are working in collaboration with Pharmacy Council to develop a pharmacist call center in which users could pay for phone consultation.
	76	One World and FHI360 have partnered to create an SMS information service which targets young adults to text questions about sexual health, receiving more than 270,000 texts in 2013.
	77	UNFPA is mobilizing against gender-based violence using facebook, and the effort will include SMS in the future.
Sierra Leone	78	A health program instituted a treatment compliance program using mobile-based voiced reports rather than SMS.
	79	MSI introduced a call centre, the first of its kind in the country, to answer questions and refer potential clients to family planning clinics.
Togo	80	An emergency toll-free number was established to report H1N1 and Tuberculosis cases.

3.8.4 HEALTH WORKER SUPPORT

As highlighted in Table 4, mobile applications for health care workers are proliferating, and they equip those delivering care on the frontlines with new tools to manage cases, track disease outbreaks, and improve diagnosis and treatment. Real-time expert consultation or access to reference materials and resources can provide needed support in clinical decision-making. From simple SMS and voice applications on basic phones to multimedia tools on tablets that incorporate video consults and e-learning courses, mhealth resources are a priority for many donor and local government programs.

Case Example: Pesinet Primary Care

Pesinet, a French NGO, launched an MCH service in Mali in 2010 that offers an affordable community-based insurance program covering weekly health agent visits, physician visits, half-priced drugs, and information on preventive health care. The health agents receive training in identifying and recording five key symptoms: fever, vomiting, diarrhea, cough, and weight loss. They are equipped with a phone-based record-keeping tool that guides them in diagnostic protocols and allows them to record and transfer case information via SMS directly to participating clinics; as appropriate, the clinics then alert the health agents to the need for follow-up. By streamlining the analysis of high-risk cases, the mobile application permits a greater number of children to be seen. It also facilitates a timely response that promotes early care before symptoms worsen and lead to complications. By following a sustainable business model, the insurance program is designed to increase the use of primary health centers. Orange and Alcatel which donated phones and airtime credits provided partial funding of the program.

The service had expanded to four sites in Mali when the political crisis erupted in 2012. Pesinet then explored other West African options and settled on Burkina Faso to replicate its service. Since the service's launch, Pesinet has enrolled more than 2,500 children in the two countries with the goal of expanding the number of clinic partners. In Burkina Faso, Pesinet is partnering with MFIs to improve fee collection processes and leverage MFIs' trusted role in the communities. Among the other service options under consideration are the use of mobile money to collect Pesinet premiums in order to improve accountability and record-keeping and the bundling of premiums with a mobile health savings account. For three reasons, the program has shifted to smartphones and data plans: 3G is available, the Internet is less costly, and data can be stored if messages cannot go through.

"Little Youssof Tiama, called "Papi," is barely 15 months old. Since enrolling in Pesinet six months ago, he is visited every week by the agent Mama Touré. His last weight was 9.84 kilograms."

Source: Pesinet

Implications for HIV and FP Programs

Pesinet's child health service addresses a common challenge: encouraging people to use health facilities for preventive care services. Outreach from doctors to health agents has encouraged families to seek health care when they would otherwise not have done so. In furthering preventive care, the model could be adapted to monitor pregnancies and promote FP through home visits from agents, with such visits made more efficient with phone-based tools. Similarly, HIV clients could receive messages directly from clinics if services are needed. PACTE-VIH uses a model of peer educators and community case managers to identify, support, and refer key populations. Mobile applications can improve their services.

Source: Pesinet interview February 2014 and http://www.pesinet.org/wp/2013/01/nenemokourou

TABLE 4: ILLUSTRATIVE USE OF HEALTH WORKER APPLICATIONS

Illustrative Use of Health Worker Applications[3]		
Benin	81	In a *Call for Life*, CARE partnered with Dimagi and D-Tree in 2011 to develop a package of software to help health workers track clients, strengthen counseling on family planning and newborn care, and address emergency health events.
Burkina Faso	82	A pilot is underway between MOH and Centre National de Recherche to link a network of CHWs with sanitary districts.
	83	Pesinet primary care initiative combines a modest insurance payment (paid through partnership with MFI) with weekly visits from health workers and a phone-enabled program to track infant nutrition and illness. The initiative also includes doctor consultations at participating clinics.
	84	JSI and Dimagi are piloting an effort to provide local language recorded messages on program staff phones to educate a community on malaria.
Cameroon	85	Orange partnered with the MOH to provide 2000 phones for use by community health workers in 2013.
Cape Verde	86	International Virtual e-Hospital (IVeH) Foundation established a telemedicine network and virtual education program managed by local telehealth program staff.
Ghana	87	Millenium Villages Project created a closed user group to strengthen social networking among health workers and improve their efficiency at work.
	88	Concern Community Hub initiative of Concern Worldwide uses MOTECH software to strengthen CHW motivation and performance through point of care decision support, mtraining, work planning tools, and supportive supervision.
	89	Swtichboard and Ghana Health Service negotiated an agreement with Vodafone called MDNet, creating a closed user group for clinical staff to make free calls to one another to facilitate remote consultations and referrals.

[3] Sources are listed in Annex C, organized by number.

Illustrative Use of Health Worker Applications[3]		
	90	SHOPS project collaborated with Ghana Pharmacy Council to provide supportive supervision to Licensed Chemical Sellers enabled by smartphone checklists to improve treatment for pediatric diarrhea.
	91	UNFPA in partnership with Intel, WHO, and Jhpiego are developing a multimedia health worker training platform.
Guinea	92	MCHIP provides mobile content on FP, child health danger signs, and pregnancy dangers to CHW callers.
Guinea Bissau	93	A partnership between MTN and MOH established a closed user group which has been in operation since 2009 for a national vaccination program that connects staff in regional offices and 114 health districts.
Mali	94	CapacityPlus project with Intrahealth and SpacedEd.com are providing in-service training on postpartum family planning that delivers training via SMS and IVR in French to provide up-to-date information and reduce need for CHW re-training.
	95	IICD's MAMMA project, in partnership with Orange, trained CHWs to report on malaria cases using mobiles, reducing response time for patients becoming ill by 65 percent.
	96	French NGO Pesinet developed a mobile application to support CHWs recruited to make weekly home visits to families contributing a modest insurance fee to reduce child mortality and morbidity.
Mauritania	97	RAFT/iPath (Geneva Hospital) provides a free distance learning and consultation platform for French-speaking countries to link doctors to libraries, lectures, and consultations. Through a partnership with Mauritel, the MOH, and the Ministry of ICT, providers in remote settings are using mobile ultrasound to receive supervision from experts in urban hospitals.
Niger	98	Airtel has provided a 5,000-phone mobile fleet service for doctors and clinical staff for calls and SMS with the community.
	99	UNFPA has provided phones to Obstetric Fistula advocates to improve coordination and tracking.
	100	WHO NICe Project in collaboration with the MOH is rolling out an integrated Community Case Management program for rural CHWs. The tools include diagnostic support to improve treatment, referrals, tracking, alerts on stocks, and counseling guidance.
Nigeria	101	As part of the Mobile Baby platform, Etisalat, Qualcomm, and D-Tree partnered to develop an application that allows health workers to send images from ultrasound machines to mobiles via SMS and email, providing real-time remote medical diagnostics.
	102	Pathfinder m4Change project in partnership with Dimagi and MOH is implementing CommCare in 20 primary health facilities in Abuja and Nasarawa state. The application allows CHWs to improve antenatal care, record client data, track ANC clients, and use audio counseling clips to promote healthy client behaviors.
	103	The MESUDD initiative which was conducted by software scientists produced a tool that provides real-time language translation for illiterate indigenous patients to speak with an expert for diagnosis in locations where there is no doctor.
Senegal	104	CRS and ChildFund are deploying CommCare software to provide service data, instruct CHWs on improved treatment for diarrhea and pneumonia, and facilitate referral tracking.
	105	Intrahealth and One World are conducting a pilot to provide mobile SMS, voice-based, and Internet refresher training on FP methods.

Illustrative Use of Health Worker Applications[3]		
	106	In the VOICES project, Orange and the MOH are conducting a two-year pilot to improve vocational training of lab technicians using voice subscriptions, SMS quizzes, and a call center.
	107	New partnership between MOH, ITU, WHO, Alcatel, and Sonatel have launched an mdiabetes program to use SMS and voice for CHW training on diabetes management with plans for integration with health insurance services.
Sierra Leone	108	World Vision is deploying MOTECH solution for CHWs to track clients with decision support, focusing on MCH continuum of care.
	109	The Sana organization built a platform being used by healthcare workers to address problems during pregnancy and assess tuberculosis risk through diagnostic information sent to health centers.
Togo	110	In 2013, NGO Hope for Health partnered with Dimagi to introduce phone-based tools for health workers to transmit real-time data to nearby health centers to improve program monitoring.

As indicated by the number and range of activities listed in tables 2, 3, and 4, mobile technology is finding widespread application in West Africa's health sector. In some case, the initiatives are relatively mature, but many of the examples represent small pilots that generated limited information, perhaps just a single reference in a report or press release. Nonetheless, these examples indicate which organizations have been active, where the necessary mobile infrastructure may be in place, or how existing experience might support new mhealth efforts. The many one-off applications confirm the need for a more organized West African mhealth community that can capitalize on mobile technology's potential.

4. RECOMMENDATIONS

Effective partnerships are critical to designing and financing reliable and durable mhealth interventions. Many of the pilots highlighted in this report rely on grants, corporate philanthropy, or donor project funding. Some contributions take the form of cash or in-kind contributions such as free phones or network services. To ensure sustainability and support scale-up, it is essential to establish mutually beneficial partnerships that go beyond corporate social responsibility and draw on partners' abilities and strengths. The recommendations in this report thus focus on multi-sector partnership opportunities.

Clearly, partnership development is not a straightforward task. It takes time and trial and error to learn each participant's organizational culture, priorities, strengths, and processes. Negotiations often unfold over several months, and staff turnover frequently results in the loss of champions and undercuts progress. Long-term commitments, a patient buy-in process, tenacity, and leadership are needed in order to capitalize on potential partners' diverse skills and knowledge. USAID Missions or projects—in partnership with WAHO—can act as "neutral brokers" to facilitate dialogue among industry, government, and civil society organizations to initiate and carry out mhealth activities.

WAHO's leadership is essential in creating a forum and framework that prompts national governments to participate directly in the development of partnership efforts. Absent country ownership, mhealth projects will remain tangential to broader health system reforms. Through WAHO, ministries of health and their partners can collaborate to address common needs related to ICT capacity-building tools, key indicators of success, performance standards, governance challenges, and policy gaps. Through mobilization of stakeholders across the region, WAHO and institutional partners can champion best practices, build awareness of existing resources, and facilitate fruitful cross-sector learning opportunities.

4.1 PATHWAYS TO PARTNERSHIPS

4.1.1 FORM A NATIONAL mHEALTH TECHNICAL WORKING GROUP

> *"We are interested in partnerships with mobile operators and mhealth developers. How do we get started?"*
>
> MOH staff member in Senegal

As a precursor to the formation of partnerships, mhealth working groups can convene a structured forum that brings together technology firms, mobile operators, application developers, health institutions, training organizations, financial services firms, multilateral agencies, donors, research organizations, and government mhealth stakeholders. USAID/WA implementing partners can foster dialogue and elicit common interests through a variety of multisectoral arrangements. A working group can invigorate leadership, reduce duplication of effort, identify potential partners and partnership opportunities, and serve as an agent of change. Many West African countries have followed a similar approach led by their respective ministries of health, thereby ensuring alignment with national health priorities. An MOH interested in partnership development may begin by organizing an mhealth workshop such as that hosted by Guinea's MOH to identify interested parties. In Benin, CARE International established a national mHealth

Learning Community to share project approaches and discuss experiences in the use of mobile phone applications.

Depending on the level of mhealth activity in a given country, technical working groups can undertake any number of functions such as drafting an mhealth strategy, prioritizing and lobbying for needed policy changes, cataloguing existing activities, identifying sub-communities of practice, conducting study tours, and hosting demonstration events. Meeting outputs can provide the foundation for the development of partnerships, encouraging health programs with similar needs to align their efforts in order to achieve greater economies of scale and reach. A high-level steering group chaired by a top government official can reduce internal conflicts among government departments or mobile competitors. Responsibility for hosting and reporting on working group meetings can rotate among members to maximize cost sharing and increase accountability and commitment. Separate communities of interest might be established for FP and HIV programs. Working in partnership with WAHO, USAID/WA can support the development of working groups by providing opportunities for sharing progress among national mhealth fora.

4.1.2 WORK WITH MOBILE REGULATORY AUTHORITY

The lack of financial resources to fund mhealth services is a major barrier to sustainability beyond the pilot stage; indeed, a government's general revenue base may be inadequate to cover the costs of mhealth services. Mobile operators are often a country's most heavily taxed industry; they pay a range of taxes, fees, levies, and contributions as a condition of licensure (GSMA and Deloitte 2012). For example, most countries impose universal service funds that consist of a levy on mobile operators with proceeds allocated to the development of infra-structure and services in rural geographic regions lacking market incentives for investment.

According to a GSMA report, many universal service funds in West Africa have amassed significant revenues with low rates of utilization noted in Burkina Faso, Côte d'Ivoire, Niger, and Togo (GSMA 2013). ECOWAS developed guidelines on universal service fund best practices, but in many cases countries have yet to disburse these funds. These untapped reserves may provide a resource for mhealth services targeted to rural areas. Depending on the flexibility of the terms of universal service funds, disbursements could cover mhealth investments in broadband capacity, hardware, VAS, or training for system maintenance in rural telecenters or health outposts.

USAID partners should convene parties to explore strategies for accessing telecommunications funds. Such a strategy should link access to health information services to universal service goals. Legal and regulatory experts could identify the policy mechanisms for applying for fund disbursements under the requirements of each country's universal service program or suggest the terms of an independent partnership to address mhealth financing needs.

> *"We could facilitate a roundtable and support negotiations between health authorities and licensed operators to organize a mechanism for funding mhealth."*
>
> AMRTP regulator, Mali, December 2013

Mobile operators have incentives to support funding plans that call for the use of untapped fees to benefit telecommunications users. Operators could bid on funding opportunities through a transparent process overseen by mobile regulators. An interview with Mauritania regulator Autorité de Régulation noted that, in addition to disbursements from universal access funds, mobile operators could be required to support mhealth through license renewal terms.

4.1.3 MAKE USE OF GLOBAL mHEALTH RESOURCES

To support the growth of mhealth in West Africa, there are many options for linking to global communities and resources. Appendix A provides a catalogue of mhealth websites, reports, applications, and compendia. The resources do not specifically address West African markets, but they list experts, approaches, and considerations that can guide effective partnerships and applications. The resources also include frameworks, contacts, and tools for assessing, designing, and deploying mhealth interventions. A selected list of options follows:

- **Join global mHealth Working Group meetings.** The mHealth Working Group is a collaborative group of mhealth implementers committed to sharing knowledge and strengthening mhealth capacity in developing countries. An open meeting each month provides a dial-in number for remote participation. The group addresses topics such as implementation challenges, business models, research studies, new applications, process issues, and partnership success stories related to mhealth (www.mhealthworkinggroup.org/).
- **Access mhealth implementation guides.** USAID's K4H project developed a guide on how to integrate mobile technology into health programs. It is particularly useful for those new to the field. The guide includes sections on planning, technology considerations, monitoring and evaluation, and use cases (http://www.jhumhealth.org/resources/k4h-mhealth-guide).
- **Request help from vetted experts.** mHELP is an initiative of the mHealth Alliance that answers questions and identifies consultants for complex support. The alliance's mission is to link organizations and projects with local and global experts. Areas of expertise include appropriate technology for mhealth projects, collaboration with mobile operators, and cost-effectiveness analyses (http://mhealthalliance.org/our-work/initiatives/mhelp).
- **Enroll in online mhealth courses.** An introductory course developed by USAID's K4H project covers the phases of mhealth implementation, best practices, and benefits and limitations of mhealth solutions (http://www.globalhealthlearning.org/course/mhealth-basics-introduction-mobile-technology-health).
- **Explore existing mhealth content.** Libraries make available free downloads of vetted health content for adaptation to the local context. Useful examples are the messages developed by Baby Center including SMS and audio stage-based health messages for pregnancy and the first year of a baby's life (http://www.babycenter.com/mama).

4.2 PARTNERSHIP OPPORTUNITIES

4.2.1 DEVELOP A STRATEGIC PARTNERSHIP WITH A REGIONAL MOBILE OPERATOR

Mobile operator partnerships in mhealth aim to tap the extensive expertise, capital, data, and skills of the companies with the most to gain in large-scale mhealth solutions. Consideration should be given to the business incentives needed to engage these companies in mutually beneficial collaborations. Although grants from mobile operator CSR departments may be helpful in pilot testing applications, more strategic agreements with mobile operator business units will better serve long-term objectives for sustainable programs.

A government partner should serve as the lead participant in a public-private partnership. Such a partner can offer convening power, provide policy guidance, advocate with key institutions, and ensure that the partnership's goals align with health system priorities. Health sector

partners involved in service delivery offer resources including formative research on end-user needs, training and capacity-building services, monitoring and evaluation, and knowledge dissemination. Mobile operators offer complementary skills including mobile application design, software development, tech support, billing solutions, marketing and distribution services, and channels for delivering SMS, voice, and data messages. For mobile operators, the appeal of an mhealth partnership lies in the partnership's potential for enhancing their double bottom line (social impact and profit) by differentiating operators in a competitive market, raising their profile with government policymakers, and/or expanding their subscriber base through the provision of compelling services.

In proposing a mobile operator partnership, implementing organizations need to make clear the returns that mobile operators may expect to receive for their investment. USAID's AGIR-PF and PACTE-VIH projects should identify some concrete use cases for mobile solutions at significant scale, such as targeting a mass consumer market with educational information or collecting monitoring data across their projects. USAID/West Africa can issue a request for proposals from mobile operators with a presence in two or more focus countries to solicit expressions of interest and provide the basis for design, testing, and implementing mhealth applications.

Service proposals should address the following:

- The development of projections for service use by location and year as well as the development of profiles of user segments with the promise of periodic and detailed measures of consumer response
- The identification of costs to be covered by the implementing partners (e.g. training CHWs to market a service) in exchange for discounted SMS, voice, and data charges
- The possibility of sponsorship messages to help cover the costs of consumer-based services
- The conduct of cost-effectiveness research to demonstrate the operational efficiencies realized with mobile applications
- Specification of the process for developing relevant, localized, and engaging content that provides value for operators' brands

ILLUSTRATIVE CASE: ORANGE

Orange (previously France Télécom) is one of the world's leading telecommunications operators. It operates in 30 countries across the globe and has 180 million mobile subscribers. In West Africa, Orange holds mobile licenses in Côte d'Ivoire, Guinea, Guinea Bissau, Mali, Niger, and Senegal. Orange Healthcare was established in 2007 to focus on the needs of health institutions, clinical care providers, and patients. Its services include ehealth applications focused on electronic data communications and storage for hospitals, insurance companies, clinics, laboratories, and pharmacies.

Orange has made a substantial investment in and demonstrated its allegiance to Francophone countries. It has expressed explicit interest in forming a partnership with USAID partners in West Africa and has been among the most active mobile operators in mhealth applications. Through its France-based Orange Labs, Orange develops applications for its local operating affiliates and seeks to gain economies of scale through multicountry initiatives. Table 5 highlights some of Orange's current activities in the region with implications for HIV and FP programs. The activities also underscore the potential breadth of a partnership that involves a single operator.

TABLE 5: ORANGE mHEALTH APPLICATIONS AND IMPLICATIONS FOR HIV AND FP PROGRAMS

Current Orange mHealth Applications	Implications for HIV and FP Programs
On-Duty Chemist (Orange 2013): A consumer service in Côte d'Ivoire that provides SMS or voice access to help identify open pharmacies by location and hours of operation by dialing a simple short code, 712.	Similar call centers/SMS databases could be established and advertised to dispel FP myths or provide information on HIV testing and counseling centers.
Project Djoubi (Orange 2012): French-speaking multicountry intervention deployed in Senegal and Mali in partnership with RAES trains mothers in the use of mobile phones for health data collection to help in the management of malaria in the community. Supports enrollment in a microhealth insurance program covering children under age five through health mutuelles.	Inclusion of FP and/or HIV messages for microinsurance clients would help integrate messages into MCH programs and provide holistic approaches to familly health. FP and HIV program partners could be trained in the microhealth insurance enrollment process.
VOICES (Ankri 2013): Improved laboratory reporting as part of the RESOLAB laboratory strengthening partnership in Senegal, Burkina Faso, and Mali. VOICES is an interactive voice-response system that allows laboratory technicians to conduct disease surveillance, report patient test results, receive medical education, and ask questions.	Adoption of healthy behaviors by vulnerable populations by, for example, accessing appropriate HIV care would require high-quality laboratory services, including an efficient, discrete, and quality-assured system for reporting test results. Improved laboratory services would provide timely test results and strengthen system responsiveness.
Ma Santé (Ankri 2013): A broad partnership of the IICD, Orange, WHO, the ministries of health, the mHealth Alliance, and local organizations in Mali and Sengegal that is piloting data collection for CHWs. The MAMMAN app will facilitate data collection on malaria and other indicators among pregnant women and children and send SMS to clinics to identify cases for treatment. The projected outreach is 200,000 in Mali and 100,000 in Senegal.	Data collection apps such as MAMMAN may be adapted to improve case management for FP and HIV services, improve data-driven resource allocation, and strengthen monitoring and evaluation.

WAHO, USAID West Africa, and other regional institutions can help guide partner negotiations by identifying the contributions of the public and development sectors, engaging other program partners to aggregate demand and drive scale, and developing standardized measurements.

4.2.2 INITIATE A MOBILE MONEY PARTNERSHIP

USAID West Africa implementing partners should establish a strategic alliance with a mobile money provider in one of the focus countries to test the potential for subsidizing mhealth content by bundling such content as a VAS with a mobile money service. Mobile money services continue to struggle to establish a foothold in most West African markets, and operators are eager to differentiate themselves in the nascent mobile money market. Health program partners offer knowledge about clients who may benefit from mobile money services such as access to savings, credit, and insurance. These partners could provide a link to services targeting the poor. In turn, mobile operators' marketing resources could be leveraged to boost the reach and visibility of BCC campaigns that promote healthy living. Implementing partners could also advance their program objectives by exploring how their NGO partners and frontline health workers could access microfinance and social marketing opportunities as highlighted in the example below:

ILLUSTRATIVE CASE: ETISALAT WEENA PROGRAM

Etisalat is a United Arab Emirates–based telecommunications services provider currently operating in 15 countries across Asia, the Middle East, and Africa. Etisalat introduced WEENA, an entrepreneurship initiative targeting rural women in Benin, Côte d'Ivoire, and Togo. The goal of the program is to empower and support women as a means of promoting economic development. WEENA provides women with microloans through mobile money accounts and delivers training in the provision of mobile services. WEENA adds mobile money bonuses to women's personal phone accounts and donates funds to community savings accounts in support of microenterprises. Women accrue savings for themselves and their community enterprises. Shortly, the program will expand to Niger.

WEENA's microsavings groups that involve rural women could provide HIV and FP health programs with an opportunity for conducting outreach to target beneficiaries. WEENA participants may be interested in receiving or marketing health information services as a benefit of membership. The community savings accounts could be targeted for the sale of health products such as condoms or rapid test kits. In Benin, WEENA has already incorporated VAS such as vaccination information.

Source: Interview with Etisalat representative, March 2015.

WAHO, USAID West Africa, and other regional institutions could support the use of mobile money in health programs by linking partners to global resources such as the Better than Cash Alliance and Nethope. Regional stakeholder meetings could bridge health and mobile money opportunities by addressing shared challenges.

4.2.3 NEGOTIATE CLOSED USER GROUP AGREEMENTS

A closed user group (CUG) is a special billing arrangement. It is well-suited to health systems in which various cadres of professionals participate in a certain "calling plan" that reduces communication costs. For health workers, the objective of a CUG is to encourage the exchange of information and improve team management, coordination, and planning. As the lowest-paid health cadres, CHWs will likely be the greatest beneficiaries of CUGs; otherwise, CHWs tend to limit phone use because of cost. The benefits of a CUG include increased social support among health workers even for non-work–related calls. Other applications could include the development of closed user groups of peers such as People Living with HIV and AIDS (PLWHA) or other groups in order to increase social support. In one study in Ghana, a closed user group of health workers used phones to expedite scheduling and coordination, seek advice on cases, plan meetings, and facilitate emergency transport (Kaonga et al. 2013).

Several informants noted that mobile network operators already offer "fleet" services that provide a reverse bill number to health system payers such as MOHs, thereby encouraging data collection, logistics support, or other types of program management assistance. Under these services, calls made to MOH-established numbers are free to the calling party (such as field workers) and paid monthly by the MOH. One difference between fleet services and CUGs is that the latter encourages users to call each other at no charge, not just the supervisors in the chain.

As illustrated by the MDNet example below, CUGs can promote sustainable partnerships with mobile operators by piggybacking on their incentives for competitive advantage and customer loyalty. Often the mobile operator in a CUG is not a country's dominant provider but rather the second- or third-tier competitor based on market share. Operators with a regional presence such as Orange, Airtel, or MTN may also be interested in connecting health professionals across countries. Benefits to the operator include health system partners such as medical

associations that can absorb the costs of distributing SIM cards to their members and the activation of new services.

Under the MOH's guidance, implementing partners could issue RFPs to identify operators interested in a CUG. Terms of the CUG agreement should provide for access to operator call data to ensure that benefits lend themselves to measurement along the following dimensions: (1) increased calling within the network and (2) subscriber use outside the user group. Terms must specify the services to be covered (e.g., voice only or voice plus text plus data), the rates charged for calls made outside the user group, and the length of the agreement. Roles and responsibilities specified by the agreement must indicate who will market the service to health workers and who will publish a directory of covered users. Local partners such as member-based professional or community groups could serve as database owners in collaboration with an MOH. NGOs such as Switchboard could advise on the process of developing the negotiation strategy and partnership objectives.

ILLUSTRATIVE CASE: MDNET—GHANA AND LIBERIA

In 2008, Switchboard, an NGO based in the United States, negotiated an agreement between mobile operator Vodafone and the Ghana Medical Association to create a CUG for health professionals called MDNet. Under the terms of the agreement, the mobile operator provided free calls for doctors within the network but charged normal retail rates for calls to friends and family. The service generated $1.3 million in revenues for Vodafone; in turn, the health system realized savings sufficient to cover the costs of provider referrals, patient consultations, advice, and general communications. Workers no longer had to ration airtime and could use mobile phones to engage in timely frequent communications to promote the transfer of knowledge between physicians in Ghana. To ease the referral process, the CUG published a doctor directory.

Switchboard replicated the CUG model in Liberia in 2009 under a contract with MTN Lonestar. The CUG included Liberia's full complement of doctors, a total of approximately 200. MTN also donated phones to the 50 hospitals that were members of the closed user group. Drawing on its experience in West Africa, Switchboard is now working on a large-scale application in Tanzania, creating a caller network of more than 9,000 health workers.

Among the lessons that Switchboard learned, regular partner check-ins are essential to ensure that the agreement serves its intended purpose and continues to benefit both the operator and health partners. Switchboard acknowledged that it did not budget for the delivery of ongoing support to the partnership once the initial agreement was in place. In addition, the market in Ghana experienced changes as competitors began to offer a retail plan that included heavily discounted "friends and family" plans, thus undercutting one of the benefits of the CUG. MDNet usage has declined over time. A process is needed for regular adjustment and renegotiation of contract terms as dictated by market conditions.

Switchboard's ability to demonstrate financial return to the operator provided the wherewithal to secure agreements with mobile operators. User data demonstrated that users were likely to upgrade their phones, expand their use of data services, reduce churn (switching to a competing mobile service), and generate revenues through calls to friends or family.

Source: Interview with Switchboard representative, January 2014.

4.2.4 SUPPORT REGIONAL FRENCH-LANGUAGE HEALTH EDUCATION PLATFORM

The time is ripe to convene digital content experts to create a French-language mobile-oriented resource on sexual and reproductive health topics including HIV and FP. The objectives of USAID's PACTE-VIH and AGIR-PF call for promoting access to available services, filling information gaps in culturally sensitive topics, and supporting healthy living. Mobile educational content is needed to provide access to information that is private, accurate, nonjudgmental, and accessible. Rather than developing separate initiatives in each focus country, USAID/WA could support shared resources for countries with similar customs and culture. While several mhealth content databases are in development, none specifically addresses the S/RH information needs of the rural poor in Francophone Africa.

Using OneWorld's My Question My Answer as a model for the service (see below), a broad-based PPP focused on S/RH mobile health education could be created. Benefits to a regional approach include opportunities for larger-scale reach and the potential to attract interested corporate sponsors. A regional platform could develop a repository of vetted outbound messages (voice and SMS) for users who choose to subscribe, training manuals to help counselors respond to individual questions (recorded, text, or live), and resources for adapting to a local context. Such a platform could expand to include a compendium of all French-language research studies, manuals, apps, codes, and communities.

A single regional hub would lower the costs per user of content development, training, monitoring, knowledge sharing, marketing, and mobile operator negotiations. Poor marketing (a high cost of mhealth services) has been a barrier to reaching adolescents with S/RH messages. Cost sharing among a broad array of partners that provide access to their members, clients, beneficiaries, and customers would be cost-efficient.

Run by a secretariat organization such as OneWorld, a broad-based partnership could include an ICT capacity-building organization (such as IICD, SISAfrique, and RAES) as well as other donors. Potential sponsors could include mobile operators interested in developing tiered pricing options for various applications, insurance companies that recognize the benefits of preventive care, and/or media companies seeking visibility through youth services.

Key considerations highlighted by informants include the following:

- The value of multimedia options to reach the widest audience. The same content should be available in several formats shared through a phone chat with a live counselor, an interactive website with youth-friendly graphics, or anonymous SMS queries.
- WAHO support and imprimatur to promote trust of MOHs. A regional approach to platform development reduces the burden on MOHs with limited staff resources "to recreate the wheel in each country."
- Rigorous M&E plan integrated from the outset. Partners could agree to the indicators to be measured on a routine basis and develop measurements on use and impact.

ILLUSTRATIVE CASE: ONEWORLD'S MY QUESTION MY ANSWER

Beginning in 2008, OneWorld (a United Kingdom–based NGO) assessed Nigerians' needs for HIV information and found that, while awareness was high, knowledge about the disease was uneven and fraught with many myths and misconceptions. With funding from Oxfam, USAID, and mobile operator foundations and in partnership with the Nigerian Ministry of Education (MOE), OneWorld and its partners created the Learn About Living website for use in schools.

The website used youth-friendly graphics and an interactive format to address a variety of S/RH topics. Partners observed that the information generated many user questions specific to personal circumstances. Those questions led to the introduction of the My Question My Answer mobile platform. Individuals call or text their questions to a toll-free phone number, and trained counselors provide answers. Currently, the service receives 300,000 questions per year, with a high number of repeat users. The MOE has successfully transitioned the website to its HIV unit. The platform includes web access, but Internet use is low. Anonymity of the messages is an important asset, as is users' practice of sharing information with friends and family. Seventy-eight percent of users say that they passed along the messages.

OneWorld is now replicating the website in French in Senegal, Mali, and soon Niger, working with a variety of funders, CSO partners, and the public sector. Noting the gaps in French-language digital content, OneWorld partners determined that "this is our niche." All of Senegal's 14 regions have received more than 200,000 SMS. OneWorld has not actively sought private sector partners because it lacks resources to conduct negotiations or manage business relationships. Opportunities for revenues to support the service include message sponsorship or variable pricing for different services. OneWorld's greatest need is the participation of marketing partners to promote the service.

Sources: Interview with Uju Ofomata, OneWorld, February 2014 (www.oneworld.org).

5. CONCLUSION

As documented in this report, mhealth in West Africa is clearly emerging, although many countries in the region are already engaged in limited levels of mhealth activity. Compared to other countries in eastern and southern Africa and across the globe, West Africa evidences fewer initiatives, partnerships, communities of practice, application developers, mhealth resources, or champions to catalyze mhealth activities. To achieve maximum impact, mhealth initiatives require national leadership, donor coordination, and well-designed partnerships that benefit all participants. Wise implementation of mhealth strategies and investment in regional partnerships can result in stronger HIV and FP programs with greater reach, lower cost, and higher quality.

USAID West Africa has an excellent opportunity to work with WAHO, regional institutions, and other donors to catalyze change in the current mhealth implementation landscape. Evidence of political will at the national level suggests that West African countries are poised to organize mhealth efforts. At the same time, WAHO stewardship is crucial to mobilizing stakeholders and setting an mhealth agenda for the region. To capture the potential of mobile technologies, WAHO is prepared to help countries articulate their vision, manage the process, develop and operationalize plans, provide tools for developing ICT capacity, and ensure that platforms align with national standards and health priorities. The trends, opportunities, and gaps highlighted in this report provide a starting point for action.

ANNEX A: mHEALTH RESOURCES

mHEALTH IMPLEMENTATION GUIDES

- **mHealth Implementation Guide**: Developed by the k4H project, this guide offers case studies, best practices, and resources for global health practitioners implementing mhealth solutions. http://www.jhumhealth.org/resources/k4h-mhealth-guide
- **mBCC Field Guide**: Prepared by Abt Associates in collaboration with mHealth Working Group, provides guidance on mhealth planning, design, and evaluation for behavior change. http://www.mbccfieldguide.com
- ***How to use text messaging as an effective behavior change campaigning too***: A guide developed by FrontlineSMS and Text to Change specifically focused on SMS inverventions. http://www.frontlinesms.com/wp-content/uploads/2012/03/TTC_Online_Final.pdf
- **mHealth Field Guide for Newborn Health:** This mhealth implementation guide developed by the CORE Group provides an emphasis on lessons learned from mhealth case studies on maternal and newborn care from the global south. http://www.coregroup.org/resources/420-mhealth-field-guide-for-newborn-health

mHEALTH EVIDENCE

- **mhealthevidence.org**: This website, funded by USAID's K4Health project, provides access to mhealth research studies from more than 6,000 sources from both developed and developing countries which have been assessed according to their rigor and catalogued. Search categories include location, population, stage of evaluation, technology platform, and health domain.

- **mHealth Tracker:** GSMA is the trade association for GSM mobile operators, representing more than 90 percent of mobile operators worldwide. GSMA's Mobiles for Development website contains an extensive database of reports, analyses, and resources including a catalogue of mhealth interventions by geographic location. www.mobilehealthlive.org/mhealth-tracker.
- **The mHealth Alliance website:** Health Unbound is a resource including blogs, communities of practices, and upcoming events. http://www.healthunbound.org/about-hub
- **African Strategies for Health mHealth Compendium Volumes 1-3:** A collection of more than 8 mhealth interventions in sub-Saharan Africa, including partners, lessons learned, and contact information. http://www.africanstrategies4health.org/5/post/2014/01/1.html
- **mHealth new horizons for health through mobile technologies:** WHO survey of mhealth applications by category. http://www.who.int/goe/publications/goe_mhealth_web.pdf

mHEALTH DIGITAL HEALTH CONTENT

- **mPowering Frontline Health Workers:** This broad partnership (mHealth Alliance, USAID, UNICEF, Frontline Health Workers Coalition, Qualcomm, Vodafone, Intel, MDG Health Alliance, GlaxoSmithKline, Praekelt Foundation, and Absolute Return for Kids) is creating an online multi-media health content library that can be accessed by organizations in developing countries. http://mhealthalliance.org/our-work/initiatives/mpowering-frontline-health
- **iHeed Animation Library:** This is a collection of animations created specifically for health education, training, and awareness. http://www.iheedcrowd.org/iheedcrowd_media.html.
- **Mobile Alliance for Maternal Action (MAMA):** MAMA partner Baby Center developed this resource of free, vetted, adaptable SMS and audio stage-based health messages which covers pregnancy and the first year of a baby's life. http://www.babycenter.com/mama.
- **HealthPhone:** Provides free health videos which can be downloaded onto phones in multiple languages. http://www.healthphone.org

mHEALTH POLICIES

- **A database of ICT policies from 30 countries developed by Tulane University:** http://tulaneict4d.wordpress.com/2012/12/05/guinea-national-ict-resources/

mHEALTH LISTSERVS

- **mHealth Working Group:** www.mhealthworkinggroup.org. The mHealth Working Group is a collaborative group of mhealth implementers whose mission is to share knowledge and strengthen capacity in mhealth in developing countries. Membership is open to all.
- **ict4chw:** http://groups.google.com/group/ict4chw. This open Google group launched by Dimagi helps bring together technologists and implementers who want to discuss and share their field experiences.

mHEALTH APPLICATIONS AND TOOLS

- **Compendium of mhealth tools and platforms:** A description with links to more than 40 mhealth software platforms. https://fusiontables.googleusercontent.com/fusiontables/embedviz?viz=CARD&q=select+*+from+1Lmrf9lUAiXxIQ-wBxs9ApJG4GL2CE7hHgb2GHm8+order+by+col5+asc&tmplt=5&cpr=2
- **Mobile data toolkit:** List of mobile-enabled collection tools. http://mobile.ictdev.org/explore?utm_source=ICTworks&utm_campaign=e58a78ae60-MC-RSS-Email&utm_medium=email

EHEALTH RESOURCES

- **WHO/ITU eHealth Straetgy Toolkit**: http://www.who.int/ehealth/publications/overview.pdf

ONLINE mHEALTH CLASSES

- **mHealth eLearning Course**: This introductory course developed by USAID K4H project covers the phases of mhealth implementation, best practices, and benefits and limitations of mhealth solutions. http://www.globalhealthlearning.org/course/mhealth-basics-introduction-mobile-technology-health
- **Mobiles for International Development**: Professional development certificate course developed by Tech Change. http://techchange.org/online-courses

MOBILE MONEY

Payment Innovations Solutions Center: Through the Global Broadband and Innovations Alliance, Nethope has developed a series of tools, webinars, and case studies to assist organizations in developing electronic payment solutions.
http://solutionscenter.nethope.org/programs/payment-innovation

ANNEX B: COUNTRY mHEALTH SNAPSHOTS

PURPOSE

This section is intended to give a flavor of the mhealth environment in each of the 17 countries. The findings are impressionistic, based on small samples of informants, but they provide perspectives to inform a sense of the region's overall challenges, priorities, and readiness for mhealth activities.

SOURCES

The country snapshots below include population and Internet usage data from the World Bank (2012),[4] language information from the CIA World Factbook (2014),[5] and market penetration from GSMA (2012).[6]

Market share percentages were gathered from a variety of news reports, company brochures, regulator databases when available, and Wikipedia posts. Market share data points are costly to obtain, and they can change rapidly. These share percentages were not vetted with mobile operators, and they should only be used as a rough estimate of market leaders.

Key findings and illustrative applications were synthesized from in-country and telephone interviews plus literature reviews of mhealth compendia, surveys, and databases. References for illustrative applications are numbered to align with the tables in section 3.5 and Annex C.

[4] http://data.worldbank.org/indicator/SP.POP.TOTL and http://data.worldbank.org/indicator/IT.NET.USER.P2
[5] https://www.cia.gov/library/publications/the-world-factbook
[6] http://www.gsma.com/publicpolicy/wp-content/uploads/2013/01/gsma_ssamo_full_web_11_12-1.pdf

BENIN mHEALTH SNAPSHOT

mHealth status: moderate

Country facts:

Population: 10,050,702
Language: French

Mobile overview:

Market penetration:	85%
Internet use:	3.8%

Regulator: Transitory Authority for the Regulation of Posts and Telecommunications

Licensed operators: market share

MTN:	32%
Etisalat Moov:	31%
Glo Mobile:	21%
BBcom:	13%
Libercom:	3%
Etisalat	N/A

ILLUSTRATIVE mHEALTH APPLICATIONS[7]

- VaxTrac (partners include MOH, Gates, UNICEF, WHO) is launching a mobile data collection suite of tools in 2014to improve a vaccine information management system, integrate health records, improve stock management, and develop cold chain performance monitoring. (1)
- Medic Mobile's Kujua software has been deployed in pilot to improve communication and synchronize clinic records with records in hospitals and district management sites. (2)
- PRISE-C project partnered with Dimagi to provide CHWs guided counseling on FP methods in two districts where 30 percent of those who received counseling adopting a FP method. (46)
- ABMS/PSI offers Ligne Verte, a free hotline available through all networks, providing confidential information on STIs, FP, malaria, diarrhea, and violence against women. (47)
- NGO CERADIS partnered with MTN Foundation in 2009 to establish a free HIV call center. (48)
- CARE and URC have partnered with Dimagi and D-Tree to institute Call for Life, software to reduce improve health worker knowledge of danger signs, manage obstetric emergencies. Currently FP counseling protocol installed. (81)

KEY FINDINGS

- No national mhealth policies exist.
- The government makes frequent use of mass text messages for awareness campaigns such as vaccination, malaria, and AIDS.
- Additional applications from donors including UNFPA are pending.
- CARE organized a National Level Learning Community, leading to adaptation of platform for other projects.

[7] Numbered references available in Annex C.

- PRISE-C project has five mobile applications planned but needs funding partners.
- A network of private HIV clinics and labs in Cotonou and Porto-Novo has established a “fleet” platform to share medical information, with a goal to enhance computerization of prescriptions.
- Telemedicine investments are in development from a government of India partnership.
- Mobile money is rapidly advancing: Etisalat Moov has launched WEENA program targeting rural women with micro-loans, training in mobile services and bonuses to encourage savings.
- Workforce applications are limited by low penetration of smartphones and internet, limiting use of applications such as distance learning.

BURKINA FASO mHEALTH SNAPSHOT

mHealth status: nascent

Country facts:

Population: 16,460,141
Language: French

Mobile overview:

Market penetration:	43%
Internet use:	3.7%

Regulator: Autorite Nationale de Regulation des Telecommunications (ARTEL)

Licensed operators: market share

Airtel:	41%
Onatel Maroc Telmob:	39%
Etisalat Moov:	20%

ILLUSTRATIVE mHEALTH APPLICATIONS[8]

- JSI in partnership with MOH introducing daily stock-out reports. JSI/Dimagi also piloting local language recorded messages to program staff phones for malaria education. (3 and 84)
- WHO/UNICEF/UNFPA planning to use RapidSMS for sentinel reporting of maternal deaths in Kaskuy health district in 2014. (4)
- BURCASO Gates Foundation pilots mobile data collection quality and timeliness in 34 OBCs. (5)
- JSI and Dimagi will replicate Senegal platform to monitor malaria cases in six villages in Kaya district, track malaria commodities. (6)
- PSI affiliate PROMACO has established a free telephone number which people can call for information on HIV. (50)
- Pilot underway between MOH and Centre National de Recherche to link a network of CHWs with sanitary districts. (82)
- In 2013,Pesinet replicated Mali platform, provided case management tool for CHWs to monitor infant health for enrolled families. (83)

KEY FINDINGS

- Strategic plan for ehealth exists in draft form, not yet operational.
- Poor quality of data key area for improvement.
- Illegal for NGOs to send messages to phones, inhibits health education.
- There is a DGITS responsible for telehealth, awaiting evidence of its efficacy.
- Surveillance pilot in Kaskuy has challenges: funding, resistance to change, competing priorities, low network coverage, limited HR capacity, lack of stakeholder engagement.
- There is a 2 percent universal service fund that could be used to support mhealth.
- JSI/Dimagi planning SMS platform to track case of malaria.
- ABBEF plans hotline to increase FP awareness, reduced price from Onatel in exchange for sponsorship.

> *"For mhealth to be sustainable, MOH must include in line item budgets."*
>
> Isabelle Bicasa, Director of FP

CAMEROON mHEALTH SNAPSHOT

mHealth status: nascent

[8] Numbered references available in Annex C.

Country facts:

Population: 21,699,631
Language: French and English

Mobile overview:

Market penetration:	56%
Internet use:	5.7%

Regulator: Agence de Régulation des Télécommunications

Licensed operators: market share

MTN:	56%
Orange:	44%
Viettel:	new

ILLUSTRATIVE mHEALTH APPLICATIONS[9]

- MTN Cameroon provided sponsored mass marketing health messages and PSAs on malaria. (7)
- Greenmash working with health partners to provide mobile medical supply chain platform. (8)
- CHAI working with MOH to install SMS printers to speed results transfer from lab to provider. (9)
- ACMS and partners train 200+ health chiefs and CHWs for phone-based data collection on families visited, stock outs, and ACTs. (10)
- Orange is launching a low-cost hotline to enable consumers to seek anonymous advice from doctors about FP, STDs, and HIV. (51)
- Orange and Text to Change offered HIV mobile phone quiz in 2011. (52)
- ADRA/UNFPA conducting RCT using phones to promote ANC/skilled birth attendance. (54)
- Orange has made available free calls to 2,000 health workers. (85)

KEY FINDINGS

- There is no ICT policy framework or mhealth strategy; a Telehealth committee has been piloted.
- Existing activities not coordinated.
- Contribution to special telecommunications fund set at 3% of turnover, but mobile operators report that often variations in license fees are received without a fare notice from the regulator.
- Limbe Labs is an emerging tech incubator.
- MORE CARE launched a study in 2013 to compare efficacy of SMS versus phone call reminders to increase presence at medical appointments of HIV-exposed children. (53)

[9] Numbered references available in Annex C.

CAPE VERDE mHEALTH SNAPSHOT

mHealth status: nascent

Country facts:

Population: 494,401
Language: Portuguese

Mobile overview:

Market penetration:	104%
Internet use:	34.7%

Regulator: Agência Nacional das Comunicações, http://www.anac.cv

Licensed operators: market share

CV Movel:	88%
T-MAIS:	12%

ILLUSTRATIVE mHEALTH APPLICATIONS[10]

- Telemedicine and "Virtual Hospital" functioning in country. (86)

KEY FINDINGS

- Cape Verde is #4 in SSA on the ICT Development Index (first in West African countries), but little information on activities was found.
- Government of Cape Verde developed an electronic Government Action Plan with a "Health for All" component.

[10] Numbered references available in Annex C.

CÔTE D'IVOIRE mHEALTH SNAPSHOT

mHealth status: nascent

Country facts:

Population: 19,839,750
Language: French

Mobile overview:

Market penetration:	94.0%
Internet use:	2.4%

Regulator: Agence des Telecommunications de Côte d'Ivoire (ATCI)

Licensed operators: market share

Orange:	35%
MTN:	33%
Etisalat Moov:	21%
Comium:	7%
Green:	4%

ILLUSTRATIVE mHEALTH APPLICATIONS[11]

- UNICEF is training agents on birth registration mobile app, sends SMS to central data center under the supervision of village leaders. (11)
- iTECH is providing lab reporting services. (12)
- Helen Keller International providing voice/SMS reminders for immunizations; will soon add ANC appointment reminders. (13)
- Helen Keller piloting with Dimagi software to enable sponsors to support beneficiary children with phone-based message support to encourage vaccinations. (55)
- Orange offers Duty Chemist, helping patients identify the closest open pharmacy via SMS. (111)
- Etisalat is planning to replicate its Mobile Baby message platform for pregnant women currently available in Nigeria. (112)
- NGO Ruban Rouge offers HIV hotline with free information by trained counselors, call monitoring. (114)

KEY FINDINGS

- MOH interested in expanding use of mhealth, especially given the expansion of fiber optic cable throughout the country for improved internet.
- AFD conducted in-depth analysis of mhealth in Côte d'Ivoire, noting it lags behind Senegal. Key barriers include lack of clear ICT strategies in national health plans.
- Mobile money registration has reached 40% of the population.
- The country is committed to expanding mobile access including high speed data through 3G and fiber optics.
- The number of multi-SIM card holders is high: there are 9 million unique subscribers with 20.1 million actual subscriptions.
- Sustainable funding for programs is a problem, e.g. Ruban Rouge HIV hotline is struggling to find operating revenue.

[11] Numbered references available in Annex C.

GAMBIA mHEALTH SNAPSHOT

mHealth status: Nascent

Country facts

Population: 1,791,225
Language: English

Mobile overview

Market penetration:	120%
Internet use:	12.4%

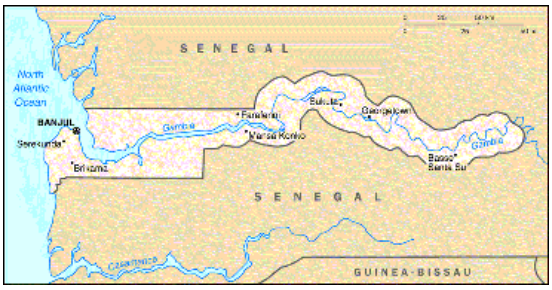
Regulator: Gambian Public Utilities Regulatory Authority (PURA)

Licensed operators: market share

Africell:	63%
Comium:	15%
Gamcell:	15%
Qcell:	7%

ILLUSTRATIVE mHEALTH APPLICATIONS[12]

- An SMS platform for disease surveillance and stock-out reports on 20 medications at 50 clinics, five hospitals and six central and regional medical stores. In addition to stock reports, health workers text weekly reports on 10 pre-specified diseases to a central database. (14)
- Drexel University project with Frontline SMS used SMS messages to improve dental health practices and enhanced vaccine inventory control. (56)



KEY FINDINGS

- No information available about mhealth on any online sources.
- Media in Gambia is controlled with one television station in the country owned by the government.
- 3G networks not yet available, mobile Internet is available through GPRS.
- Mobile money services not yet being advertised.

[12] Numbered references available in Annex C.

GHANA mHEALTH SNAPSHOT

mHealth status: active

Country facts:

Population: 25,366,462
Language: English

Mobile overview:

Market penetration:	120%
Internet use:	12.4%

Regulator: National Communications Authority

Licensed operators: market share

MTN:	48%
Vodafone:	20%
Tigo:	19%
Airtel:	12%
Expresso Telecom:	1%

ILLUSTRATIVE mHEALTH APPLICATIONS[13]

- MOVE-IT project employs surveillance agents to report vital events in three districts via SMS. (15)
- DELIVER project SMS stock tracking for 20 commodities, 200 users since 2011. (16)
- FioNet provides mobile-enabled devices to transmit rapid results for GHS and TB. (17)
- ChildCount+ used by Millenium Villages. (18)
- MOTECH (GHS, Grameen Fdn) includes stage-based messages for mothers, mobile data entry tool at health centers, and decision-support tools for health workers. (57 and 88)
- SHARPER project reduces HIV among MARPs with mobile health counseling. (58)
- mPedigree provides free SMS platform for consumers to check the authenticity of medications. (59)
- No Yawa provides reproductive health messages for youth in SMS and voice format. (60)
- In 2013, Vodafone introduced a fee-based healthline for callers to consult with doctors. (61)
- Millenium Villages Project created a closed user group to improve networking and efficiency. (87)
- SHOPS project collaborated with Ghana Pharmacy Council to provide supportive supervision to LCS with smartphones. (90)

KEY FINDINGS

- Ghana has been a West Africa leader in adoption of iHRIS software to manage human resource allocations, supported by USAID CapacityPlus project.
- GHS completed installation of DHIS2 which now has more than 5,500 registered users in 170 districts, including private providers.
- Government of Ghana adopted ICT4D policy in 2003 to facilitate use of ICTs and promote development of commercial ICT hub.
- Mobile VAS sector is flourishing.
- Projects report that wait times are high to obtain short codes for mhealth applications, sharing among services is common.
- Opportunities exist to collaborate with magriculture, such as through Esoko, an agriculture platform with market price info for clients; could integrate health messages.
- MTN Foundation is active in Ghana, but health expenditures focus on facility construction, medical equipment donations, and financial support for those with chronic disease.
- ☹ Mobile operators pay 2.5% of revenue as a health insurance tax used to fund investment in health services; 2% is also paid to the government.

[13] Numbered references available in Annex C.

GUINEA mHEALTH SNAPSHOT

mHealth status: nascent

Country facts:

Population: 11,451,273
Language: French

Mobile overview:

Market penetration:	47%
Internet use:	1.5%

Regulator: ARPT Guinée: http://www.arpt.gov.gn

Licensed operators: market share

Orange:	44%
Areeba / MTN:	32%
Cellcom:	20%
Intercel:	4%

ILLUSTRATIVE mHEALTH APPLICATIONS[14]

- Voice-based data collection platform for surveillance and service statistics. (19)
- African Friends of Guinea and Dimagi use SMS reporting for neglected tropical diseases. (20)
- RapidSMS platform piloting service to provide clients with emergency taxi transport numbers. (21)
- Sunukaddu.com is training youth via new technologies to increase outreach to populations and improve knowledge of FP. (62)
- MCHIP project provided a mobile phone network among providers and supervisors. (92)

KEY FINDINGS

- 99% of phone transactions are pre-paid, and 99% of mobile operators profits come from voice services (SMS and Internet are marginal).
- There is a 1.5% universal service fund that could be used to support mhealth.
- Orange has 3G services in country.
- Mobile money and transfers from diaspora already implemented in the country, could be expanded to health services.
- Coordination efforts underway, MOH organized a workshop to harmonize efforts with WB, OMS, UNICEF, USAID, MSHP, UE, ORANGE, and UNFPA.
- Challenges reported by MOH at Addis November 2013 meeting include high telecommunications charges, gaps in connectivity, and broken phones.

[14] Numbered references available in Annex C.

GUINEA BISSAU mHEALTH SNAPSHOT

mHealth status: nascent

Country facts:

Population: 1,663,558
Language: Portuguese

Mobile overview:

Market penetration:	64%
Internet use:	2.9%

Regulator: Instituto das Comunicações da Guiné-Bissau (ICGB) http://www.icgb.org

Licensed operators: market share

MTN:	65%
Orange:	32%
Guinetel:	3%

ILLUSTRATIVE mHEALTH APPLICATIONS[15]

- Partnership between MTN and MOH created a closed user group for national vaccination program in regional offices and 114 health districts since 2009. (22 and 93)
- Mobile SMS used to alert citizens during an emergency. (63)

KEY FINDING

- MTN Mobile Money service available since 2010.

[15] Numbered references available in Annex C.

LIBERIA mHEALTH SNAPSHOT

mHealth status: nascent

Country facts:

Population: 4,190,435
Language: English

Mobile overview:

Market penetration:	52%
Internet use:	3.8%

Regulator: Liberia Telecommunications Authority

Licensed operators: market share

Lonestar/MTN:	54%
Cellcom:	46%

ILLUSTRATIVE mHEALTH APPLICATIONS[16]

- UNICEF has supported the government of Liberia with mobile-faciliated birth registration in health facilities and through community agents since 2011. (23)
- LAUNCH project uses mobile data collection to monitor health indicators and improve timeliness of nutrition supplements. (24)
- Global Strategies for HIV Prevention uses mobiles to improve reporting, inventory management, distribution, and forecasting for their remote health programs. (25)
- In 2009, Switchboard partnered with MTN Lonestar to create closed user groups for doctors to call within network for free. (115)

KEY FINDINGS

- MOH is in process of transitioning to DHIS2 data standard to improve management of health information from health clinics and sub-districts.
- There is an active iLab of tech projects based in Monrovia led by Ushahidi Liberia.
- MTN Lonestar launched mobile money service in 2013 in partnership with the Guaranty Trust Bank Liberia Limited in Monrovia.

[16] Numbered references available in Annex C.

MALI mHEALTH SNAPSHOT

mHealth status: moderate

Country facts:

Population:	14,853,572
Language:	French

Mobile overview:

Market penetration:	70%
Internet use:	5.7%

Regulator: Comite de Regulation des Telecommunications

Licensed operators: market share

Orange (Sonatel):	63%
Malitel (Etisalat):	37%
Planor:	new

ILLUSTRATIVE mHEALTH APPLICATIONS[17]

ANTIM (telehealth agency) has fleet of phones for public health workers; partners use to collect data for malaria, MCH, other health statistics. (26)

- UNFPA has supported SMS commodity tracking system in two regions. (27)
- Ma Santé project has trained more than 100 CHWs in the use of mobile phones for daily data collection in poor neighborhoods of Bamako. (28)
- UNFPA in partnership with FrontlineSMS and Datadyne has reported births in Mali using verbal autopsy. (29)
- One World provides access to free FP information through SMS questions to counselors. (64)
- CapacityPlus project with Intrahealth and SpacedEd.com are delivering in-service training on postpartum FP that delivers training via SMS and IVR in French. (94)
- IICD's MAMMA project, in partnership with Orange, trained CHWs to report on malaria cases using mobiles, reducing response time for patients becoming ill by 65 percent. (95)
- French NGO Pesinet developed a mobile application to support CHWs recruited to make weekly home visits to families contributing a modest insurance fee to reduce child mortality and morbidity. (95)

KEY FINDINGS

- Regulator expressed interest in negotiating deal with operators to earmark portion of universal service tax for mhealth.
- Orange actively supports mhealth initiatives, first through Foundation, then through business units.
- Local software company Yeleman providing mhealth applications for MOH initiatives.
- Clarity of roles between ANTIM (ehealth agency) and DNS (health) needed regarding HIS leadership.
- Orange in partnership with MCF, MCM, and PSI is testing proof of concept using mobile money for microfinance and health insurance.
- IICD reports that obtaining toll free numbers that interconnect to more than one operator isvery challenging. They have been in negotiations for more than one year.

[17] Numbered references available in Annex C.

MAURITANIA mHEALTH SNAPSHOT

mHealth status: nascent

Country facts:

Population: 3,796,141
Language: Arabic

Mobile overview:

Market penetration:	88%
Internet use:	5.4%

Regulator: Autorite de Regulation

Licensed operators: market share

Mauritel (Etisalat):	58%
Mattel (Tunisie):	42%
Chinguitel:	New

ILLUSTRATIVE mHEALTH APPLICATIONS[18]

- New SMS surveillance program under way to monitor 10 selected diseases to track number of cases and demographic statistics. (30)
- RAFT/iPath (Geneva Hospital) provides free distance learning and consultation platform for French-speaking countries to link doctors to libraries, lectures, and consultations. Providers in remote settings are using mobile ultrasound to receive supervision from experts in urban hospitals. (97)
- Mobile operators agreed to implement free national emergency number. (121)
- UNICEF partnership is supporting NOH to establish SMS reporting to track nutrition indicators in Guidimaka and Nouakchott region. (122)
- UNICEF provided mass SMS awareness messages on breast cancer. (123)
- MATTEL is planning mobile money service for health mutuelles. (124)

KEY FINDINGS

- Regulatory agency notes that mobile licenses are up for renewal, and this is a good opportunity to negotiate mhealth commitments as a condition of licensing.
- MATTEL is interested in mhealth partnerships, says that NGOs and MOH have not put forth proposals.
- High speed mobile Internet (3G) is lacking.
- Smartphone applications have been developed specifically for the Mauritanian market, and interest in health applications is high.
- There is a national telehealth policy, but it does not refer to mobiles.

[18] Numbered references available in Annex C.

NIGER mHEALTH SNAPSHOT

mHealth status: nascent

Country facts:

Population: 17,157,042
Language: French

Mobile overview:

Market penetration:	29%
Internet use:	1.4%

Regulator: L'Autorite de Regulation Multisectorielle

Licensed operators: market share

Airtel:	65%
Orange:	15%
Etisalat Moov	13%
Sahelcom:	7%

ILLUSTRATIVE mHEALTH APPLICATIONS[19]

- Orange is working with the WHO on a medical stock management system. (31)
- UNFPA activity implemented by Pathfinder provided 20,000 solar SIM cards to refugees in camps with Flooz mobile money accounts. Through this CSR donation, the partners will track how refugees spend funds within the camp to guide future interventions. (65)
- Airtel Fleet provides free calls within closed user group to promote calls among doctors. (98)
- UNFPA has provided phones to Obstetric Fistula advocates to improve coordination and tracking. (99)
- WHO NICe Project in collaboration with MOH is rolling out an integrated Community Case Management program for CHWs. (100)
- World Food Programme piloted use of mobile money for conditional cash transfers to address malnutrition. (113)
- Sahelcom Com broadcast humanitarian messages to all its subscribers by SMS on behalf of aid agencies (116)

KEY FINDINGS

- There is a low level of mhealth activity, but MOH is eager to explore use for stock forecasting and to address logistical challenges.
- CNSTP is a local business coalition for HIV/Malaria. It includes some telecommunications companies, and provides a potential partner base.
- Low literacy (28%) limits potential for SMS applications.
- Regulator recently deactivated one third of SIM cards which had not been properly registered to curb criminal activity.
- 4% of revenue paid to Universal Service Fund.

[19] Numbered references available in Annex C.

NIGERIA mHEALTH SNAPSHOT

mHealth status: active

Country facts:

Population: 168,833,776
Language: English

Mobile overview:

Market penetration:	59%
Internet use:	32.9%

Regulator: Nigerian Communications Commission

Licensed operators: market share

MTN:	45%
Glo Mobile:	21%
Airtel:	20%
Moov Etisalat:	13%
Mtel:	0.2%

ILLUSTRATIVE mHEALTH APPLICATIONS[20]

- MADEX data collection system facilitated by M&E officers with tablets. (32)
- SMART project used SMS printers to create a feedback loop between rural clinics and diagnostic labs for HIV test results. (35)
- GxAlert, developed by Abt Associates, is used in 69 sites to quickly report via text or email rapid TB test results to national TB database. (36)
- mPedigree and Spoxil drug authentication platforms are available via SMS. (66 and 67)
- Etisalat Mobile Baby (Qualcomm, WHO, D-Tree) provides local language messages for pregnant mothers, CHW case tracking, and mobile money for transport. (69 and 101)
- A toll-free number to support pharmacovigilence for reporting adverse reactions to anti-malarial drugs was established. (71)
- M4Change (MOH, Pathfinder, Dimagi) providing CHWs phone apps to guide diagnosis, improve quality of supervision, send SMS to mothers, and facilitate cash transfers through mobile money. (102)
- MESUDD initiative conducted by software scientists produced a tool that provides real-time language translation for illiterate indigenous patients to speak with an expert for diagnosis in locations without doctors. (103)

KEY FINDINGS

- Technical working group under Nigeria's Saving One Million Lives (SOML) includes GSMA, mHealth Aliance, World Bank, and BBC World Trust and is working to coordinate initiatives and finalize ICT policy. Focus includes mobile inventory tracking, demand generation, and DHIS2.
- National Primary Health Care Development Agency has established mobile ICT focal person to lead mhealth activities under SOML.
- GSMA Pan-African Initiative is launching in 10 countries, starting with Nigeria in 2014. Seeking to scale use of mobiles for registration and demand generation for health and nutrition.
- Has been challenging environment for mobile money, many licensees, regulatory uncertainty, and low consumer awareness.

[20] Numbered references available in Annex C.

SENEGAL mHEALTH SNAPSHOT

mHealth status: moderate

Country facts:

Population: 13,726,021
Language: French

Mobile overview:

Market penetration:	79%
Internet use:	19.2%

Regulator: ART/Senegal

Licensed operators: market share

Orange:	65%
Tigo:	26%
Expresso:	9%

ILLUSTRATIVE mHEALTH APPLICATIONS[21]

- MOH and Intrahealth are piloting SMS and web system to collect and share MCH data gathered at health facilities. (38)
- VOICES project supports epidemiological data collection and training. (39)
- Project Djobi improves maternal child health using phone-based data collection through mutuelle insurance agents. (40)
- UNICEF is rolling out ChildCount+, a birth registration program. (41)
- NGO RAES is integrating data collection on malaria cases through mobiles with expected reach of 100,000 people. (42)
- MSI collected more than 3,000 phone numbers of young people and broadcast SMS with information on sexual health. (73)
- Helen Keller is using SMS and voice messages to remind mothers about Vitamin A. (74)
- Orange/Sonatel working in collaboration with Pharmacy Council to develop a pharmacist call center in which users could pay for phone consultation. (75)
- One World/FHI 360 created an SMS service for young adults to text questions about sexual health with over 270,000 inquiries in 2013 (76)
- Intrahealth and One World are conducting a pilot to provide mobile SMS, voice-based, and Internet refresher training on FP methods. (105)

KEY FINDINGS

- MOH has signed a by-law instituting a national framework for PPPs and created a technical PPP committee. Operationalization is underway.
- MOH in process of formalizing mhealth landscape, McKinsey is assisting. There is interest in dialogue with mobile operators, and intermediaries to broker agreements are welcome.
- Country is still recovering from years of no data sharing. MOH pilot for mobile data collection is scaling up to six districts after demonstrated high rates of acceptability. Barriers include appropriate supervision and incentives to ensure its continuation after pilot funding.
- Challenges include need to develop local ICT capacity and not rely on international consultants
- New privacy laws prevents bulk health messages using MNO databases, NGOs must generate lists of numbers which are costly
- The introduction of HR database iHRIS has strengthened MOH capacity to manage ICT, now leading efforts to transition to DHIS2

[21] Numbered references available in Annex C.

SIERRA LEONE mHEALTH SNAPSHOT

mHealth status: nascent

Country facts:

Population: 5,978,727
Language: English

Mobile overview:

Market penetration:	48%
Internet use:	19.2%

Regulator: National Telecommunications Commission (NATCOM)

Licensed operators: market share

Airtel:	49%
Africell:	37%
Comium:	14%

ILLUSTRATIVE mHEALTH APPLICATIONS[22]

- CRS and Ministry of Health & Sanitation in 2013 conducted malaria indicator household survey and biomarker testing form using iPhones. Saved time from transcription, transport, and data cleaning. (43)
- M&E officers improved compliance with HIS surveillance reporting through financial incentives and solar-powered laptops. (44)
- UNFPA in partnership with Frontline SMS and Datadyne to report births and deaths using verbal autopsy. (45)
- Health program instituted a treatment compliance program using mobile-based voiced reports rather than SMS. (78)
- Marie Stopes established call centers linked to their family planning clinics, providing trained counselors able to answer questions about sexual and reproductive health. (79)
- World Vision is deploying MOTECH solution for CHWs to track clients with decision support with a focus on MCH continuum of care. (108)
- The Sana organization built a platform being used by healthcare workers to address problems during pregnancy and assess tuberculosis risk through diagnostic information sent to health centers. (109)

KEY FINDINGS

- Signal coverage in rural areas is spotty, but network connections can be found in most villages.
- Mobile regulator receives high numbers of complaints about unreliable networks and high prices.
- Connection in 2013 to the Africa Coast to Europe submarine cable is expected to expand access to affordable Internet.

[22] Numbered references available in Annex C.

TOGO mHEALTH SNAPSHOT

mHealth status: nascent

Country facts

Population: 6,642,928
Language: French

Mobile overview

Market penetration:	48%
Internet use:	4%

Regulator: Autorite de Reglementation des Secteurs de Postes et Telecommunications (ART&P)

Licensed operators: market share

Togocel:	66%
Etisalat Moov:	34%

ILLUSTRATIVE MHEALTH APPLICATIONS[23]

- Established an emergency toll-free number to report H1N1 and TB cases. (80)
- In 2013, NGO Hope for Health partnered with Dimagi to introduce phone-based tools for health workers to transmit real-time data to nearby health centers to improve program monitoring. (110)
- Moov launched mobile money late 2013. (117)
- PLAN Togo to pay CHWs using mobile. (118)
- Some mass SMS have been sent to promote health. (119)
- TogoCell has Pharmacist on Duty phone service. (120)

KEY FINDINGS

- New minister of Health is very enthusiastic about use of technology, has blogged about it.
- Mobile money was introduced in 2014, and people are starting to use it. Some pharmacies have installed the ability to pay with mobile money, but it is far from widespread.
- Moov has received solicitations from 2 micro insurance NGOs to facilitate premium collection via mobile money to save on collection time and efforts. Moov would be interested in supporting but would prefer the NGOs be organized rather than coming one by one.
- There is IT capacity in-country in terms of application development, including organizers of coding camps.

[23] Numbered references available in Annex C.

ANNEX C: SOURCES FOR SECTION 3.5 DATA TABLES AND COUNTRY SNAPSHOTS

Data Collection Applications	
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2	http://www.itu.int/en/ITU-D/ICT-Applications/Documents/CoIA%20Background%20ICT4RMNCH.pdf
3	Country Team Presentation, Addis International Conference on Family Planning mHealth 2013
4	In-country interview with UNFPA 2014
5	In-country interview with BURCASO 2014
6	http://www.coregroup.org/storage/2013_08_28_Webinar_mHealth_for_SCM.pdf)
7	http://www.malarianomore.org/news/press/private-sector-partners-help-cameroon-knock-out-malaria-in-support-of-histo
8	Communications to mHealth Working Group listserv
9	http://www.sms2printer.co.uk/pages.php?pageref=clinton-foundation_3
10	http://www.slideshare.net/COREGroup1/m-healthcapacity-strengthening-for-global-health-msn
11	http://africahealthitnews.com/blogs/2013/04/01/registering-births-in-ivory-coast-now-possible-via-sms
12	http://globalhealth.washington.edu/project/4385
13	Presentation at USAID/WA partners meeting in Accra 2014
14	http://anywherehealth.com/2011/03/03/sms-for-health-pfizer-and-vodafone-make-a-difference-in-gambia
15	www.who.int/healthmetrics/news/MOVE_IT_Africa_Board_Paper_21.2.12.pdf
16	http://www.jsi.com/JSIInternet/Features/article/display.cfm?thisSection=Features&thisSectionTitle=Features&thisPage=stories&ctid=1030&cid=233&tid=20&id=371
17	Interview with FioNet 2013
18	http://www.adaorganization.org/docs/ADA_mHealth_FV_singlepages.pdf
19	MOH presentation at Addis mHealth Meeting 2013
20	http://www.commcarehq.org/home

21	Telephone interview with UNFPA 2014
22	http://www.nationalplanningcycles.org/sites/default/files/country_docs/Guinea-Bissau/draft_ppac_gub_08fev_2013_vfinal.pdf
23	www.vtt.fi/inf/pdf/workingpapers/2011/W159.pdf
24	http://www.jsi.com/JSIInternet/Features/article/display.cfm?cid=399&ctid=1030&id=535&thisPage=stories&thisSection=Features&thisSectionTitle=Features&tid=20
25	http://www.samaanguru.org/wordpress/?tag=liberia
26	In-country interview with Abt Mali 2014
27	UNFPA interview 2014
28	IICD correspondence 2014
29	UNFPA interview 2014
30	In-country interview with UNICEF 2014
31	Telepohne interview with Orange 2013
32	www.nphcda.gov.ng
33	PRRINN-MNCH Program
34	http://jsi.com/JSIInternet/Inc/Common/_download_pub.cfm?id=14202&lid=3
35	http://healthunbound.org/node/1355
36	http://www.gxalert.com
37	www.childcount.org/abou/
38	In-country interview with Intrahealth 2013
39	http://www.e4n.fr/images/colloque/doc/slides/2.4.1_Voices_Orange%20Healthcare_e-tools.pdf
40	http://mvoices.eu/2013/03/RalphAnkri_Support%20AMEA%20for%20local%20innovation.pdf
41	http://www.adaorganization.org/docs/ADA_mHealth_FV_singlepages.pdf
42	http://www.iicd.org/articles/combating-mother-and-child-malaria-mortality-with-mobiles#sthash.LCQDe0No.dpuf
43	https://www.msh.org/sites/msh.org/files/usaid_mhealth_compendium_vol._2_us_letter_final_desktopprint_with_infogr.pdf
44	http://new.paho.org/clap/index.php?option=com_docman&task=doc_details&gid=85&Itemid=219
45	UNFPA interview 2014
Illustrative Consumer Applications	
46	http://www.urc-chs.com/news?newsItemID=364
47	In-country interview with PAMAC 2014
48	http://www.who.int/goe/publications/goe_mhealth_web.pdf

49	http://link.springer.com/article/10.1007%2Fs13149-012-0236-y
50	In-country interview with PROMACO 2014
51	http://www.itwebafrica.com/mobile/406-cameroon/232619-orange-launches-first-healthcare-hotline-in-cameroon
52	http://www.slideshare.net/orangebusiness/e-health-by-orange-business-services
53	http://www.trialsjournal.com/content/14/1/313
54	http://www.pactr.org/ATMWeb/appmanager/atm/atmregistry?dar=true&tNo=PACTR201210000424220
55	http://www.jhumhealth.org/resources/internship-mhealth-hki#sthash.dQ4UoDGN.dpuf
56	http://www.frontlinesms.com/2013/05/28/the-gambian-project
57	http://www.grameenfoundation.org/resource/motech-lessons-learned
58	http://www.fhi360.org/projects/strengthening-hivaids-response-partnership-evidenced-based-results-sharper
59	http://www.adaorganization.org/docs/ADA_mHealth_FV_singlepages.pdf
60	Correspondence with Marie Stopes 2014
61	http://vibeghana.com/2013/11/07/vodafone-healthline-255-saves-life
62	http://www.ongraes.org/sunukaddu-uk.html
63	http://www.who.int/goe/publications/goe_mhealth_web.pdf
64	http://oneworld.org/2013/09/19/info-ado-mali
65	Interview with Etisalat 2014
66	http://www.mobilemonday.net/reports/MobileAfrica_2011.pdf
67	http://healthmarketinnovations.org/program/sproxil
68	http://www.gsma.com/mobilefordevelopment/what-is-the-role-for-mobile-operators-in-mdg-4-a-look-at-etisalats-mobile-baby-service
69	International Conference on Family Planning presentation in Ethiopia, 2013
70	http://www.myquestion.org/about-us
71	Https://www.mhealthevidence.org/content/exposure-anti-malarial-drugs-and-monitoring-adverse-drug-reactions-using-toll-free-mobile
72	Interview with UNFPA 2014
73	http://www.xcdsystem.com/icfp2013/program/index.cfm?aID=1997&seID=225&CFID=4547835&CFTOKEN=34213401&jsessionid=d43061e043cfe2387ebf6a5c74c801c684d7
74	In-country interview with Helen Keller Institute 2014
75	Telephone interview with Sonatel 2014

76	http://www.oneworld.org/our-work
77	Interview with UNFPA 2014
78	http://whqlibdoc.who.int/publications/2011/9789241564250_eng.pdf?ua=1
79	http://www.mariestopes.org/where-in-the-world#sierra-leone
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Illustrative Use of Health Worker Applications	
81	http://www.care.org/sites/default/files/documents/MH-2013-BEN-Project-Summary-A-Call-for-Life.pdf
82	In-country interview with URCB
83	Phone interview with Pesinet 2014
84	In-country interview with JSI 2014
85	In-country interview with MOH 2013
86	http://www.iveh.org/
87	http:// http://www.biomedcentral.com/1472-6947/13/100www.biomedcentral.com/1472-6947/13/100
88	Interview with Grameen 2014
89	http://www.switchboard.org/sb/wp-content/uploads/2011/07/MDNet-Ghana-Case-Study-WHO-mHealth-Report-2011.pdf
90	http://www.shopsproject.org/about/highlights/drug-sellers-in-ghana-improve-service-through-supportive-supervision
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92	MOH presentation at Addis International Conference on Family Planning 2013
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98	In-country interview with Airtel 2014
99	Interview with UNFPA 2014
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102	http://www.jhsph.edu/departments/international-health/_documents/USAIDmHealthCompendiumVol2FINAL.pdf
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104	In-country interview with ChildFund 2013
105	http://www.capacityplus.org/category/blog-tags/mhealth
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Illustrations of Mixed Applications	
111	http://healthcare.orange.com/eng/about-Orange-Healthcare/Orange-Healthcare-around-the-world/Ivory-Coast/(month)/2/(year)/2014
112	Interview with Etisalat 2014
113	http://www.wfp.org/stories/niger-using-mobile-money-buy-food-local-markets
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115	Interview with Switchboard 2014
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117	In-country interview with Moov 2014
118	In-country interview with Moov 2014
119	In-country interview with Espoir Vie Togo
120	In-country observation of TogoCell posters 2014
121	In-country interview with the Mauritanian Telecommunications Regulator 2014
122	In-country interview with UNICEF 2014
123	In-country interview with UNICEF 2014
124	In-country interview with MATELL 2014

ANNEX D: INTERVIEW LIST

Note: This contact list combines interviews from two separate SHOPS activities: (1) the West Africa mhealth landscape report and (2) the private health sector assessments undertaken for six focus countries: Burkina Faso, Cameroon, Côte d'Ivoire, Mauritania, Niger, and Togo. Because the six focus countries for the private health sector overlapped with the 17 countries for the mhealth research, teams in those six countries asked about mhealth from anyone they interviewed, resulting in a larger number of stakeholders for the focus countries.

GLOBAL/REGIONAL		
Organization	**Name**	**Title**
Aga Khan Dev Fdn	Ousmane Seye	CEO
Dimagi	Fiorenzi Conte	WA Manager
Etisalat	Amadou Sidikou	West Africa
FHI360	Virginie Ettiegne Traore	COP PACTE VIH
	Niagia Francis Santuah	BCC Specialist
Foundation Merieux	Christophe Longuet	Medical Director
Gates Foundation	Perri Sutton	West Africa RH
GSMA	Kah-Lik Foh	Manager Pan-African Initiative
	Victor Ohuruogu	Nigeria SOML
IFC	Anthony Seddoh	IFC Ghana
	Stefan Rajaonarivo	Senegal Advisory Dept
IICD	Francois Laureys	Burkina, Mali
	Ken Kubuga	Senegal
MCDI	Jane Fieldhouse	ARM3 Benin
mHealth Alliance	Jon Payne	Liaison ICT4SOML
MSI	Faustina Fynn Nyame	Advisor West Africa
	Jennifer Tuddenham	mHealth
One World	Uju Ofomata	Program Director
	Kevin Adomayakpor	Country Manager
Orange	Ralph Ankri	Orange Labs
	Hussein Jaffar	Orange Healthcare ME&A
	Ange Angeli	Orange Labs
PATH	Siri Wood	RH Program Officer
Pesinet	Elena Bridgers	Business Development
RAES	Alexandre Rideau	Senegal
Switchboard	Eric Woods	Founder
Text to Change	Hajo van Beijma	Co-Founder
UNFPA	Ben Light	Commodity Security
WAHO	Mr. Salifou Zouma,	Director WFA
	Dr. Carlos Brito,	Director PI
	Mr. Cletus Adohinzin	Regional Program WFA
	Dr. Bouwaye Aïssa Ado,	DPCH/DC
	Dr. Keita Namoudou,	Senior SSP/RDD
	Dr Kofi Busia,	DSSP/RSS
	Dr. Sorho-Siluie	M&E WFA
World Bank	Jed Fix	M&E

BENIN		
Organization	**Name**	**Title**
URC	Marthe Akogbeto	PRISE-C project COP
MOOV	Madam Ada Diallo	Assistant Director
UNFPA	Dr. Soda	Program Officer
Clinique Dahain	Dr. Evelyne Ahyi Attakpa	Clinic Director
CUGO/CNHU	Pr. Issifou Takpara	Head of Gynecology
	Pr. Sosthène Adisso	Adjunct Head of Gynecology
Hôpital de la Mère et de l'Enfant (HOMEL)	Pr. Perrin	Head of Maternity
	Dr. Benjamin Hounkpatin	Assistant Professor of Obstetrics and Gynecology
Direction de la Santé de la Mère et de l'Enfant (DSME)	Dr. Benjamin Hounkpatin	Secretary General of GIERAF
Programme National de Lutte contre le SIDA	Dr. Charles Gilles Sossa	Coordinator
Direction de la Recherche en Santé de la Formation (DRSF)	Dr. Ernest Nounagnon	Director
ABMS/PSI	Megan Wilson	Executive Director
	Cyprien Zinsou	Evaluation Coordinator
	Judith Ognin	Service Chief and Communication Specialist
MOOV ETISALAT	Mme. Aissatou Diallo	Deputy Director
	Brice Kpangon	Head of Infotainment and Solutions
MTN	Barnabé Dossa	Communication and Project Coordinator
	Anselme Ayanou	Communication Officer
UNICEF	Dr. Adama Ouedraogo	Head of the Child Development Department
SP/CNLS	Marie Reine Sonia Boni	Secretary
Autorité Transitoire de Régularisation des Postes et Télécommunications (ARTPT)	Romain Abilé Houehou	Council Member
Ministère de la Communications et des Technologies Nouvelles (MCTN)	Félicité Kotchofa	Adjunct Director of the Cabinet
	Ambroise Zinsou	TIC Director
Ministère de la Santé	Aboubacar	Adjunct Director of the Cabinet
BURKINA FASO		
Organization	**Name**	**Title**
Catholic Relief Services	Moussa Dominique Bangre	Country Representative
PACTE-VIH	Dr. Joseph Aimee Bidiga	Coordinator
Population Council	Kabore Gisele	Project Coordinator
Marie Stopes International (MSI)	Nicolette Van Duursen	Country Director
Programme d'Appui au Monde Associatif et Communautaire de Lutte contre le VIH/SIDA (PAMAC)	Lougue Marcel Koudio	Coordinator

ABBEF Association Burkinabe pour le Bien-etre Familial	Boureihiman, Ouedraogo	Executive Director
Initiative Privée et Communautaire contre le VIH/ SIDA au Burkina Faso	Dr. Genevieve Onadja	Executive Director
Association des Promoteurs des Cliniques Privées du Burkina (APROCLIB)	Dr. Diedon Alain, Hien	Principal Doctor, *Notre Dame de la Compassion*
Initiative Privee et Communautaire de Lutte contre les VIH/SIDA au Burkina Faso	Dieudonne Bassonon	Executive Director
Conseil burkinabe des Organisations de Lutte contre le Sida (BURCASO)	Ousmane Ouedraogo	National Coordinator
Conseil National du Patronat Burkinabè	Philomene Yameogo	General Secretary
Ordre des Médecins du Burkina	Pr. Ali Niakara	President
PROMACO	Simplice Seraphin Toe	Executive Director
	Nobila Kabore	M&E director
Direction Générale de la Santé Familiale	Dr. Djeneba Sanon Ouedraogo	Secretary General
Ministère de la Santé	Dr. Amedee Prosper Djiguemde	Secretary General
John Snow, Incorporated	Parfait Nyuito Komlan Edah	Country Director
Association Burkinabe Raoul Follereau	Adama Jacques Ouandaogo	President
CAMEROON		
Organization	**Name**	**Title**
MTN	Marie Germaine Ndzie	Stakeholders Manager
GIZ	Dr. Dieter Kocher	Principal Technical Adivsor
Catholic Relief Services	Lori Kunze	
Fondation Médicale Ad Lucem	Dr. Ngotte-Ntondo Josiane	Head of Medical Division
Fondation Médicale Ad Lucem au Cameroun (FALC)	Dr. Bidjogo Atangana	Executive Director
Direction de la Pharmacie du Médicament et des Laboratoires (DPML)	Dr. Lekpa Karnaud	Supply Chain director
	Tetang Fouelefack	Deputy Director
	Xavier Lancelot	App Programmer

Ministère de la Santé, Directeur de la Sante Familiale	Pr. Robinson E. Mbu	Director
Ministère de la Santé, Programme National Multisectoriel de Lutte contre la Mortalité Maternelle, Néonatale et Infanto Juvénile	Dr Martina Baye	Technical Advisor
Ministère Telecom	Jean Paul Richard	ITC Director
Ministère de la Santé, Sante Maternelle et Infantile	Dr. M'batye	Director
Ministère de la Santé, Direction des Ressources Humaines	Pr. Samuel Kingue	HR director
Cameroon National Association for Family Welfare (CAMNAFAW)	Paul Dieudonne Desire Atangana Ondobo	Program Director
CHAI/CLINTON	Katherine W. Kalaris	Family Planning Program Manager
PSI Cameroon (Association Camerounaise pour le Marketing Social (ACMS))	Auguste Kpognon	Executive Director
	Dr. Jean Christian Youmba	Family Health Division
	Lea Monda	ProFam coordinator
	Jean Pythagore Biyik	Senior Coordinator
	Annie Michele Mvogo	HIV division
UNFPA	Dr. Sharif Egal	Medical and Technical Division
UNAIDS Cameroon	Dr. Amadou Moctar Mbaye	Country Coordinator
Ordre National des Médecins du Cameroun	Dr. Josiane Ngotte-Ntondo	Medical and Technical Division
Centre Médical la Cathédrale	Dr. Michele Tagni Sartre	Director
CÔTE D'IVOIRE		
Organization	**Name**	**Title**
PNSR (Programme National de SR/PF)	Dr Eliane ABBE	Former Director
	Dr. Kouakou Virgine	Director
	Dr Alexis Kouadio	Training Director
	M ZeregbeToh	Technical Advisor
CECI Coalition des Entreprises de CI	Paul Angenor Koffi	Executive Secretary
NPSP Nouvelle Pharmacie de la Santé Publique	Dir. Kristel KODO	Assistant Director
AIBEF Association Ivoirienne de Bien-être Familial (IPPF)	Florent KEI	Executive Director
DEPS Direction des	Dr. Benjamin Nabala	Director

Etablissements et Professions Sanitaires		
ACPCI Association des Cliniques Privées de CI	Dr. Joseph Boguifo	President
	Dr. Dacoury	Executive Secretary
ASACI Association des sociétés d'Assurance de CI	M Ambroise KONAN	Technical Advisor
Engender Health (Agir PF)	Dr. Kamelan	Director
SYNAMEPCI Syndicat des Médecins Privés	Dr. Sidick Bakayoko	President
Agence Française de Développement	Sonia Amalric	Program Manager
AIMAS : Agence Ivoirienne de Marketing Social	Koudou Lazare M GOUSSOU	Executive Director
FHI360	Marthe AHUI	Technical Advisor
ACID	Sanogo SEKOU	Director
USAID	Christina CHAPPELL	Health Director
PNPEC	Dr. ABO KOUAME	Director
GHANA		
Organization	**Name**	**Title**
Tigo	Lucien Ndong	Marketing
Vodafone	Rhodaline Dzade	Vodafone Foundation
Grameen Foundation	Karen Romano	Country Director, Grameen Ghana
	David Hutchful	MOTECH Technical Director
IFC	Anthony Seddoh	IFC Ghana
MC.COM	Rudolph Kotoka	Senior Manager, Business Development 7 Solutions
FHI 360	Kimberly Green	Chief of Party
PACTE-VIH	Niagia Francis Santuah	BCC Specialist
LIBERIA		
Organization	**Name**	**Title**
USAID	Andrew Karlyn	Mobile Solutions
MAURITANIA		
Organization	**Name**	**Title**
AECID (Mauritania) - Agence Espagnole pour la Coopération Internationale au Développement	Francisco Sancho Lopez	Coordinator
USAID	Linda Rae Gregory	Country Program Manager
WVI - Vision Mondiale Internationale (Mauritania)	Jean Gavriel Carvalho d'Alvarenga	Director of Operations
Caritas (Mauritanie)	Abdoulaye Samba Bâ	
Stop Sida (Mauritania)	M. Diawara Mahamadour	Program Manager
SWAA International - Society for Women and Aids in Africa (Mauritania)	Sana Adebass,	Program Manager
Sante Sans Frontieres	Dr. Cire Ly	President
ONUSIDA - Programme	Dr. El Hadj Ould Abdallahi	Country Coordinator

Commun des Nations Unies Contre le VIH/SIDA (Mauritania)		
FNUAP - Fonds des Nations Unies pour la Population (Mauritania)	Bocar M'Baye	HIV Program Assistant
AMPF	Brahim Ould Ahmedou	Executive Director
PNSR	Dr. Mahfoud Ould Boye	Coordinator MOH/PNRS
Association des Ulémas et Erudits de Mauritanie	Ademine Ould Saleck	Imam, Nouakchott Mosque
Centrale d'Achats des Médicaments Essentiels et des Consommables Médicaux (CAMEC)	Dr. Ahmed Mohamed Ahmed	Commercial Director
Secrétariat Exécutif National de Lutte contre le SIDA (CNLS)	Mohamed Lemine Ould Mreizig	Office Manager
Mauritanie Android	Moustapha Ould Yacoub	Founder
Regulatory Authority	Ahmed Ould Mohamedou,	Communication Department Manager
Chinguitel	Mohamed Ould Ahmed Salem	Director of Public Companies Department
ASCOMA Courtage d'Assurances et de Reassurances	Mohamed Sadegh	Commercial Director
AGIR-PF	Dr. Racine Kane	Country Representative
Association des Cliniques Privées de Mauritanie	Dr. Tolba MD Abderahmane	General Secretary
Matell	Mamoudou Ba, Chef du Service Marketing	Marketing Department Manager
UNICEF	Dr. Mamadou Ndiaye	Nutrition Manager
Ministry of Health, Hospital Medicine Management	Dr. Ba Mamadou S.	Director
PNSR	Jean Gavriel Carvalho d'Alvarenga	Director of Operations
Association des Ulémas et Erudits de Mauritanie	Abdoulaye Samba Bâ	
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Secrétariat Exécutif National de Lutte contre le SIDA (CNLS)	Sana Adebass, Responsible dans le cadre de la lutte contre le VIH	HIV Program Manager
Mauritanie Android	Dr. Cire Ly	President
Regulatory Authority	Dr. El Hadj Ould Abdallahi	Country Coordinator
NIGER		
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AFD - Agence Française de Développement (Niger)	Sonia AMALRIC	Program Manager
CRS (Niger) - Catholic Relief Services	Dr. Ibrahim Ousmane	Coordinator

Samaritan's Purse	Alan Bobbett	Country Director
Direction de la Santé de Mère et de l'Enfant (DSME)	Dr. Ibrahim Souley	Director
Ministère de la Sante - Direction de la Pharmacie, des Laboratoires, et de Médicine Traditionnelle	Dr. Messan Halimatou Allassane	Director
SWAA International - Society for Women and Aids in Africa (Niger)	Djatatou OUASSA	President
PSI Niger	Leger Royet	Country Representative
EngenderHealth	Dr. Fatima Moussa	Director of AGIR-PF
Banque Mondiale (Niger)	Djibrilla Karamoku	Sr. Health Specialist
Délégation de la Union Européenne (Niger)	Nadia Cannata	
ANBEF - Association Nigérienne pour le Bien-Etre Familial (Niger)	Dr. Zagui Sani	Executive Director
ASUSU Microfinance Bank	Reki Moussa Hassane	Director
Polyclinique MAGORI	Dr. Ali ADA	Director
Pharmacie Maison Economique	Aichatou Nayama Kere	Deputy Director
Pharmacie Rond Point	Mohamed ISSA	Associate
Soni Ali Ber – Public Pharmacy	Bouraima Jackoumah	
Direction de la Pharmacie, des Laboratoires et la Médecine Traditionnelle (DPHL/MT)	Dr. Messan Hallimatou Allassane	Director
ANIMAS-SUTURA	Robert Eiger	Senior Advisor
	Nicolas de Metz	Consultant
Association des Pharmaciens Privés	Moustapha Diallo	State Pharmacist
Coordination Intersectorielle de Lutte Contre les IST/VIH/SIDA (CILS)	Dr. Zeinabou Alhousseini M.	National Coordinator
La Coalition Nigérienne des Entreprises du Secteur Prive Contre les IST/VIH/SIDA, la Tuberculose, et le Paludisme (CNEP/STP)	Abdou Wahabou Amadou Issofou	Executive Director
Conseil National de l'Ordre des Médecins, Pharmaciens, et Chirurgiens-dentistes	Dr. Almoustapha Illo	President
AREVA/SOMAIR	Toure Mariama Galadima	
AFD - Agence Française de Développement	Sonia AMALRIC	Program Manager

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CRS (Niger) - Catholic Relief Services	Dr. Ibrahim Ousmane	Coordinator
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Direction de la Santé de Mère et de l'Enfant (DSME)	Dr. Ibrahim Souley	Director
Ministère de la Sante - Direction de la Pharmacie, des Laboratoires, et de Médicine Traditionnelle	Dr. Messan Halimatou Allassane	Director
SWAA International - Society for Women and Aids in Africa (Niger)	Djatatou OUASSA	President
PSI Niger	Leger Royet	Country Representative
EngenderHealth	Dr. Fatima Moussa	Director of AGIR-PF
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Pathfinder, M4Change	Farouk Jega	Country Representative
SHOPS project, Abt	Ayodele Iroko	COP
Health Finance & Governance project, Abt	Olusesan Makinde	COP
National Primary Health Care Development Agency	Steve Felix-Uduh	Team Lead ICT, Program Analyst
Nigeria Urban Reproductive Health Initiative (NURHI)	Toyin Afachung	COP
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	Fatou Ndiaye	MCH advisor
	Julie Thwing	CDC, Strategic Information
	Souley Wad	PPPs, GDAs
	Baudo Gallo	HSS Advisor
MOH	Aissatou Sall Fall	ICT Liaison
Abt Associates	Alioune Wade	Deputy Chief of Party
Sonatel	Edith Faye	Enterprises Business Unit
	Julien Riou	Health Business Developer
Intrahealth	Abdoulaye Diedhiou	Senior M&E Advisor
	Cheikh Tidiane Kane	Mobile Medic
	Moussy Dia	HRH
IFC	Stefan Fajaonarivo	Investment Officer
AREMAS	Alison Malmquist	
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Afrique Arc en Ciel (NGO)	Yves Kugbe	Program Manager
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CCM Togo – Global Fund	Akou Pignandi	National Coordinator
Ministry of Health, Management of Global Funds Projects	Dr. Antoinette Eya D. Awaga	Coordinator
EngenderHealth	Dr. Eloi Ayamenou Amegan	Country Manager
Conseil National de Lutte Contre le SIDA et les IST (National AIDS Council)	Damien K. Amoussou	Deputy National Coordinator
CARITAS Togo	M. Emmanuel Planté	Project Manager
Agence Française de Développement	Lucie Vigier	Program Manager
AGIR (NGO)	Ayoko Mawuenam Koudoyor – Kangni	NGO Coordinator
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CILSIDA (NGO)	Apoté Zekpa	Director
Clinique Biasa	Moise Fiadjoe	Director
UNDP	Jean François Some	HIV Program Specialist
UNAIDS	Tamir O. Sall	Country Director
ASPROFEM (NGO)	Odette Fagnon	Coordinator
Centrale d'Achat des Médicaments Essentiels et Génériques (CAMEG)	Komi Sefenu Takpa	Supply Chain Coordinator
Chambre de Commerce et d'Industrie	Rose Koudjome	Global Fund, Private Sector Representative
Appui au Développement et à la Santé Communautaire (ADESCO) (NGO)	Didier Nakpane Tante Kodjo	Director
Direction de la Santé Familiale	Dr. N'Tapi Kassouta	Director
UNFPA	Guy C. Ahialegbedzi	Assistant to the RH/HIV Program
Medical Society (Ordre des Médecins)	Komi Patrice Balo	Deputy Director
Pharmacists Society (Ordre des Pharmaciens)	Laté J.P. Lawson-Drackey	Deputy Director
Employers Association	Kékéli Klutse	Program Manager

(Patronat)	Mensa Yawo Kogbetse	Executive Director
Espoir Vie Togo	Jule Kokouvi Tchalla	M&E Director
Forces en Action pour le Mieux-Etre de la Mère et de l'Enfant (NGO)	Dometo Sodji	Director / President of the Platform of CSO against HIV
Direction des Etablissements de Soin	Dr. Amivi Afefa M. Bibiane Baba	Director

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