
MoTECH: MHEALTH ETHNOGRAPHY REPORT



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It is our sincere hope that this report will truly help inform the development and deployment of mobile phone based tools that contribute to improved access to health services and information for pregnant women, mothers, and newborns and ultimately result in decreases in maternal and child morbidity and mortality.

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SUMMARY OF RESULTS

The number of mobile phone subscriptions has increased by approximately one billion between the end of 2007 and the end of 2008 (ITU, 2009). At the beginning of 2009, the number has surpassed four billion. With this, the use of mobile phones and networks in the mobile health has become increasingly popular in low- and middle-income countries, including Ghana where a broad range of mHealth initiatives are now being implemented. This offers many opportunities to translate information and communications technology into gains, particularly for fighting disease and improving population health. This mHealth Ethnography serves as a critical entry point to both assess the initial state of information, communication, and mobile phone use for maternal and newborn health both within the health sector and the general population in the Dangme West District in the Greater Accra Region of Ghana. Key study findings illustrate that there is a strong foundation upon which the MoTECH Project can build to advance the use of mobile telephony to support the achievement of the Millennium Development Goals for health. These can be divided into two broad categories – those within the health sector and those that extend services to target beneficiaries in the general population.

HEALTH SECTOR SUMMARY OF FINDINGS AND RECOMMENDATIONS

Existing maternal and newborn health service delivery is well structured and appreciated by the general population in Dangme West. Key challenges include the renewal of health insurance, resulting in a recent decline in the demand for services. Outreach services by clinical staff are well structured, however, the links to and roles of volunteers are poorly defined. In the health sector, mobile technologies are already in use for consultation, administration, and emergency support. They present an opportunity to streamline data capture and reporting practices. While the intention of the MoTECH project is to focus on standalone low-end data capture systems and handsets that feed data into the DHIMS- the sophistication of the mobile phone networks (3G) and increasing availability and affordability of touchscreen SmartPhones as well as the provision of computers to clinics by the National Health Insurance Scheme presents an opportunity to realign MoTECH within the broader eHealth ecosystem in Ghana. For outreach workers- efforts to identify low-end reporting and data capture systems for volunteers should continue to be promoted.

GENERAL POPULATION SUMMARY OF FINDINGS AND RECOMMENDATIONS

In the general population, cost of services plays a significant role in treatment-seeking behaviors. For maternal and newborn health gender of the care provider and/or volunteer also plays a significant role. The use of mobile phones to access health information and coordinate health-related transportation for emergencies was prominent. Key recommendations included the use of voice over text for outreach to pregnant women and recent mothers as well as linking to other broadcast and community media outlets- such as the vehicle with the microphone used to mobilize child welfare clinics.

LITERATURE REVIEW OF MATERNAL AND NEWBORN HEALTH AND MOBILE TECHNOLOGIES

MATERNAL HEALTH

The mortality risk for pregnancies is conventionally divided into direct causes (those that occur only during pregnancy and the immediate post-delivery period) and indirect causes (those derived from conditions that precede, between are aggravated by pregnancy, such as anemia, diabetes, malaria, tuberculosis, cardiac disease, hepatitis, and, increasingly, AIDS). Direct causes are attributed to approximately 75% to 80% of maternal mortality. Such causes include (in order) hemorrhage, sepsis, hypertensive disorders of pregnancy (eclampsia), complications of unsafe abortion, and obstructed and/or prolonged labor.

A maternal death is defined as a “death of a woman while pregnant or up to 42 days post-delivery from any case (except accidents)” (Menken et al., 2006, p. 103). Some ways to reduce maternal deaths include reducing pregnancies, reducing high-risk pregnancies, and improving access to and quality of obstetric care. The adequacy of obstetric care is based on several items, including: the treatment of sepsis, shock, anemia, hypertensive disorders; providing uterotonic (induction, prevention and treatment of post partum hemorrhage); manual procedures, including vacuum extraction; monitoring of labor; provision of safe abortion services; blood transfusions; and others such as anesthesia, surgery. Misoprostol has been suggested for active management of postpartum hemorrhage because of its strong uterotonic effects, ease of administration, low costs, and room temperature storage (Gülmezoglu, 2001).

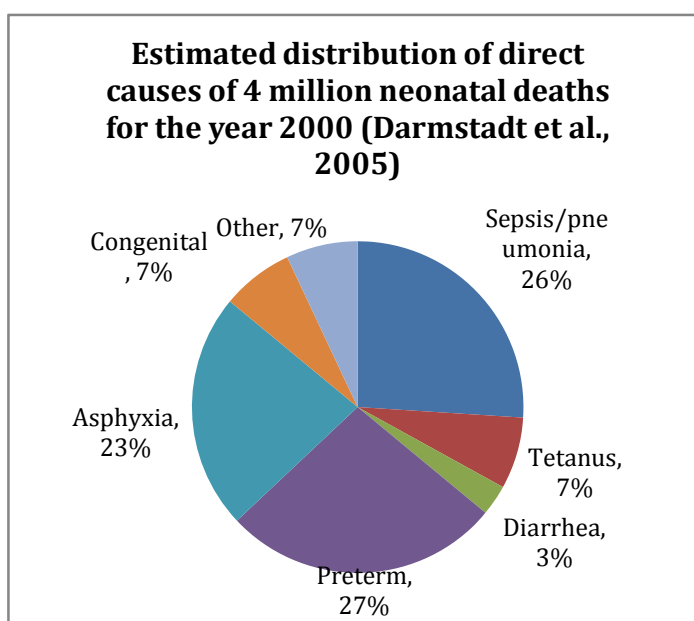
However, the emphasis on reducing maternal morbidity and mortality has been on “decreasing the total number of pregnancies per woman” (Menken et al., 2006, p. 109) as well as targeted interventions to ensure early detection of risk factors during pregnancy. The risk differentiation for the maternal delivery process is distinguished by number of pregnancies for each woman. Table 1 is taken from Menken et al., 2006.

Table 1 The mechanisms by which reproductive patterns affect maternal health

Reproductive Pattern	Mechanism through which Maternal Health is Affected
Number of pregnancies	Each pregnancy carries a risk of morbidity and mortality
High-risk pregnancies	
First-time mothers	Higher risk than pregnancies 2 through 4 for obstructed labor, pregnancy-induced hypertension, other obstetric complications due to initial adaptation to pregnancy
Higher-order pregnancies	Higher risk for hemorrhage and uterine rupture, due to cumulative toll of previous pregnancies and reproductive injuries
Pregnancy at very young maternal ages	Higher risk due to physiologically immature reproductive systems and reduced propensity for timely care seeking
Pregnancy at old maternal ages	Body in poorer condition for pregnancy and childbirth
Short interbirth intervals	Inadequate time to rebuild nutritional stores and regain energy levels
Unwanted pregnancies ending in unsafe abortions	Unsafe abortions increase exposure to injury, infection, hemorrhage, and death
Pregnancies for women already in poor health	Aggravated health condition

NEWBORN HEALTH

The graph illustrates the estimated distribution of direct causes of the 4 million neonatal deaths by Darmstadt et al. (2005). Each year, approximately four million babies out of 130 million born die in neonatal period of the first 28 days (4 weeks) of life (Lawn et al., 2005), and 70% of these deaths could be prevented if proven interventions were implemented effectively with high coverage where they are needed most (Darmstadt et al., 2005). The proportion of child deaths that occurs in the newborn (or neonatal) period is increasing, and the Millennium Development Goal for child survival – to



reduce the under-five mortality rate by two thirds between 1990 and 2015 – cannot be met without substantial reductions in neonatal mortality (Lawn et al., 2005).

It has been demonstrated that reductions in neonatal mortality do not depend on high-tech solutions. Newborn care is simple, but assessing the socioeconomic and cultural barriers to care seeking and evidence-based care is crucial in determining proper intervention integration. Efforts must include links to the health system: between community and referral facilities and with existing maternal and child health care programs and services. Strategies must include home-based care where the majority of births and deaths occur. In Table 2, proven interventions are grouped into four main time periods: **pre-conception, antenatal, intrapartum, and postnatal**. Other interventions that are not included in Table 2 but are still of benefit for infant, child, or maternal health exist. These are listed in Table 3.

Table 2 Evidence of efficacy for interventions at different time periods (Darmstadt et al., 2005)

Timing	Intervention	Reduction (%) in all-cause neonatal mortality or morbidity/major risk factor if specified (effect range)
<i>Pre-conception</i>	Folic acid supplementation	Incidence of neural tube defects: 72% (42-87%)
<i>Antenatal</i>	Tetanus toxoid immunization	33-58%; incidence of neonatal tetanus: 88-100%
	Syphilis screening and treatment	Prevalence-dependent
	Pre-eclampsia and eclampsia: prevention (calcium supplementation)	Incidence of prematurity: 34% (-1 to 57%)
	Intermittent presumptive treatment for malaria	32% (-1 to 54%) PMR: 27% (1-47%) (first/second births)
	Detection and treatment of asymptomatic bacteriuria	Incidence of prematurity/low birthweight: 40% (20-55%)
<i>Intrapartum</i>	Antibiotics for preterm premature rupture of membranes	Incidence of infections: 32% (13-47%)
	Corticosteroids for preterm labour	40% (25-52%)
	Detection and management of breech (Caesarian section)	Perinatal/neonatal death: 71% (14-90%)
	Labour surveillance (e.g. partograph) for early diagnosis of complications	Early neonatal deaths: 40%
	Clean delivery practices	58-78%; Incidence of neonatal tetanus: 55-99%
<i>Postnatal</i>	Newborn resuscitation	6-42%
	Breastfeeding (8-30% reduction in deaths from infections)	55-87%
	Prevention and management of hypothermia	18-42% (Bhutta et al., 2005)
	Kangaroo mother care (low birthweight infants in health facilities)	Incidence of infections: 51% (7-75%)
	Community-based pneumonia care management	27% (18-35%)

Table 3. Interventions not included in evidence-based neonatal health care packages that are of benefit for infant, child, or maternal health (Darmstadt et al., 2005)

Infant or child benefit	Maternal benefit
Birth spacing	Birth spacing
Maternal zinc supplementation	Promotion of smoking cessation in pregnancy
Maternal iron and folic acid supplementation	Antenatal iron and folic acid supplementation
Maternal iodine supplementation	Antenatal vitamin A supplementation
Neonatal vitamin A supplementation	Insecticide-treated bed nets for malaria prevention
Insecticide-treated bed nets for malaria prevention	Maternal anthelmintic treatment
Maternal anthelmintic treatment	Maternal vaginal chlorhexidine cleansing
Prevention of maternal-to-child transmission of HIV	Antepartum haemorrhage management
Delayed umbilical cord clamping	Emergency transportation
Prevention of ophthalmia neonatorum	
Hepatitis B vaccination and immunorophylaxis	

The delivery of health care can be population-oriented outreach services, family-oriented and community-oriented services, and individual-oriented clinical services (World Bank, 2004). Interventions improving newborn health can be delivered through family-community care, outreach care, and/or facility-based care. Family-community care services include breastfeeding practices, thermal care, and community-based management of sepsis. Generally, these require community mobilization and empowerment, includes behavior change communications, and can include community- or home-based care. Outreach care includes basic services that can be delivered periodically in facilities or in-home visits. Examples of outreach care services include antenatal care, routine prenatal care, Tetanus toxoid administration, presumptive malaria treatment, and the distribution of ITN. Facility-based care services include institutional delivery, emergency obstetric care, corticosteroids for preterm, facility-based treatment of neonatal sepsis. These services require more skilled personnel and may be provided only within a facility.

A more recent article published in *The Lancet* has demonstrated that for maternal, newborn, and child survival, interventions that can be routinely scheduled had a much higher coverage than those that rely on functional health systems and 24-hour availability of clinical services (Countdown Coverage Writing Group, 2008). Darmstadt et al. has performed a cost-effectiveness analysis emphasizing the benefits of packaging interventions by mode of service delivery over providing single interventions (2005). See Table 3 for evidence-based packages of interventions provided at different periods. The “additional” interventions are those that only become cost-effective when added to universal packages delivered at high coverage in a more developed health system (Darmstadt et al., 2005). However, “overbundling interventions and exacerbating inequities in the availability of these services for the poor” should be practiced cautiously (Gwatkin et al., 2004). If all the interventions in Table 4, including situational and additional elements, were implemented at full coverage (99%), an estimated 41-72% of neonatal deaths could be averted in the 75 countries (Darmstadt et al., 2005).

Table 4. Evidence-based packages of interventions provided at different periods (Darmstadt et al., 2005)

	Interventions		
	<i>Universal</i>	<i>Situational</i>	<i>Additional</i>
Periconceptual			Folic acid supplement ation
Antenatal/ Intrapartum/ Postnatal	<p><i>Family care package (family-community care)</i> Community mobilization and engagement, and antenatal and postnatal domiciliary behavior change communications to promote: evidence-based neonatal care practices (breastfeeding, thermal care, clean cord care), care seeking), and demand for quality clinical care</p> <p>Promotion and practice of clean delivery and referral of complications (for home births)</p>		
Antenatal	<p><i>Antenatal care package</i> Outreach visits, including history and physical examination, with assessment of blood pressure, weight gain, and fundal height; urine screen for protein; screen for anemia; two doses of tetanus toxoid immunization; syphilis screening and treatment; counseling on plan for birth,, emergencies, breastfeeding, referral in case of complication</p>	Intermittent presumptive treatment for malaria	Detection and treatment of asymptomatic bacteriuria
Intrapartum	<p><i>Skilled maternal and immediate neonatal care package</i> Skilled attendant at birth; labour surveillance; encouragement of supportive comparison; assistance to birth (including vacuum extraction); early detection, clinical management and referral of maternal or fetal complications (emergency obstetric care at first level); resuscitation of the newborn baby</p> <p><i>Emergency obstetric care package</i> Detection and clinical management of obstetric complications, including the provision of instrumental delivery, caesarian section, blood transfusion</p>		<p>Antibiotics for preterm premature rupture of membranes</p> <p>Corticosteroids for preterm labour</p>
Postnatal	<p><i>Extra community-based care of low birthweight infants (family-community care)</i> Extra home visits; support for breastfeeding, thermal care, and hygienic cord care, early recognition and care seeking for illness</p> <p><i>Community-based case management of pneumonia (family-community care)</i> Algorithm-based diagnosis and management of pneumonia, including treatment with oral antibiotics</p> <p><i>Emergency neonatal care package</i> Facility-based clinical care of ill newborn babies, particularly those with infections, prematurity (e.g. very low birthweight infants), birth asphyxia</p>		

MHEALTH FOR MATERNAL AND NEWBORN HEALTH

While there are numerous programs focusing on the use of mobile technologies for maternal and newborn health, there is limited research and documentation about what works and how it works. MoTECH presents a strategic opportunity through its focus on rapid prototyping and monitoring and evaluation to contribute to the evidence base in this area.

The Three Delays Model is a current framework for maternal health that presents pregnancy-related mortality to be overwhelmingly related to three delays: (1) in the time to make the decision to seek care, (2) in the time to reach a facility, and (3) in the time to receive adequate treatment. The first delay is related to problem recognition, decision-making, and the perception of care at the nearest facility. The second delay is related to finances, transportation, and logistics. The last delay is related to quality, supplies, personnel, and equipment.

The following is a synthesis of current mHealth applications for improving maternal and neonatal health in low- and middle-income countries that aim to minimize the delays associated with increased risk for maternal and newborn mortality and morbidity. Many of the activities involve strategic partnerships between the telecommunications industry, health sector, academia, and software development groups- including those similar to the Grameen Foundation. These activities, at varying stages of implementation, include the following examples:

- Datamation Foundation, Microsoft, and OneWorld South Asia are implementing a pilot mobile health information service that will provide specific knowledge advisory on pre-natal healthcare to expectant mothers via SMS.
- The SEWA Rural's Family Centered Safe Motherhood and Newborn Care Project (MNCP) is working to reduce maternal and neonatal mortality and morbidity in rural Gujarat through its Community Health Project. SEWA Rural has requested ClickHealth's help and expertise in setting up appropriate health technology platforms to supporting community-based interventions within this project. The most critical component of the MNCP is the community health workers (CHWs) who are responsible for conducting home visitations with mothers. These women provide the following services: prenatal care and counseling, maternal and newborn monitoring and care, tracking mechanisms for every pregnant mother and her newborn to ensure appropriate and timely delivery of health services, timely identification of complicated deliveries (in addition to provision of guidance to frontline workers to appropriately manage such cases at the field level), and post-partum care for mothers and young babies followed by family planning centered counseling. Based on these needs, one of the primary aims of this project is to identify potential mobile phone products and services that can sufficiently address the needs of the organization, CHWs and local community.
- With UNFPA support, Kenya's MOH is piloting community or home-based midwifery in two districts. The aim of the project is to reduce maternal and perinatal morbidity and mortality by improving the quality of normal pregnancy, delivery and postnatal care for women in the community. Specific objectives for this pilot project include: improving access to skilled care within the socio-cultural context; increasing reproductive health knowledge among women, their male partners and the community at large; assist women to make individual birth-preparedness plans; providing more antenatal, childbirth and postpartum support to mothers and newborns, continuing up to six weeks after birth; reducing costs for women during the pregnancy, childbirth and postpartum period. UNFPA is supporting training, delivery kits, manual vacuum aspiration (MVA) kits, and mobile phones for midwives' use, and monitoring and supervision.

- A partnership with the Ministry of Health and Social Welfare, Zanzibar, Tanzania, the Health Sector Programme Support Zanzibar, and the University of Copenhagen aims to examine the beneficial impact of use of mobile phones for health care on maternal and neonatal morbidity and mortality, and to seek innovative ways to ensure access to skilled attendance at delivery through an intervention called "wired mothers." Wired mothers are pregnant women linked to primary health care units through use of mobile phones receiving standard SMS reminders for care appointments and who can call primary care providers in case of acute or non acute problems. Another study aim is to look at the health system's response in relation to obstetric emergencies when using mobile phones to strengthen communication.
- Run by the Pakistani Government's "National Program for Family Planning and Primary Health Care", the Lady Health Worker (LHW) scheme was launched in 1994 to reach out to remote, rural communities and to act as primary healthcare providers. Currently LHWs have no formal means to communicate with their supervisors, basic and district health units, hospitals or ambulances in order to refer serious cases onwards. In addition, LHWs find it extremely hard to access emergency health care. The Lady Health Worker (LHW) Programme is aimed at bringing mobile communications to LHWs. In the first phase of the project, 240 LHWs were provided with a mobile phone for the first time, to be used to support their work. They were also able to use the phone when not working, as a public phone that members of their family and community could use for a fee. Enabling the LHWs with mobile phones along with well regulated monitoring and evaluation mechanisms and prompt corrective measures, the LHW Pilot Project is hoping to mitigate the basic health problems of rural women and children. The project also aims to directly address the UN Millennium Development Goals of improving maternal health, reducing maternal and infant mortality, promoting gender equality and contributing towards women empowerment across Pakistan.
- Through the WorldVision program in Indonesia, more than 200 Acehnese midwives and local midwife coordinators have been trained in new skills including difficult deliveries and data collection. Over 100 were also provided with a mobile phone and instructions on how to use it. The study poses to assess whether or not mobile communications can be used as an effective tool for impacting the quality of pre- and post-natal care in Indonesia.
- In Sept 2007, UNICEF and the Government of Madhya Pradesh set up a call centre in the Guna district hospital to exclusively provide 24x7 emergency transport for pregnant women, newborn, and sick children with the aim to: link communities to the facilities of hospitals; reduce maternal mortality; and increase the number of institutional deliveries. There are 25 government-run institutional delivery centres across the district, as well as a district hospital. These centres have been provided with an ambulance facility and drivers have been given mobile phones. In addition a 24-hour helpline was launched in January 2008. Part of a package to reduce maternal mortality, the Helpline aims to lower maternal deaths by addressing three critical delays: delay in deciding to seek medical care, delay in reaching a place where care is available, and delay in receiving appropriate care.

Networking of various private and public vehicles and locally identified mobile phones form the core infrastructure of the helpline.

- UNICEF and Columbia University graduate students adapted basic cell phones to monitor the health of children in danger of malnutrition. The "RapidSMS" text-messaging system was first developed in Ethiopia to monitor food supplies and will now be used to map and track child malnutrition trends in Malawi more accurately and in real time, enabling quick responses to unfolding food and nutritional crises. This system is now also being deployed by the Millennium Villages Project in Kenya for malaria and nutrition monitoring and management. Links to OpenMRS (open source electronic medical record system) and District Health Information System (DHIS- open source health system reporting platform) are currently under development.
- Launched in September 2008, MobiSUS in Brazil (a partnership between Nokia and the Government of Brazil) provides a mobile phone-based program that allows more efficient and effective health data collection by Brazilian health workers operating in challenging and under-resourced environments. In the proposed program, data entry modules would be created for use with mobile devices and they would replace paper forms and manual entry. The first module would be for immunizations services, to be followed by creation of modules for nutrition, oral health, and maternal and child health over the three years of the project. The project would take place in 18 of 34 Special Indigenous Health Districts, where the use of mobile technologies can be compared to the current paper form-based system.
- The NGOs Service Delivery Program in Bangladesh has established a community support system intended to support pregnant women and their families during an obstetric emergency. Depot Holders (DHs work out of their homes to re-supply clients with family planning and reproductive health supplies, including birth control pills and condoms) are the first to know of a pregnancy in the community. They seek out the pregnant mother, counsel her about pursuing antenatal care at the nearest clinic, and teach her about the services of the paramedics. NSDP has furnished each of these paramedics with mobile phones, and the DH checks regularly with the mother to make sure she still has the phone number.
- Started in 2002, Ca:sH is a mobile electronic record system designed to be used by outreach workers in large communities. The Ca:sH system was designed to address problems of poor data flow and logistical support for rural paramedical workers in the state of Haryana, India. The collaborators developed a handheld software application to facilitate ordered data collection, immunization, scheduling pre-natal care for pregnant mothers and recording routine demographic changes in the community. The new Ca:sH engine incorporates a rule-based decision support engine to facilitate triggers of disease management guidelines such as WHO-Integrated Management of Childhood Illness.
- One noteworthy open-source PDA application for child health is e-IMCI. Developed by D-Tree International, e-IMCI (electronic Integrated Management of Childhood Illness) is PDA-based decision support tool that guides clinicians through a series of pre-programmed algorithms based on the Integrated Management of Childhood Illness (IMCI) protocols

developed by the WHO. These protocols facilitate the standardized diagnosis and treatment of common childhood illnesses. This system, recently pilot tested in Tanzania showed that the use of e-IMCI improved adherence to standard protocols (DeRenzi et al., 2008). A similar platform under development by D-Tree, namely CommCare, is currently being tested for pregnancy monitoring by Community Health Workers in the Millennium Villages Project in Tanzania.

- In Serbia, Beba Dolazi, uses mobile phones as a platform for providing automated weekly health promotion messages to pregnant women based on the stage of their pregnancies. This system was developed in Serbia in partnership with Microsoft and funded by the European Union and National Ministry of Health. Mobile phones were chosen because they can deliver quality information at the right moment. In 2007, there were 3,200 women on the program, as reported at Med-e-Tel 2007. <http://www.bebadolazi.net/> Similar platforms are under development for the United States as well as in India sponsored by Johnson and Johnson through BabyCenter.



Children in Dangme West pointing at a butterfly

HEALTH SYSTEM OVERVIEW: DANGME WEST DISTRICT¹

Dangme West is comprised of four administrative sub-districts located in the Greater Accra Region of Ghana, namely Dodowa, Prampram, Great Ningo (formerly Old Ningo), and Osudoku.



Source: Wikipedia

The strategic objectives of the Dangme West district health sector are to:

- Ensure that people live long, healthy and productive lives, reproducing without risk of injury or death
- Reduce excess risk and burden of morbidity, mortality, and disability especially among the poor and marginalized
- Reduce inequalities in access to health, population and nutrition services and health outcomes

The Dangme West district structures its health-related activities around four thematic areas:

- General health system strengthening
- Healthy lifestyles and environments

¹ The following section has been compiled from the District Health Management Team's *Dangme West District 2007 Annual Report and Review of Health Sector Performance*.

- Health, reproduction, and nutrition services
- Governance and Finance

HEALTH INFRASTRUCTURE AND PROVIDERS

Each of the four sub-districts of Dangme West has a health centre. These are located in Dodowa, Prampram, Old Ningo and Asutsuare towns respectively. These health centres are in reasonable physical condition with laboratory services provided at Dodowa and Osudoku Health Centres. Staff accommodations, however, are limited throughout the district.

There are also five community clinics that also function as Community Health and Planning Service (CHPS) compounds located at Agomeda in the Dodowa sub-district, Dawhenya and New Ningo in the Prampram sub-district, Nyigbenya, and Osuwem in Osudoku sub-district. Health services are delivered from these clinics/compounds as well as through 150 outreach sites. There are three other CHPS compounds (for a total of 8) in Ningo and Osudoku sub-districts that are not fully functional due to lack of staff. All CHPS zones have at least one community health nurse, though most have two.

Several private facilities also deliver services throughout the Dangme West district. These include the Grace Maternity Home in Dodowa, the Ebenezer clinic in Prampram, the Godia clinic at Dawhenya, the Omari Clinic at Mataheko, the Gloria Maternity Home at Mataheko, and Afienea Community Based Clinic. Afienea Youth Clinic at the Afienea Youth Leadership Institute is a quasi-governmental health facility. Additionally, the Catholic Church runs the St. Andrews Catholic Clinic in Kordiabe.

Since there is no hospital in the Dangme West district, some residents seek hospital care from the following hospitals: Atua Government hospital (Eastern region), Agomanya Catholic Hospital (Eastern region), Battor Catholic Hospital (Volta region), Akuse Government hospital (Eastern region), Tema General Hospital or Ridge Hospital (Greater Accra Region).

There are two Pharmacy shops and 52 registered Chemical Shops in the Dangme West district. There are also 95 traditional birth attendants (TBAs) who provide services at the community level.

OVERALL PERFORMANCE AND QUALITY

Outpatient Department (OPD) attendance per capita has experienced a steady increase since 2000. The increase in OPD utilization in 2007 was seen in both private and public sector facilities. This is attributed to improving quality of care in health facilities in response to client concerns, improved human resources, and more importantly the establishment of a district wide health insurance scheme in 2000. Two out of five private health facilities as well as the mission clinic all offer services under the health insurance scheme.

The quality of health care has reportedly been improving steadily in the district resulting in an increase in patients reporting to health facilities. The increase has been most marked at the Dodowa health centre, which sees on average 100 cases per day and has patients coming from as far as Madina in the Ga East district regularly for health services. As such, there is severe congestion at this health centre, which has been earmarked to be upgraded to hospital status. Some new infrastructure has been implemented to enable this upgrade, including a new dental clinic funded by the Dutch government.

A new centre (called “My Place”) for delivering a range of integrated reproductive health services has also been constructed by World Vision, an NGO. Services include counseling and testing for HIV/AIDS, anti-retroviral therapy, management of opportunistic infection, family planning services, cervical cancer screening and adolescent reproductive health services.

DANGME WEST POPULATION OVERVIEW

In 2007, the total population of Dangme West district was 130, 864. Table 5 below is a breakdown of population estimates by target group for both Dodowa and Dangme West.

Table 5: Total and Target Population in Dangme West District and the sub-district of Dodowa, January - December 2007

Target Population	Dodowa (sub-district)	Dangme West District
Children 0 - 11 months	1,444	5,235
Children 12 - 23 months	798	2,892
Children 24 - 60 months	2,393	8,676
Children 5 - 14 years	7,969	28,895
Women 15 - 49 years	10,286	37,296
Men 15 - 49 years	9,745	35,333
Men & Women 50 - 60 years	1,653	5,994
Men & Women 60 + years	1,805	6,543
Total Population	36,091	130,864

The table above represents a projected population estimate determined by using the Greater Accra region growth rate of 4.4%. However, according to a demographic surveillance system in the district that involves bi-annual visits to every household, the actual population in 2007 was 106, 429.

The Dangme West district is very poor and representative of disadvantaged rural districts throughout Ghana. Most of the inhabitants are subsistence farmers or fishermen. Some are petty traders and others are trained artisans, craftsmen and a few civil servants, mainly migrant employees from government ministries, departments, and agencies.

Poor health status and poverty are closely interrelated in Dangme West. Unhealthy living environments compounded by limited education, illiteracy, and cultural taboos cause much ill health. Such decreased health status exacerbates household poverty due to the cost of health care and income loss, all of which causes a vicious poverty trap in which poverty causes poor health and poor health keeps people in poverty.

EPIDEMIOLOGICAL AND PROGRAM STATISTICS

The most commonly reported disease at the OPD was malaria, which accounted for 49% of the total number of disease reported. Most of the malaria was clinically diagnosed, though steps are being taken to increase proportion of malaria diagnoses that are lab confirmed. Malaria was number one among both males and females. There were at total of 39,329 malaria cases in Dangme West district in 2007.

Table 6: The Top 10 Diseases/Conditions at OPD-Dangme West 2007

Disease/Condition	Percent
Malaria	49 %
Acute Respiratory Infection	11 %
Skin Diseases	5 %
Hypertension	4 %
Diarrhea	4 %
Anemia	4 %
Rheumatism, Joint Pain	2 %
Home Accidents	2 %
Intestinal Worms	1 %
Acute Eye Infections	1 %
Other diseases	17 %

REPRODUCTIVE AND CHILD HEALTH PERFORMANCE AND STATISTICS

Antenatal care (ANC) services are provided by both public and private health facilities and trained TBAs. The current strategy for ANC is the promotion of patient-centered, individualized, comprehensive services. A total of 15 staff in the district are trained in Focused ANC, though Dodowa Health Centre is the only facility providing such care.

Supervised delivery is also a key priority in Dangme West. The main objective of labor and delivery care is to ensure the proper management of the four stages of labor, early identification and proper management or referral of complications.

Postnatal care, the period from delivery to six weeks after delivery, is crucial to maintaining the health of both mother and child. Community mobilization has served to increase coverage of postnatal care.

While ANC coverage overall has reached the target, the average number of ANC visits is still low. Furthermore, the percentage of mothers delivering at an institution is far below target while TBA-supervision is still somewhat below target. The total number of deliveries carried out at the 5 out of 6 community clinics/CHPs compounds was 113 in 2007. Deliveries by these clinics/CHPS compounds comprised 4.8% of all supervised deliveries in Dangme West while TBA-supervised delivery comprised 56.7% of the total number of supervised deliveries.

Malaria in Pregnancy

During January to December 2007, there were a total of 279 new malaria in pregnancy cases. 84 were diagnosed at the Dodowa Health Centre and 49 at the Grace Maternity Home in Dodowa. The district registered a total of 4,756 pregnant women for antenatal care in 2007. The coverage of Intermittent Preventive Treatment (IPT) with Sphadoxine-Pyrimethamine to prevent malaria transmission during pregnancy was 53.3% for IPT1, 33.9% for IPT2, and 18.1% for IPT3, of all antenatal care registrants. Most pregnant women report malaria during the second or third trimester. No Insecticide Treated Nets (ITNs) were received in 2007, even though coupons for bed nets were distributed to pregnant women and children 0 to 1 years during the Integrated Maternal and Child Health campaign.

Hypertension

For women in Dangme West Hypertension is ranked at number 3 while for men it is ranked number 7. It is not clear whether this is because more women generally have hypertension or because they use the health facilities more than men.

Anemia in Pregnant Women

Out of a total of 3008 registrants who checked their Hb during their first visit to public sector facilities, 41.6% had Hb below 11 g/dl. At 36 weeks of pregnancy, 159 out of 385 women (41.3%) who had Hb status checked had Hb below 11 g/dl, with 80 coming from the Dodowa sub-district.

Table 7: Comparison of Targets and Performance in Maternal Health Indicators in Dangme West district

Indicator	2005		2006		2007	
	Target %	Perf. %	Target %	Perf. %	Target %	Perf. %
Antenatal Care	90	83.3	90	85	90	90.9
Average # of ANC visits	4	2.2	4	2.5	4	2.7
Hb < 11.0g/dl at registration	-	-	30	30.1	25	41.6
Hb < 11.0g/dl at 36 weeks	-	-	20	13	10	41.5
Skilled Delivery in Institution	50	36	50	16.0	50	17.4
Supervised Delivery with TBA	40	35.6	40	48.2	50	44.7
Post Natal Care	40	33.3	40	36	40	56.7
TT2 + Immunization	50	51	55	48.8	40	63.4

Vitamin A Supplementation

Maternal Post partum Vitamin A supplementation and Vitamin A supplementation among children 6 to 59 months is ongoing in health facilities and outreach centres. In 2007, a total of 44.1% of women expected to become pregnant during the year received Vitamin A capsules soon after delivery, either in the maternity wards of health clinics or at satellite clinics/outreach points in the district. While the number dosed has increased between 2005 and 2007, further improvements in Vitamin A coverage could be achieved.

Table 8: Reproductive and Child Health Services in Dodowa sub-district and Dangme West District

Indicator		Dodowa		Dangme West Total	
		No.	%	No.	%
ANC coverage	# Registrants	2037	141.02	4756	90.85
	# Expected pregnancies	1444		5235	
Delivery Coverage	Total # deliveries	446	31	2338	44.7
	# Expected deliveries	1444		5235	
TBA Delivery Coverage	# Deliveries by trained TBAs	68	4.7	1326	25.4
	# Expected deliveries	1444		5235	
Still births	# Stillbirths	1	0.3	3	0.2
	# Total deliveries	446		2240	
Low Birth weight	# Birth weight < 2.5 kgs	22	5.0	35	1.9
	# Newborns weighed	446		1839	
PNC Coverage	# First postnatal visits	466	32.28	2966	56.66
	# Expected deliveries	1444		5235	

The above table highlights successes in coverage of antenatal care and relatively low proportion of stillbirths and low birth weight babies. However, delivery coverage, TBA delivery, and PNC coverage remain relatively low.

INTRODUCTION TO THE MHEALTH ETHNOGRAPHY

The rapidly increasing uptake of mobile phones and other information and communication technologies (ICT) in developing countries presents a strategic opportunity for the public health community to maximize the benefits of improved telecommunications in achieving health-related objectives. In populations where the telecommunications infrastructure was poor or non-existent, mobile phones are enabling improved access to and coordination of emergency and routine health services, enhancing disease surveillance and control, and improving access to medical information and decision support. Mobile phones are also enabling families to increase income, better maintain contact and support each other's needs, and respond to emergencies; creating an environment for advancing quality of life and socio-economic status. Mobile phones also have the capacity to promote the attainment of basic human rights for vulnerable groups, including people living with HIV/AIDS and women. Although, Ministries of Health and policymakers are eager to explore the use of mobile phones and other ICT to promote health, the lack of published data on the health benefits poses significant challenges.

The **Mobile Technologies for Community Health** or MoTECH project, funded by the Bill and Melinda Gates Foundation, will investigate the question, "Can the adaptation of low-cost, mobile phone-based health technology address major gaps in knowledge and information-sharing among health care workers at the community and district levels?" MoTECH, with a special focus on the use of mobile technologies for maternal and newborn health, is a collaboration between the Columbia University Mailman School of Public Health and the Grameen Foundation. The project will also develop, test, and disseminate mobile phone-based applications designed to be used by people living in rural communities to answer questions they have about their most pressing health issues. This aspect of the project will investigate the question, "Can mobile phones be utilized to meaningfully answer questions and provide information to individuals in a way that promotes better health practices?" The project will build upon the momentum that has been created through the promising health care reform efforts to date in Ghana; set the stage for the completion of such efforts; and test whether promising technology can strengthen the community-based health care services that are increasingly being implemented throughout the developing world.



Focus group with women in a farming community

To begin the project, the Grameen Foundation is supporting the implementation of a qualitative study on existing health practices related to maternal and neonatal health and the use of mobile phones to support health-related activities in Dodowa both in the general population as well as in the health sector. Leading this effort is the Dodowa Health Research Center with technical guidance provided by Dr. Patricia Mechael, an mHealth and Qualitative Research Specialist. This study was conducted from April to June 2009 and involved focus group discussions and in-depth interviews with a purposive sample of approximately 75 encounters, including male and female community members, with a special focus on pregnant women and mothers, and health professionals. In addition direct observation of data collection and reporting practices among health professionals was conducted in a sub-sample of health facilities. Informed consent was provided by all participants and interviews were conducted entirely by trained qualitative interviewers. Data from the study has been analyzed in NVIVO8 and upon approval of the report of findings, feedback will be provided to study participants, communities, and the district, regional, and national health authorities.

This qualitative study will help inform the types of mobile phone applications and services that are created to benefit the frontline health workers and the individuals in the communities. The Grameen Foundation will build upon their experience implementing the “Application Laboratory” effort in Uganda, which is successfully developing mobile phone based applications targeted at poor rural individuals. A similar methodology will be followed to discover user needs, rapidly prototype applications, and develop solutions that can be implemented at scale.

The Ethnographic and Needs Assessment Research will form the foundation of the Project Plan in collaboration with individuals from both the District Health system as well as the National Health Ministry. This plan will define possible applications and evaluate them across multiple criteria, including their potential impact on health outcomes, working efficiency of health workers, ease of training/implementation, and ability to scale across the country. After thorough analysis, 3-4 applications will be selected for pilot testing. While these applications are being developed, a detailed training curriculum will be created and executed for users of the system. After initial deployment, the success of the applications will be studied and up to three new versions of each application will be produced to improve functionality and impact. A Monitoring and Evaluation program will measure baseline metrics and identify the key indicators to track over time to assess the program’s success.

AIM AND OBJECTIVES OF STUDY

The overall aim of this activity was to design and ensure the successful implementation of a qualitative research methodology for the use of mobile devices to improve health outcomes with a special focus on maternal and neonatal health services. This has been done in a way to promote the achievement of the broader MoTECH goal and objectives.

This report sets out to present the methods and process undertaken by the Dodowa Research Centre, a review of relevant literature on maternal and newborn health as well as mHealth for maternal and newborn health, and detailed findings in the following areas:

- Overview of CHPS Program & Existing Work, Information, and Communication Flows
- Maternal, Neonatal, and Child Health Services- focus on pre-natal care, labor and delivery, and post-natal care
 - Health Sector Activities
 - General Population Practices
- Mobile Phone Practices
- Recommendations for Potential Products and Services
- Conclusion and Way Forward

The report also provides reflection on the sorts of additional research needed in this area as well as how the study design used in Dodowa can and ought to be applied to other projects aiming to leverage mobile telephony for health.

MOTECH GOALS AND OBJECTIVES

The overall goal of MoTECH is to test whether the adaptation of low-cost, mobile phone-based health technology can address major gaps in knowledge and information-sharing among health care workers at the community and district levels, and by doing so, significantly improve health outcomes in impoverished, rural communities in Ghana. The project will work toward this goal by pursuing five objectives:

- To review existing health information systems and assess community health service information needs;
- To develop a community service delivery system for testing mobile phone-based data capture in a district where a full functioning demographic surveillance system can be used to assess impact;
- To develop the district health management system software that is needed to accommodate mobile phone-transmitted service information and to support the provision of emergency health services;
- To design, test, and support technology for enhancing the use of mobile phone-generated data for health service supervision and management and national health insurance system administration with data visualization and information management tools; and
- To evaluate the impact of mobile phone technology introduction on health service volume and delivery, and disseminate lessons learned about mobile phone applications to key stakeholders, policy makers, and health system managers so that, if effective, this type of

data gathering can be replicated in similar settings.

THE RESEARCH TEAM

The research team consisted of staff, students, and advisors from the Gates Foundation, Grameen Foundation, Columbia University Mailman School of Public Health, Dodowa Health Research Centre, and Dodowa District Health Management Team. Overall technical and management support was provided by Patricia Mechael, contracted by the Grameen Foundation to lead this effort. The following represents engagement of each phase of the study and key team member contributions:

- **Study Design** – Columbia University, Dodowa Research Centre, Grameen Foundation (Leads: Patricia Mechael and Jemima Frimpong)
- **Training materials for development and training** – Dodowa Research Centre and Grameen Foundation (Leads: Patricia Mechael and Lucy Yevo)
- **Qualitative research study management and oversight** – Dodowa Health Research Centre (Leads: Lucy Yevo and Margaret Gyapong)
- **Qualitative research data collection and processing of transcripts**– Dodowa Research Centre (Leads: Lucy Yevo and Margaret Gyapong with support from Elsin Attafuah, Vava Mortey, Barbara Ananze, and Angela Odei)
- **Data analysis** – Dodowa Research Centre and Grameen Foundation (Leads: Patricia Mechael, Lucy Yevo, and Margaret Gyapong)

METHODOLOGY

The research methodologies and protocols used for this study are primarily based on ethnographic and qualitative research principles have been developed through virtual and face-to-face collaboration. A recently updated review of mHealth literature was used to inform the study design, which was developed in a way to contribute to the growing body of knowledge related to the used of mobile technologies for health. The literature has also been used to contextualize findings based on the data collected through this study.

The following methodological approaches were used during the qualitative study to examine the current health systems environment and data capture processes, community-based health-related practices, and informal and formal health-related uses of mobile phones:

- In-depth interviews with people in key positions in the Dodowa District Management Team

- In-depth interviews with targeted sample of health professionals in CHPS Compounds and Sub-district health facilities
- In-depth interviews with targeted sample of health volunteers affiliated with CHPS Compounds and Sub-district health facilities
- Direct observations in two clinics
- Focus groups with men and women in farming and fishing as well as trading communities
- In-depth interviews with pregnant women and mothers of newborns and infants

The Dodowa Health Research Center led in the process of recruiting potential interviewers. Nine interviewers were interviewed and six selected for participation in the three-day training in qualitative research methods. The training included:

- Introduction to Qualitative Research-including triangulation
- Purposive sampling
- Interviewing skills
 - Introducing the study and obtaining informed consent
 - Open questions
 - Probing
 - Tape recording
 - Extemporaneous note taking
- Direct observation
- Developing instruments
 - Pre-testing
 - Translation
- Managing qualitative data
 - Transcription
 - Expansion of field notes

Instruments were drafted and used during the training and selection of interviewers to streamline the question flow and length. They were then pre-tested in English with health professionals and acquaintances in the general population. Advanced drafts were then translated into Dangbe and Ga. The final interview guides for each sample and method have been included in Appendix A. From the training 4 interviewers were selected.

SAMPLING

In order to better understand provision of services related to pregnancy, delivery, and care for newborns and health in general (in addition to communication and data collection and reporting practices) and the role that mobile phones have played or can play- the following purposive sample is suggested.

- Nurses and/or midwives in CHPS zones
- Community Health Volunteers in CHPS zones
- Supervisors and administrators in sub-district health centres and District Health Administration

Health Professionals (n=21)

The final sample of health professionals was comprised of 18 female respondents and 3 male respondents in the age range of 27-55 years of age. The following table provides an illustrative snapshot of positions, genders, and ages (ranks such as senior- have been removed to protect the identities of respondents).

Title / Respondent Type / Occupation (n= 21 respondents)	Sex	Age
N/A - MPH	Female	49
Accountant	Male	42
Community Health Nurse	Female	25
Community Health Nurse	Female	27
Community Health Nurse	Female	32
Community Health Nurse	Female	35
Community Health Nurse	Female	52
Community Health Nurse	Female	52
Community Health Officer	Female	45
Medical Assistant	Male	55
Medical Assistant	Female	48
Midwife	Female	53
Midwife	Female	55
Midwifery Officer	Female	54
Nursing Officer	Female	47
Nursing Officer	Female	44
Technical Officer	Female	40
Technical Officer	Female	N/A
Nurse Supervisor	Female	52
Pharmacist	Female	33
Supply Officer	Male	36

Community Health Volunteers (n=7)

In the final sample of volunteers who were interviewed for the study, five were male and 2 were female. See below for self-described titles and age ranges (26-57 years of age). When discussing issues related to maternal and newborn health, the male volunteers claimed general ignorance and deferred to their female counterparts.

Self-described Title	Sex	Age	Marital Status
Community Health Volunteer	Female	56	Widowed
Community Volunteer	Male	26	Single
TBA, Counselor, CBA, CV	Female	57	Married
Volunteer	Male	56	Married
Volunteer	Male	41	Married
Volunteer	Male	38	Single
Volunteer Worker	Male	49	Married

In order to better understand preventative, home-care, and treatment-seeking behaviors specifically related to pregnancy, delivery, and care for newborns as well as for health in general and the role that mobile phones have played or can play- the following purposive sample was sought in two fishing and two farming communities. A nomadic community was also included for focus groups as a comparison site.

- Male community members for focus groups
- Female community members for focus groups
- Pregnant women
- Mothers of newborns
- Mothers of children under the age of 1
- Mothers of children between 1-5
- Women 18-22
- Women over 45

Focus groups

The focus groups in the isolated and connected fishing and farming communities as well as those conducted among pastoral nomads provided a snapshot of the general trends within each of the main areas of study while serving as an entry point for identifying and conducting in-depth interviews with pregnant women and recent mothers in the farming and fishing communities. In the end, the study engaged 42 women aged 20-70 and 27 men aged 22-79 in the focus group discussions. Finding men to participate in such discussions proved challenging particularly in the fishing community and resulted in an overall lower rate of participation by men. From early focus

groups the men generally deferred on discussions about maternal and newborn health and were more able to address questions related to general treatment seeking and mobile phone behaviors.

Focus Group Type	No.	Age	Highest Education	Marital Status	Main Occupation	No. Children
Fishing Community Focus Group with Women Yard of a community member's house	1	28	Teachers Training College	Single	Business	-
	2	54	MSLC (F1)	Divorced	Stone cracker	6
	3	27	ICCES (vocational school)	Single	Stone cracker	-
	4	58	MSLC (F1)	Divorced	Trade	8
	5	46	MSCLC	Married	Stone cracker	6
	6	64	No Education	Separated	Farmer	10
	7	N/A	No Education	Divorced	Unemployed	5
	8	39	Primary	Married	Farmer/Seller	5
	9	58	No Education	Married	Seller	5
	10	35	Primary	Widowed	Stone cracker	4
	11	30	JSS 3	Married	Seamstress	1

***unable to coordinate focus group with men in same community*

Focus Group Type	No.	Age	Highest Education	Marital Status	Main Occupation	No. Children
Farming Community Focus Group with Men (Isolated)	1	42	Second Cycle	Married	Farming	4
	2	45	Form Four	Married	Farming	6
	3	57	Uneducated	Married	Farming	7
	4	39	Second Cycle	Married	Farming	3
	5	43	Uneducated	Married	Farming	5
	6	31	Macaranta	Married	Farming	4
	7	35	Arab	Married	Farming	3
	8	40	Form Four	Unmarried	Unemployed	2

Focus Group Type	No.	Age	Highest Education	Marital Status	Main Occupation	No. Children
Farming Community Focus Group with Women (Isolated)	1	35	Middle School Level	Married	Farmer	3
	2	33	Not Educated	Married	Trader	4
	3	25	Class Six	Married	Hair Dresser	3
	4	80	Not Educated	Married	Not working	5
	5	20	JSS	Single	Trader	-
	6	45	Middle School	Married	Farmer	5
	7	40	Not Educated	Married	Trader	4
	8	32	JSS	Married	Trader	2
	9	34	No Education	Married	Charcoal seller	2
	10	28	Primary	Married	Farmer	4

Focus Group Type	No.	Age	Highest Education	Marital Status	Main Occupation	No. Children
Farming Community Focus Group with Men Church Premises (Connected)	1	53	Form 4	Married	Mass Education Office	6
	2	49	Ssan 7	Married	Farming	2
	3	35	JSS	Married	Farming	1
	4	53	Ssan 7	Married	Farming	5
	5	29	JSS	Married	Driver	2
	6	32	Class 3	Married	Farmer	2
	7	23	JSS	Married	Driver	1
	8	22	SSS	Single	Unemployed	-
	9	39	Teacher Certificate	Single	Teaching	1
	10	79	SSS 'O' Level		Retired Broadcaster	5

Focus Group Type	No.	Age	Highest Education	Marital Status	Main Occupation	No. Children
Farming Community Focus Group with Women (Connected)	1	59	Primary 5	Widow	Trader	2
	2	23	SSS	Single	Teaching	0
	3	27	JSS	Widow	Seamstress	2
	4	25	SSS	Single	Teaching	2
	5	25	JSS	Single	Hairdresser	1
	6	30	Commercial	Married	Hairdresser	2
	7	49	Middle school	Married	Teaching	5
	8	40	Class 5	Married	Trader	5
	9	51	Middle school	Single	Teaching	2
	10	26	SSS	Single	Nurse	0
	11	52	From 4	Widow	Contractor	4

Focus Group Type	No.	Age	Highest Education	Marital Status	Main Occupation	No. Children
Nomadic Community Focus Group with Men Under a big tree	1	67	No	Married	Farming	11
	2	30	p.6	Single	Farming	0
	3	41	No	Single	Farming	3
	4	26	SSS	Single	Casual worker	0
	5	35	JSS	Single	Arabic teacher	0
	6	70	None	Married	Mixed farming	8
	7	76	None	Married	Mixed farming	9
	8	39	(Arabic)	Married	Mixed farming	4
	9	39	None	Married	Cattle farming	4

Focus Group Type	No.	Age	Highest Education	Marital Status	Main Occupation	No. Children
Nomadic Community Focus Group with Women Under a big tree	1	31	JSS	Married	Not working	4
	2	24	No Education	Single	Not working	0
	3	26	JSS	Married	Not working	2
	4	60	No Education	Married	Not working	8
	5	70	No Education	Married	Not working	6
	6	47	No Education	Married	Provisions seller	6
	7	70	No Education	Married	Provisions seller	7
	8	65	No Education	Married	Not working	6
	9	34	No Education	Married	Not working	5
	10	26	Primary	Married	Business	0



Focus group with men in a farming community

Pregnant Women (n=11)

During the study, in-depth interviews were conducted with 11 pregnant women (age 17-36) ranging from 5 to 9 months pregnant with one not knowing how far along in her pregnancy she was. Most of the respondents were unemployed at the time of the interview with low primary school education.

Title/Role	Sex	Age	Marital Status	Number of Children	Months pregnant
Unemployed	Female	17	Single	N/A	Don't know
Not working	Female	19	Not Indicated	0	7 months
Unemployed	Female	19	Cohabiting	0	6 months
Unemployed now, but formerly Sand collector	Female	23	Cohabiting	0	9 months
Seller	Female	25	Married	1	6 months
Unemployed	Female	27	Married	2	5 months
Seamstress and Farmer	Female	36	Cohabiting	2	5 months
Hairdresser	Female	28	Married	0	8 months
Seamstress	Female	28	Married	1	5 months
Unemployed	Female	17	Married	0	9 months

Unemployed	Female	20	Separated	0	5 months
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Recent Mothers (n=19)

The sample of recent mothers (age 17-38) with 1-6 children, included women with newborns and infants that ranged from 1 week of age to 11 months. The number of married and cohabiting mothers was evenly divided with one recent mother who described herself as single.

Title/Role	Sex	Age	Marital Status	Number of Children	Age of child
Hair Dresser	Female	20	Married	1	3 months
Farmer	Female	27	Cohabiting	3	2 weeks
Fish seller	Female	37	Cohabiting	6	1 week
Seller	Female	30	Cohabiting	3	8 months
Unemployed	Female	30	Married	3	6 months
Trader	Female	27	Cohabiting	3	1 month
Unemployed	Female	24	Married	3	2 mo. 11 days
Storekeeper	Female	28	Married	2	4 months
Trader	Female	38	Married	3	7 months
Food Vendor	Female	N/A	Single	1	10 days
Storekeeper	Female	17	Cohabiting	0	5 months
Seamstress	Female	32	Married	3	1 week
Unemployed	Female	26	Married	2	11 months
Unemployed	Female	23	Married	3 (one died)	1 mo. 2 wks
Trader	Female	27	Cohabiting	3	1 month
Farmer	Female	34	Married	5	6 months
Hawker / Farmer	Female	38	Married	0	5 weeks
Seller	Female	20	Cohabiting	3	3 months
Trader	Female	35	Married	4	2 months

There was also a female student age 28 who was not married and did not have children who was interviewed for this study to share her treatment seeking and mobile phone practices.

DATA COLLECTION AND ANALYSIS

Data collection was carried out in English, Ga, and Dangbe (depending on the preference of the respondents) over a two-month period. Where permission was granted, interviews were tape recorded. Interviewers were paired up to conduct the interviews, whereby one interviewer asked questions and the other took extemporaneous notes. Interviewers were then responsible for the expansion of the transcripts and translation into English. Transcripts were then typed by a professional typist and organized for analysis in Nvivo8. A codebook based on the objectives of the study was drafted and used to inform the coding structure within Nvivo8 (See Appendix B). It

was then refined during the coding process. During the coding process, impressions were documented and illustrative quotes identified. The results of the analysis are presented below.

PRESENTATION OF RESULTS: OVERVIEW OF CHPS PROGRAM & EXISTING WORK, INFORMATION, AND COMMUNICATION FLOWS

The study was conducted in all operational CHPS zones in Dangme West. In each clinic, the Research Team conducted in-depth interviews with the in-charge, who was often a Nurse Midwife, the Community Health Nurse (CHN), and two volunteers associated with the facility. CHPS facilities included in the study were: Osuwem, Nyigbenya, Lekpongunor, New Ningo, and Dawhenya. Many of the clinics were newly refurbished and well-maintained. Several facilities were old clinics that had been renovated or other community properties such as abandoned schools donated for the creation of the CHPS compounds. Most of the clinics had power, however, in one clinic the power had been off for several days and they were awaiting repairs to restore electricity. One facility- with a large meeting room is used to register patients, but doubles as a community meeting room and space for NGOs to come and provide special treatments and clinics.

The interviews were frequently conducted after the clinic staff finished seeing their morning round of clients on days in which community outreach activities were not scheduled. At the time the study was being conducted, many of the clinic-based staff expressed a significant decline in the number of clients coming to the facilities due to the health insurance renewal process. In extreme cases community members pay a subsidized rate to bring in very sick patients for treatment.

In each clinic the Research Team was welcomed by the assistant and asked to await the in-charge. While in the waiting area of one of the clinics, a woman in her final trimester of pregnancy came in with her 4 year old daughter to see the midwife. The CHN complained to her that she hadn't called ahead to make sure the midwife was available. *"Where is your phone? I was expecting your call."* We were able to ask the pregnant woman (who had just returned from living in London for an extended period) some questions about how she has used her mobile phone during her pregnancy- to which she replied mostly to speak with her husband and sister. We then brainstormed a bit and she felt that an information service for pregnant women would be helpful especially if they could call in and talk to someone to ask questions due to literacy issues.

KEY STAFF ROLES AND RESPONSIBILITIES

Each CHPS clinic is staffed by a **Community Health Nurse** and/or **Community Health Officer** as well as a Nurse Midwife- who oftentimes is the facility in-charge. In some facilities support staff have also been assigned to register clients and assist with preventative and clinical service delivery. In general, the staff provide outreach services to the local catchment area on a daily basis and refer clients as needed for treatment as well as preventive services such as antenatal care in the facilities. The roles of the facility-based staff emphasize outreach and early referral, clinical care and preventative activities in facilities, and monitoring and reporting related to out-patient visits, supply chain management, national health insurance, and financial management.

Transportation was highlighted as a main challenge to performing outreach activities. In terms of other barriers to household visits, a 45-year-old Community Health Officer from one of the CHPS compounds remarked,

For challenges, we have a lot of problems. Sometimes our vehicle breaks down which makes it difficult for us to go on outreach. Sometimes the driver will complain about the battery which means we would have to arrange for another transport. With the women when they come for antenatal and CWC², some forget about whatever advice that we give to them and we would have to repeat the same thing to them every day. We expect that they ask certain questions about themselves and their baby but they do not. A woman brought her baby to CWC, and the 8-month-old baby does not eat any food apart from the breast milk because the mother did not introduce even cereals to the breast milk which is very bad.

Clinic attendance was particularly low during the data collection period due to the delays in renewals for the health insurance scheme and reluctance by patients to pay for services in the interim. In the fishing community, clinic attendance is also closely linked to how good or bad the fishing yields are. When fishing is good, people have more money, clinic attendance is higher. When people are sick, but the fishing is bad they stay home.

Community health volunteers (CHV) are assigned to each clinic, but their roles are not clearly understood by either the facility-based/outreach staff or the CHVs themselves. While they are well-positioned to liaise between households and health facilities, the roles and organization of community health volunteers (CHVs) are poorly defined and while the CHPS compounds might have a number assigned to them, very few are active. Their work primarily focuses on finding sick people in the communities and referring them to the facilities. They provide some advice, but mostly related to getting treatment in the clinic. Many of them attended a training workshop and were told they would receive equipment- bags and first aid supplies, but have not received anything to date. CHVs were newly trained and assigned and their role was not clear to the facility-based staff- apart from net distribution and registering deaths and births- which does not seem to be happening systematically across facilities.

The most frequently mentioned role and responsibility for a CHV is referral. One 57-year-old female CHV who is also a Traditional Birth Attendant (TBA), Counselor, and Community Birth Assistant (CBA) at one of the CHPS compounds described her role as follows,

² Child Welfare Clinic

If someone... is pregnant I am able to attend to the person. I do whatever I am expected to do, to the person, if it needs referral to the clinic, I do refer the person to the clinic. If... someone needs to delivery and I am called, I go and I if I can deliver the person I do. If I can't, I send that person to my immediate head to do it, because at times, if you don't know how to deliver, you will cause damage.

Some of the key health issues raised by the CHVs were focused on sanitation and environmental conditions for malaria and diarrhea. In many instances, the CHVs are male and to the perinatal/neonatal health questions - repeatedly said, "you (as in female interviewer) know better than us (males)". As male CHVs- they mentioned that most of their discussions with pregnant women or new mothers focus on male involvement (or lack thereof) and money. They expressed a desire for training on counseling and how to talk to approach and talk to people when they go for home visits. One CHV who had been doing outreach for over 10 years- mentioned that they used to have community registers from Dodowa that were provided by the Assemblyman, but now they do not use them anymore.

Most people say that they do not have any barriers with their supervisors; however, when expressed, it generally deals with being promised resources and not receiving them. Transportation was also highlighted as a major challenge at all levels of service delivery and in the provision of outreach services. In light of both challenges, a 26-year-old male CHV remarked, "*They also promised to give us certain things to help us in our work but the things have not come yet. As I speak with you, I don't even have a mobile phone that I can communicate on to the nurses when the need arises. I also do not have a bicycle to use for my household rounds.*" Similarly, a 55-year-old, male CHV said, "*If we are giving a bicycle or motor for our work, it will help. Because walking from one community to the other is quite a distance.*"

The **District Health Management Team (DHMT)** serves as a liaison between the district health facilities and staff and the regional health administration. The team is responsible for providing oversight to all health activities and to ensuring successful implementation of policies developed at the national level. The DHMT is also accountable for target setting, planning, budgeting, and managing all government supported health activities in the district. It has designated staff who oversee key aspects of service delivery and public health, including financial management, disease surveillance, clinical care, and support supervision. As a DHMT member described,

We go round the sub-district, supervise and monitor them. To see what they are doing, we monitor the activities that they are doing and we supervise the people so that we see what they are doing... When you do supervision, you see it is just general training you have done, you need to supervise them to see whether they are doing the right thing. You know you can teach a class and only 40 to 50 percent will get what you are actually saying. But on the ground they may be doing mistakes and if you are there you will teach them that this is the way it is

supposed to be done. You just correct them. You know practice make man perfect so as you visit them and they are practicing then they become perfect.

EXISTING COMMUNICATION PRACTICES

Supervision for the CHPS-based staff is conducted by the DHMT, who coordinate quarterly monitoring visits to review performance and to observe service delivery. During these visits DHMT members provide guidance on new policies, reinforce skills taught in trainings, and review reports and plans for the following quarter. There is no formal performance monitoring system or reward system in place at the moment, however, this is something that both the clinical staff as well as the DHMT expressed would help to incentivize better quality of care as well as reduce staff turnover. Other incentives expressed by most respondents included improving living conditions and providing transportation support for staff in the CHPS zones.

Most health professionals expressed ease in communicating with their supervisors. Reasons for contacting supervisor include giving reports, scheduling meetings, double checking symptoms, and making appointments. Mobile phones are commonly mentioned in communication practices with supervisors. Most workers state that they do not hesitate to call when needing advice.

When asked about sources of advice for complicated cases or support, most respondents first mentioned seeking help from peers or professional colleagues, like their supervisory medical assistant at the sub-district level, or friends with higher medical qualifications. This consultation is most frequently mediated through mobile phones and paid for out-of-pocket by the staff members themselves.

There was a frequent mention of coordination of community mobilization through mobile van with loudspeaker for immunization campaigns as well as the use of church services for reaching out to pregnant women and mothers. Chiefs and assemblymen were also mentioned as gatekeepers for health activities in the communities.

During the data collection among facility-based health professionals, the prominent role of the sub-districts was highlighted. They serve as an intermediary between the CHPS compounds and the District Health Management Team for referrals for more advanced clinical care, supervision, consultation, supply replenishment, and service delivery and financial reporting.

DATA COLLECTION PROCESSES

In the past few years the Ghana Health Service and Ministry of Health reorganized and streamlined its data collection processes and computerized reporting from the district level to the regional to the national levels through the District Health Information Management System (DHIMS). To support this process, a comprehensive record book for out-patient care and

prevention services was instituted. These books are used by the clinic-based staff during interactions with clients to track client-specific data. The overall perception of the information collected was positive based on reports by 13 respondents. There was no information that any respondents found useless.

The a 53 year old mid-wife at one of the CHPS compounds thinks that the monthly reporting process *“is good because as I said earlier, it helps you to know what you have done within the month to improve upon it and the things that you fall short of, you have to back up with it.”*

While generally positive, there was a unanimous expression that the workflow for data collection and reporting could be improves – particularly the recommendation to break the CHO register into separate books. Currently, records for family planning, antenatal services, delivery, and treatment go in the same book. Some of the observations presented by respondents included:

- If the facility finishes one section it creates confusion for all the others, and it keeps patients waiting while their records are retraced to other books.
- The consultation section is finished much more quickly than the others and should be a separate book and the others might be able to stay together- but overall preference was for separate books.
- The general perception is that while the process is time consuming that all data collected is useful. It was difficult for staff to make recommendations on what information can be streamlined and/or eliminated.

As one midwife remarked a key challenge for using one book with multiple staff members, *“When sister is writing treatment in the book, and my family planning client is there, she has to wait for her to finish before I [can] write.”*

REPORTING PROCESSES

The clinic in-charges begin the reporting process on the 25th of the month and continue until the 5th when the reports are due to the sub-districts and are compiled for submission to the DHMT. For each section in the record book, there is a special report that is compiled and submitted. This window was selected as the optimal time to conduct direct observations in a sub-set of the clinics (See Appendix A for the Direct Observation Guide). Key documents under review and observation included: Registers, Reports, Child welfare cards, Referral book, Insurance register, and Account books- often self created. DHTM staff use reports to compare one quarter to the previous quarter as well as to the same quarter a year ago to assess trends in a particular sub-district and/or clinic.

Key challenges expressed by both facility-based staff as well as the sub-district and district management teams were the timely completion and submission of reports as well as the ability to

validate data submitted to ensure overall quality of information. Recommendations to overcome some of the reporting delays were:

1. Using motorbikes to facilitate the delivery of reports. As described by one sub-district supervisor - with a motorbike, *“someone can bring [the data collected] direct and at anytime.”*
2. Taking pictures using a camera phone of reports came up as a suggestion to eliminate travel time.
3. Calling in reports or sending text-message summary reports to reduce transportation-related delays in reporting.

A 32-year-old female community health nurse expressed her appreciation for the data collection and report consolidation process,

At the end of the year, I will know the number of ANC clients registered and then upon that one I know whether I did well or I did not do well, so when I see that I have done well, I will still stick to the strategy that I applied before I did that work, but if I see I did not do well, then I have to sit down and examine myself and see what I can do to do well. Like I said earlier on that the attendance, is low, I sat down with the people, and I ask, Is it our attitude? But all of them said it is the health insurance that they have not renewed that is preventing them from coming. Secondly, not that they are not sick, they are sick but they don't have the money. At times you have to sit down and analyze yourself and know what to do.

A DHTM member also added, *“If there is information I need about a facility I refer to it and if I find it, it will help me to follow up with the in-charge. Maybe I told him to go to a place or do something so I will check on him to find out if he has done what I told him. So it helps me.”*

MATERNAL AND NEWBORN HEALTH SERVICES

Apart from the overview of maternal and newborn health services provided earlier in this report, the following section describes such services from the perspective of health professionals, community volunteers, as well as members of the general population- particularly pregnant women and recent mothers.

HEALTH SECTOR ACTIVITIES

The health sector has prioritized maternal health services for women of reproductive age between 10 and 45 years of age. In relation to **pre-natal care**, pregnant women are encouraged to attend antenatal clinics regularly, take prophylaxis, and to attend clinics when any complications occur.

Most respondents mentioned the prioritization of Tetanus Toxoid immunization as well as encouraging pregnant women to use treated bed nets.

In July 2007, free maternal health care was introduced in Ghana. As described by one community health nurse,

[Free maternal care] has eased the problems more because pregnant mothers regularly come for health care because they know when they come, they are going to get services free. Unlike formerly when they used to pay, they would not like to go to the healthcare facilities because of financial constraints. They would like to stay in their houses, which creates problems, but with the introduction of the government's free maternal system, it has solved most of the problems."

Such problems relate to existing financial flow from government exemptions. She continues,

"Formerly, the government used to give us money which we called the exemptions- so used to have the money in our account and use it to deal with those things. With the introduction of free maternal health and other things- that money has ceased and they expect us to use the IGF³."

For male volunteers, their pre-natal care focus even during pregnancy is on education related to newborn care rather than ensuring the health of the pregnant woman herself. The highest prevalent prenatal activity for CHVs was providing education to pregnant women. A 55-year-old male CHV describes,

When I visit [pregnant women] I try to educate them on how to care for their baby when it comes to the food that the baby has to eat and keeping the baby clean to prevent malaria and fever. I also educate them on exclusive breastfeeding. I always tell them that the baby has to live solely on breast milk for a certain period and also the breast milk is good for the babies' health. So they should always give breast milk and not food.

During pregnancy, women are also encouraged to deliver in a health facility which may or may not have traditional birth attendants present. There is also monitoring system to check whether those who come for antenatal clinic deliver within the health sector or elsewhere. 13 respondents in the health sector sample, mostly mid-wives, described their approaches to **labor and delivery**-including monitoring vital signs and ensuring a normal delivery. In situations in which there is an abnormality with the labor, the midwives help the family arrange transportation to the sub-district health center. A 54-year-old Midwifery Officer at one of the CHPS clinics said, "When they

³ Income Generating Funds

come in, I continue to check their vitals. I check the BP and see the life of the baby, see the maturity of the pregnancy or the abdomen. Upon what I will see when there is any abdominal thing, I will just refer but when there is nothing and everything is normal, I will just encourage them and reassure them."

Eleven respondents continued on to describe the types of activities performed immediately after delivery. A 53-year-old senior staff midwife at a CHPS compound highlighted these activities,

Immediately after delivery... we take temperature, pulse, respiration, BP. Before you discharge her home, you counsel her on personal hygiene, things to wear, and things she shouldn't wear to avoid infection, after that we give her treatment. You also have to visit her morning and evening. After the delivery you have to visit her once a day and during the delivery, you teach her how to launch the baby and how to expel the baby.

Eight observations at two CHPS facilities (referred to as Clinic 1 and Clinic 2) were performed and interactions between health providers and patients were observed. These cases involved pregnant women seeking antenatal care services or women who had just given birth. First encounters at the health facilities were observed to be with either a community health nurse (4 of 8 observations times) or a health care assistant (4 of 8 observations).

Upon entering the health clinic, some women were asked how old their pregnancies were. If the patient had her first encounter with a community health nurse, the nurse would take the patients weight, complaints, and blood pressure, while recording the information in a pregnancy records book and health insurance form. Standard protocol across several observations which began with a health care assistant were:

Care assistant takes clients antenatal card and fills her details unto a health insurance claim form and expectant mothers slip. She also records the patient weight and temperature on a piece of paper. Care assistant gives the form to client and asks her to wait for her turn into the consulting room.

One observation (004, Clinic 2) described how other clients were seated close to where the patient and community health nurse were communicating, but the proximity to these other clients did not disrupt the care delivery process, *"but rather did not allow patient privacy in seeking health care."*

Consulting and antenatal care rooms were always staffed by a resident midwife. The midwife would ask the patient about any complaints and if the patient were pregnant, the midwife would ask for the client's ANC card. All of this information was then recorded.

The RCH/Family Planning unit in Clinic 1 is staffed by the community health nurse (005, Clinic 1). Some of the forms used during this observation included:

1. **CHO register** (A big register divided into 8 columns, namely consultation, immunization, family planning, antenatal, postnatal, delivery, surveillance and health promotion)
2. **EPI tally sheet** (A form that captures antigen, child name, total number of children, total number of immunization)
3. **Child welfare clinic notebook** (Notebook that captures child's name, date of birth, sex, mother's name, address)
4. **Nutrition unit notebook** (Notebook that captures serial number, date, child's name, date of birth, age, condition, mothers name, occupation and address)

In one instance where the mother had just delivered her baby at home was advised by a worker to not give water to her baby until the baby reaches six months in age (006, Clinic 1).

Some pregnant women were given Sulfadoxine-Pyrimethamine (SP) as a malaria prophylaxis to take immediately with a cup of water and/or were given medications to take home. They were advised to take SP three times before delivery (001, Clinic 2; 005, Clinic 1), and in one case, the medications to be taken home were packed in a small, black rubber bag (003, Clinic 2). With one woman who was approximately 9 months pregnant (004, Clinic 2), the package of medications included folic acid, vitafol, paracetamol, and abendazole. Another woman who arrived at the health facility to seek antenatal care was given quinine tablets, folic acid, and paracetamol (002, Clinic 2).

During the observations, health professionals were often observed recording information in registers and on forms. Sometimes information was recorded during the visit, and sometimes the information was recorded after the patient left. The facility in the OPD unit in Clinic 2 was observed to use the following documentation methods:

1. **Outpatient department register:** Used to record personal information and complaints of client (name, age, sex, card number, address and complaints)
2. **Health insurance claim form:** captures health insurance and patient information (used for clients registered with the district health insurance scheme and pregnant women (name, date of birth, sex, community name, name of scheme, health insurance number, hospital record number)
3. **Patient folder:** A card used to capture patient information, usually given to client without health insurance (name, age, address (home and employer), name of facility, diagnosis, clinical history, treatment and prescription)
4. **Family planning card:** A booklet given to women who want to practice family planning (name, age, sex, address, educational background, occupation, last menstrual period, last pregnancy outcome, menstrual cycle, amount of flow, family planning history, age of youngest child, social, surgical and medical histories)
5. **Antenatal card:** A booklet given to pregnant women (personal, obstetric and lactation histories, delivery outcome, postnatal progress, investigations and physical

examination)

6. Prescription form

Additionally, in the unit at Clinic 2, the following records were used to capture data in the unit: health insurance form, consultation register, revenue cash notebook, health insurance notebook for consultation, pregnancy record book, IMCI for children, and receipt book. During one of the consultations, a health extension worker came in to assist the midwife in giving the patient a tetanol injection as well as some medication. This information was subsequently recorded in the ANC register by the midwife. During this last process, a tetanol injection form, a daily issue book, and a drug tally card was used to capture dispensary data.

Clinic 1 was observed to use the following documentation methods:

1. **Out-patient department card:** A small, blank card on which client information is captured (name, age, date, address, and card number)
2. **Health insurance claim form:** Captures health insurance and patient information and is used for clients registered with the district health insurance scheme and pregnant women (name, date of birth, sex, community name, name of scheme, health insurance number, hospital record number)
3. **Attendance register:** A notebook used to capture the information of pregnant women who attend ANC for the very first time (name, age, name of community, date of first visit, menstrual history, weight, temperature, date of birth, specialty code, type of service, hospital)
4. **Application form:** Contains same as the attendance register (name, age, community name, house number, date of registration, sex, occupation, name of household head)
5. **A piece of paper:** Containing the vital signs of client.
6. **Expectant mother's slip:** A slip given to pregnant women attending antenatal care for the first time (name, age, community name, name of facility, house number, date)

Postnatal care practices focused primarily on newborn and child health and not on the woman's health post-delivery. 15 respondents described how they track and support recent mothers and newborns. For recent mothers, a 51-year-old CHN said,

After discharging from the hospital we do home visiting, we ensure about the health and diet. We advise them on diet, and then how to clothe themselves, and not to use any dirty rag to collect the blood that is coming. They should always also bathe, twice a day and care for themselves... Usually when somebody delivered, the person should eat well unless maybe the home is not good. And then we advise them on family planning, after six weeks, during six weeks time, they can start family planning.

The health sector focuses on children, especially those of 0-11 months, for child health services and immunization. The basics for **newborn care** in Dangme West district include exclusive breastfeeding, full immunizations, and proper treatment management by attending the clinic early. Key aspects of newborn health described by the CHPS staff included first and foremost immunization (15 respondents). This was then followed by early detection and follow up on key problems, including *diarrhea* (9 respondents), *pre-term or low birth weight* (8 respondents), *sepsis* (8 respondents), and *asphyxia* (3 respondents). A 55-year-old, male volunteer at one CHPS compound prefers calling as the best way to spread information about postnatal care practices for mothers: *“Calling will be best because it assumes we have set out tables for weighing and the people haven’t arrived, we can just call one person to tell the community members that it is time for weighing so they should come.”*

A 26-year-old male CHV stated that for ensuring that children are brought in for immunizations at recommended times,

I walk through the town, I roam about in the whole town and give the information, and some of the information I have been given. I also give the information to school children and they go and say it, but most especially, I enter the town because it is not everybody that has a child at the school so I go to the town to give them the information in the town.

GENERAL POPULATION PRACTICES

In general, people closer to the CHPS compounds use the services more and those farther away access other available public and private health facilities. For the nomadic group, which tends to be wealthier- they prefer to access private facilities. Preferences also included going to the same facilities to build relationships with health workers. Access to facilities becomes challenging particularly during rainy season, *“whenever it rains, the river overflows to the road and we have to cross it at the chest level before we can get to Dodowa.”* (30 year old female respondent, married with 4 children)

GENERAL TREATMENT SEEKING PRACTICES

Health-seeking behavior is directly linked to money, perceived quality of service, and education. If financially constrained- people prefer to try to self-medicate through hawkers, pharmacies, and attending prayer camps and if these don’t work then they go to a facility. A male focus group member expressed his perception of quality in describing hospital care – which is often described as the highest level of treatment, *“People choose the hospital because they think the doctors are well trained and can take care of them. There are machines that can be used to diagnose your sickness and drugs that can cure the disease.”*

When asked where they seek treatment respondents mentioned the following in order of frequency: *Health facility (39 respondents), Herbalist (21 respondents), Drug store (19 respondents), and Religious institution or healer (18 respondents)*. For a male focus group participant his preferences were expressed as, *“Well, if am sick, and I buy some paracetamol at 10 pesewa but the sickness does not go, I will prefer to go to the prayer camp because over there, there is no cost or charge.”* When probed about reasons for going to health facilities, respondents mentioned- *Illness (31 respondents), Medication or immunization (22 respondents), Emergencies (10 respondents), Follow-up visit (6 respondents), Testing (5 respondents), and Proximity (5 respondents)*. Specifically respondents mostly commented on barriers to treatment in facilities- including *Health facility costs (27 respondents), No transportation (14 respondents), Inadequate technology (2 respondents), and lack of technical skills (1 respondent)*. As expressed by a male respondent in one of the focus groups in the farming community, *“Sometimes the cost of care is a factor because if you have no money to go to the hospital, you will prefer to buy some medicine from the hawkers which are cheaper.”* 26 respondents also expressed preference for trying home-based care options first before going to a health facility.

Money was frequently mentioned as the criteria in where to seek treatment. 38 respondents mentioned it as the most important factor. One female respondent from the farming community mentioned, *“I can’t go to the hospital if I don’t have money. We are having a problem in this community. There are no jobs. The only job available is farming. The farmers have planted maize but the rains have still not come and the crops are dying. We are facing financial problems.”* One 38-year-old female farmer describes this in terms of whether or not money plays a role in seeking treatment, *“It depends on the amount of money that you have. For me, I don’t often go to the hospital, I normally depend on herbal medicine. I only go to the hospital when the illness is serious.”*

Individuals generally perceived the health insurance to be positive conceptually- but have had problems with the renewal process and negative perceptions of the quality of services accessed using the “green card.” Respondents perceived the National Health Insurance Scheme to be *Important (39 respondents), No opinion (14 respondents), and Not important (8 respondents)*. Perceptions include: health insurance is beneficial to some, but not to others, in some facilities services are completely free of charge and in others- people still have to pay “something small,” limited services are accessible through the insurance scheme and less effective medicines are provided. As 28-year-old female from the fishing village mentioned,

When I did not have [health insurance], when I go to the hospital, I do come home early but now that I have it when I go I don’t come back early, because for those who do not have it, when you go you pay, and they attend to you [first] but for those who have it we are many, so seeing to us results in delays.

Individuals also want health insurance to cover a wider range of illnesses. As expressed by a male focus group member in one of the farming communities,

I have the health insurance card but I don't use it. It's my wife who uses hers. Anyways, does the health insurance cover dentistry? When you go to a certain places, they tell you that it covers a whole lot of sicknesses but if you go to other places, they say it does not; so I want to know exactly what diseases that the health insurance covers.

Also, an emergency fund by government is needed to cover those unable to pay for insurance. Another male focus group member commented on health insurance,

We have the health insurance but one thing is your health insurance doesn't cover your child. So if you give birth you have to do one for the child and it has become a problem. We will be very happy if you will do something about it for us. Even with the free delivery there is a problem. The nurses will tell you that some things are not part of the free delivery and so you have to pay money for that. So please do something about it.

There was a significant pre-occupation with health insurance among focus group participants, particularly among the male groups- who are predominantly responsible for funding health care.

When probed on the use of religious institutions and healers both mosques and churches were described as sources of care. As one of the pastoral nomadic men described, "Yes, some people go to the mosque. For instance, if a woman is in labour but finding it difficult to delivery the baby, she can go to the mallam and the mallam would write something on a card for her to recite and after doing that she will safely delivery the baby." Similarly among Christians, a woman from one of the farming communities mentioned, "If you have been to the hospital and still there is no improvement then you can presume that it is a spiritual sickness so you take it to a prayer camp for healing. One can also decide to try herbal medicine when he or she has been to the hospital and still there is no improvement or that illness is not meant for the hospital between rather for the herbalist or a spiritualist."

In terms of **guidance on health-related issues**, respondents most frequently mentioned family members (25 respondents), healthcare workers (14 respondents, and friends (5 respondents). A 27-year-old female from the nomadic community says she goes to her auntie, "because she is old and she also has children. That's why." Age and gender play a significant role particularly in seeking guidance about pregnancy and child-related issues.

PRE-NATAL CARE

While women tend to know early on in the pregnancy that they are pregnant, the timing of when pregnancies are revealed will have an impact on when women can be enrolled into support programs. As a 53 year old male focus group respondent describes *“with the woman who has some children already, she would make it known to her husband in her 3rd month, but for the woman who is pregnant for the first time, she will make it known to her husband immediately she realizes she is pregnant.”* Younger women are less familiar with this sense. For example, one 17-year-old woman did not know that they were pregnant until midway through the pregnancy: *“My father said I was pregnant and I told him I don’t believe it. So when we went to check at the hospital, I was told its 5 months, 18 days. It was there that I first went to the hospital.”*

Women, however, felt that their pregnancies are obvious from the start- and describe them as being like *‘koku’*- a house built by insects with clay that increases in size daily. Men also expressed the observation that some men will try to get a woman pregnant before going to her family to initiate the marriage process. Due to the perception that marriage processes in Ghana are laborious, this ensures that the woman is capable of bearing children before a marriage commitment is made. Unmarried women also tend to hide pregnancies up to the 6th month- particularly those who are uncertain about who the father is. In relation to mobile phones, in many of the households interviewed as part of the study- the phones are often shared among family members. This would likely decrease the likelihood of women in this category from openly subscribing to a support service before she is willing to publicly reveal her pregnancy. Working women also tend to hide pregnancies for fear of being sacked- however, those with personal mobile phones might be more likely to subscribe to mobile phone-based support service.

Once a woman is aware of her pregnancy, they reported engaging in the following activities: *ante-natal care (36 respondents), better eating habits (24 respondents), and exercise (24 respondents)*. Most of the pregnant women who participated in in-depth interviews expressed that their husbands and partners play a financial role that is supportive. One male focus group member remarked,

A pregnant woman must take her bath early in the morning, find something to eat and do household chores like cooking. She must eat and get satisfied. She has to do household chores and also report to the husband any problem she faces with the pregnancy so that they go to the hospital for drugs. I think it is not good for a pregnant woman to do strenuous work. What she can do to stay healthy is when she wakes up and takes her bath, she can prepare the other children and take [them] to school, wash their dirty clothes and then visit the hospital. I also think that for the woman and the baby to stay healthy, you need to have sex with the woman. The woman must attend clinic. The food she has to take is also important. She also needs to do light jobs – not strenuous ones – and also attend

clinic. For me, it will be best for the doctor to confirm the pregnancy and give you dates to attend clinic.

The role of men during pregnancy is largely monetary- linked to making sure that women have money to access ante-natal care (especially transport costs), buy healthy food, and buy things for the baby. Women associate telling their husbands about their pregnancies with requesting money for ante-natal care and food to ensure a healthy pregnancy.

LABOR AND DELIVERY

At the time of delivery, women expressed preferences for going to a health facility but because of financial problems, they may not go, and some women opt to deliver at home. 16 respondents mentioned delivery by a nurse mid-wife, while 25 mentioned delivery by some other person including TBAs and family members. 32 respondents mentioned delivering their babies in a health facility and 22 mentioned delivering at home with six respondents mentioning delivery in other locations, including a relative's home. Occasionally, women who were interviewed from the general population delivered by themselves or had a family member assist. One woman, who mentioned that she would like her mother to deliver her baby for her even though her mother is not trained to deliver babies, explained that *"she is the only one in the house"*. A 36-year-old female said that she preferred that a woman deliver her baby, but not any particular person. There was a general preference for interfacing with other women for issues related to pregnancy, delivery, and newborn care.

During a focus group held in the fishing community, one woman expressed her thoughts on some issues women face when receiving attention at health facilities,

Our pregnant women sometimes complain that some of the doctors make advances to them anytime they [are] examining them. So we are appealing to them to be very careful...I also want to talk about nurses attitude towards patients. Some of these nurses scream and insult patients... The nurses in the big hospital like Tema General and Korle-Bu behave like that because of stress. They take care of a larger number of patients so at the end of the day they become so stressed out.

POST-NATAL AND NEWBORN CARE

Immediately after delivery, the woman and her newborn remain inside after birth. This process is termed *"outdooring"* in reference to the naming ceremony of a baby. Post-natal practices include: women sitting in a special bath *"yefukpe"*- which means pregnancy, drinking soup to generate

more breast milk, and sending child to be weighed and immunized with a close female relative. On the 6th week, the women wear “white white” and go out of town for the first time. It is common for women to sit in warm water after delivery “to keep strong”, because that was what was taught.

For advice after delivery, recent mothers go to *family members (13 respondents)*, *Mid-wife (8 respondents)*, and *CHV (3 respondents)*. Most newborn care is done within the home and was difficult for respondents to describe what they do for newborns apart from take them to the health facility whenever they detect a problem.

PHONE PREVALENCE AND USAGE

As a country Ghana has an overall mobile phone subscription rate of 32.4 per 100 inhabitants (ITU, 2009). Because of its location in the Greater Accra Region and its proximity to the capital, it is estimated that the mobile phone subscription rates in Dangme West district would be higher than this. With the launching of 3G in the country in early 2009 and the increased competition through the presence of three major mobile phone operators in the country, namely MTN, Zain, and Vodafone- it is expected that the coverage, value-added services, and pricing structures in the country will continue to improve to attract more subscribers and encourage greater network traffic. Unfortunately at the time of this study, patchy network complaints emerged during most of the encounters.

EXISTING MOBILE PHONE PRACTICES WITHIN THE HEALTH SECTOR

There was an overwhelming sense that more strategic use of mobile phones for health would create greater efficiencies within the health sector- particularly in the reduction of unnecessary travel costs and transport time. 17 health sector respondents mentioned having their own personal mobile phones and 5 respondents said that they did not have one, but had access to one. Most of these phones were basic voice and text handsets. Current mobile phone uses included: consultation for advise in dealing with complicated situations, coordination of supervision, follow up on missing information for reporting, mobilization of supplies and financial resources, and engagement with clients. Specific responses of how health professionals use mobile phones to support their work include: *Contacting health facility- their own and the next higher level facility (9 respondents)*, *Contacting patients (17 respondents)*, and *Contacting supervisors (11 respondents)*.

A 55-year-old, male CHV described mobile phone usage as follows,

The mobile phone is helping in the community. If you want to visit someone you can first call to find out if that person is at home, if the person is not there you can relax at home or you need something. This morning I called the operator to see if we can go, I was even supposed to outdoor (naming ceremony) a baby this morning but I called someone to stand in for me. It is really helping us. In the past you will walk to somebody's place and if you go and that person is not there, you would have wasted your time. ... There are a lot of people with mobile phones but at least you will find one person without a phone. So the one with the mobile phone can inform the one without a mobile phone.

20 respondents within the health sector mentioned using text messaging, however, when discussing using mobile phones to reach out to the general public- text messaging was discouraged. The same 55-year-old, male CHV commented,

I don't like texting, but when you send a text I will receive it. Last week one of my children at Akuse sent me a text that he will be coming home. I called him to ask why he sent the text and he said he has run out of credit. ...

There are a lot of illiterates in our community, excuse me to say, so if for instance you are talking to them about sanitation or cleanliness, some wouldn't understand at the initial stages but as you go they tend to understand. We are always hoping that they will understand us at the initial stages but it is not so.

Throughout the facility-based interviews, the staff received several calls from nurse midwife and other colleagues. When asked about the focus of most phone calls- they replied that they mostly focused the use of mobile phones on problem solving and resolution.

Trends for mobile phone use were expressed as follows by health sector respondents: *Health service delivery (9 respondents), (8 respondents), Emergencies (8 respondents), Information access (7 respondents), Maternal health (6 respondents), Newborn health (5 respondents), Financial management (4 respondents), Communicating with the general population (4 respondents), and Health sector management (4 respondents).*

In relation to mobile phone interactions with the general population mobile phones are frequently used by husbands of Northern Wives for translation between health provider and pregnant woman or mother (on behalf of her child). In this situation the nurse midwife is contacted by the husband of a pregnant woman, experiencing some health complication – who then translates for his wife a description of her condition to the clinical staff person and then translates for his wife the analysis and recommendation of the nurse mid-wife.

At management levels- mobile phone uses tend to focus more on providing support to lower levels of service delivery as expressed by a DHMT member,

Normally people call me for counseling, if they need information. I don't believe in giving my private number but for people that I know I can offer counseling and education. There is no need for them to come, they can call, and I can give information. ... In response to text messaging, she explained, "Not for patients – mostly for friends, but short short. I don't use it so often, but it saves to give short short information if I am in a meeting or I can call later. Also if someone texts me and I have to reply, I can send a text.

Prior to the emergent spring of mHealth initiatives in Ghana, the National Health Insurance Scheme- in its effort to digitize the system provided clinics with VSAT connections and computers, but the nurses and other facility-based staff are not using them. Some training has been provided, but the facility-based staff do not feel confident in being able to use them.

A 52-year-old community health nurse at the Osudoku Health Centre describes the computers given to the CHPS zones,

[The CHPS zones] have gone for training as to how to use the computers, but they haven't been established well for them to seriously start working on them because you go to most of the CHPS compounds, they are still there and not effectively being used. Between when that starts it will ease many of our problems because this paperwork that we do... builds their returns and we have to sit through and go through them manually, but if the computer system takes place in earnest it will solve these problems for us because it will save time on the processing. Yes, but for now they are not being effectively used... When they start, it will enhance our work.

EXISTING MOBILE PHONE PRACTICES WITHIN THE GENERAL POPULATION

MTN is the most popular network in Dangme West, and other networks in the communities include Tigo, Vodafone, OneTouch, Zain, and Kasapa. Reception is not available for all networks everywhere, and there are vantage points where calls can be reliably made- depending on one's subscription. *Space-to-space* (mobile phone kiosks) exist in some areas, one with MTN network costs 20P per minute. These kiosks open around 6:00AM and close between 10PM and midnight. Generally, individuals use their personal phones, but if someone does not have one, a phone can easily be borrowed. There are no landlines or working phone booths for public calling.

The majority of those interviewed who have one or more mobile phones within the household use a generator to recharge the battery. Other ways include using a torch battery, visiting phone charging businesses (such as Volo, Aveyime, or on the roadside) or charging it at work or home. Generally people recharge their phones from every day to every fifth day.

For most respondents in the general population, mobile phones were perceived as useful. Health-related uses include: *Contacting health care worker (15 respondents), Contacting a health facility (7 respondents), Emergencies (6 respondents), and the Police (3 respondents).*

Clients would like to have more interaction with providers through mobile phones, but don't have their numbers. It was also expressed by clinic-based staff that they, too, would like greater interaction with their clients through mobile phones- especially as it would make them more effective in their outreach work and reducing delays in referral of cases requiring a physical encounter with a health care provider.

It has been suggested several times that individuals in the community should have access to the phone numbers of health providers so that they can contact them whenever something is wrong. A 17-year-old female said, *"If... you suddenly fall sick while in the farm, you can use your mobile phone to call the people in the house so that they can come and pick you to the hospital."* She continues, *"If you have the contact number of any taxi driver you can call on him to pick you to the hospital whenever you fall sick and cannot walk."*

RECOMMENDATIONS FOR POTENTIAL PRODUCTS AND SERVICES

Using mobile technology to reach pregnant women and mothers is feasible, but will require the use of voice-based systems and outreach through multiple channels to get messages to the women, including through husbands, neighbors, church (or other religious body) and through all available mobile phone operators (MTN, Tigo, Vodafone, etc.). Text messages were viewed as useless by CHPS workers, DHMT members, and respondents in the general population due to literacy and language issues. Some respondents mentioned engaging in phone segments of radio programs- which could also be used to reinforce health messages. Other methods of communication include- "gong gong" for gathering women and the health van. Within the health system, for reporting the recommendations were that data could be phoned in through voice, photographed using a camera phone, and/or aggregated and submitted through SMS with the appropriate training as a first step to alleviate cost of transportation and delays related to transportation.

The following are recommendations for potential products and services that the Grameen Foundation could develop to address maternal and newborn health needs in Dangme West, taking into account the existing communication technologies and practices as well as possible ways to improve access to needed information. In the mHealth field there are several key trends in applications and systems development that are relevant to the findings of this ethnography aimed at improving maternal and newborn health. Several of these sit within the health system, some within the general population, and others provide a critical continuum of care link between the

two. The first two areas, decision support for health workers and data collection systems- focus on improving quality of service delivery at the point-of-care as well as generating cost-savings and more timely information for health administrators, respectively. The third area focuses on the creation of a suite of tools that promote an enabling environment for access to timely prevention information and early detection and referral for pregnant women and their newborns.

DECISION SUPPORT TOOLS FOR HEALTH CARE WORKERS

One key finding from this study is that while the potential for CHVs is great, their work is poorly structured and they are underutilized in the current health system in Dangme West. A trend in other health systems is to task shift to Community Health Workers to provide a critical link between communities and health facilities. While this role in some of the CHPS Compounds was being undertaken by the CHOs and CHNs- the number of households was perceived to be too high to maintain regular contact with clients.

Mobile synchronous (voice) and asynchronous (SMS) telemedicine diagnostic and decision support to remote clinicians as well as extension workers can facilitate timely detection of risks and referrals for pregnant women and newborns. This in combination with clinician-focused, evidence-based formulary, database and decision support information available at the point-of-care- has the potential to improve quality of service delivery and improve health outcomes.

As presented earlier, decision support in clinics as well as in communities has the potential to improve adherence to protocols (such as the Integrated Management of Childhood Illness – through platforms like e-IMCI and CommCare developed by D-Tree International). For engagement with pregnant women, protocols aimed at identification of risk factors and a checklist of health promotion activities timed to the stage of pregnancy – can provide a more structured interaction between health workers and volunteers at the household level. Similar protocols can be used for household engagement related to newborn health. Such systems range from static uploading of protocols onto PDAs and SmartPhones to interactive algorithm based tools that both capture information- while acting as a peripheral brain. While requiring more high level human resource support – structured teleconsultation services that link health professionals to higher levels of guidance through a call center is a rapidly growing trend within mHealth that may also be worth considering.

REPORTING AND DATA COLLECTION SYSTEMS AND TOOLS

One of the main areas of interest within MoTECH is the use of mobile phones for data capture into the DHIMS. Based on the data collected in this study- there are a number of recommendations for Grameen Foundation and Columbia Mailman School of Public Health to consider. The first is to capitalize on the computers and VSAT connections that have been deployed by the National Health Insurance Scheme as part of the ecosystem of technologies to be used to enhance automation and timely reporting and use of information by facilities for decision-making. The second is to focus on the use of forms that capture aggregated data on SmartPhones (possibly Android) with touch screens in clinics and basic handsets in the periphery for reporting of pre-structured health-related data such as births, pregnancy, deaths, and referrals through platforms such as RapidSMS or FrontlineSMS. At the moment there are movements to use OpenMRS to capture clinic-based patient data that is aggregated and submitted to the District Health Information System (DHIS) and JavaRosa, RapidSMS, and FrontlineSMS to submit and retrieve data to and from OpenMRS and DHIS present an opportunity to promote the development and deployment of closed loop scalable and sustainable mHealth solutions. That said, even the ability to call in reports to the DHMT will save time and money related to transporting of paper-based reports as is the current practice.

SUPPORT TOOLS AND SYSTEMS FOR PREGNANT WOMEN AND RECENT MOTHERS

Outreach to the general population with mHealth services builds on the Grameen Foundation's work in Uganda in other mServices areas. In countries with increasing mobile network penetration and subscription rates in the general public, a shift within mHealth to provide services accessed through mobile phones is increasing. Such services include topic-specific health lines-preprogrammed and/or staffed by a team of trained personnel, subscription based information services, polling and gaming programs to assess knowledge and encourage action, mobilization campaigns through text blasts, and text-based query programs similar to that deployed by Grameen in Uganda. The content of such systems can be designed in such a way as to promote and capture many of the key behaviors highlighted in the maternal and newborn health review.

One program currently under consideration is to engage with partners such as BabyCenter to provide an SMS and call-in platform for pregnant women or recent mothers (similar to Beba Dolazi) that provides targeted information through text and pre-recorded voice based on the week of pregnancy or specific query submitted by pregnant women. One area that emerged quite strongly in the research was that the timing in which women reveal their pregnancies may influence when they might avail themselves of such a program.

For such systems one area to encourage investments in monitoring and evaluation (M&E) is the role of mobile technologies in achieving behavior change. Early work by Text2Change in Uganda embedded the M&E component within the system itself – whereby knowledge was assessed and change in the uptake in testing and counseling services was measured with limited external research support. Programs like BabyCenter (if designed in an interactive fashion) also lend themselves well to this sort of approach to M&E. They also lend themselves to broadcasting links

to radio programming as well as reinforcing messages provided through the community loudspeaker and vans (and vice versa).

CONCLUSION AND WAY FORWARD

The use of qualitative methods provided a relatively quick (4 month) in-depth view of practices related to health service delivery and information management, maternal and newborn health, and mobile phones uses. The information collected provides insight that will enable the design of applications for maternal and newborn health as well as inform how such applications can be promoted and positioned within the health sector and the general population. The use of focus groups as an entry point into communities prior to in-depth interviews proved incredibly useful. It is recommended that these, however be conducted and analyzed prior to in-depth interviews to refocus the interviews on key areas in which greater detail is needed to address study aims.

The process of accommodating multiple research interests resulted in the development of cumbersome instruments, longer interview periods (upwards of 2 hours each), and delays in transcription and processing – leaving little time for proper coding, analysis, and writing up of results. It was generally felt that the observational data enhanced the overall quality of the report and provided validation for information obtained through in-depth interviews within the health sector.

In the future it is recommended that similar methods are used in the light manner in which they tend to work best- with fewer questions and greater openness and flexibility in the instruments. It is also recommended that transcripts are coded and analyzed during the data collection process to inform future encounters- as originally planned. Overall, the methods and approaches used in this study proved effective and informative. The data- now available as a coded project in Nvivo8 can continue to be analyzed to provide greater detail to specific areas of interest to the Grameen Foundation as they proceed with applications development and testing in addition to other MoTECH partners and the broader public health and growing mHealth communities through publications and conference presentations.

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APPENDIX A: INSTRUMENTS

HEALTH SECTOR

MoTECH In-depth Interview Guide- Community Health Officer (CHO)

1	<p>To begin this interview, can you describe how many people work at this health facility and what are their roles? How many volunteers work with you in the community? What do they do in the facility and in the community?</p> <p>Please tell me what your job responsibilities are. What are your activities on a normal day? On average, how many patients do you see at the CHPS compounds in a week? What factors influence this number?</p> <p>How often do you provide health services in the community in a given week? How is each activity organized? Usually, how many households are you supposed to visit in a week when you go to the communities? How many communities are you supposed to visit in a week? How often are you supposed to conduct household rounds? Do you actually achieve that? Why? What are some of the barriers you face in your community outreach and household visits work?</p> <p>If any, what types of in-service training do you get? How often? [Probe on training about perinatal / neonatal health] Please comment on how this training has influenced your work (positively and negatively).</p>
2	<p>How do you identify and monitor pregnant women in your catchment area? What types of ANC services do you provide? How do you decide how to provide ANC service? On average, how many encounters are you supposed to have with a pregnant woman for ANC? What are some of the reasons why this might not be achieved? What types of ANC education do you give to pregnant women? What role do volunteers play in this process? What are some of the reasons why a woman might not continue to come for ANC?</p> <p>What labor and delivery services do you provide? What types of safe delivery education do you give? How do you ensure safe delivery for women giving birth at home? How do you ensure safe delivery for women giving birth at the health facility? How do you work with traditional birth attendants? How do you ensure the health of women immediately following birth? What about the baby? How do you work with TBAs when it comes to newborn health?</p> <p>What postnatal services do you provide for mothers? What types of services do you provide for newborns? What types of education do you provide for newborn health [Probe on perinatal and neonatal specific education – i.e. exclusive breastfeeding, warming, etc]? How do you track newborns (<28 days) that you have delivered? What about those that you did</p>

	<p>not deliver in your facility? When do you first visit a baby that you did not deliver? What factors influence which baby to visit? How many babies in the first week after birth are brought to the clinic per month? What health problems are they brought for? (Probe on asphyxia, preterm/LBW, sepsis)</p> <p>What new information would you need to improve how you provide health services to newborns?</p> <p>How do you monitor immunizations to children under 1? How do you make sure that children are brought in for immunization at the recommended times? How do you apply the routine immunization schedule to when vaccinations are given? Under what circumstances do parents not bring their children in for immunization?</p> <p>How do you treat sick children? How do you incorporate the Integrated Management of Childhood Illness (IMCI) as part of your service delivery?</p>
3	<p>Do you have a functional mobile phone? For how long have you had a mobile phone? Why did you buy it? What functions do you use (voice, text, camera, music/radio, calendar, etc.)? What network do you use? What is your experience with network quality/reception in your catchment area?</p> <p>How do you use your mobile phone to support your professional work? Who do you call the most frequently for work-related purposes? Why? What about for general purposes? How often do you use your personal phone to make work-related calls?</p> <p>Please discuss any uses of phones belonging to the clinic as compared to the use of your personal mobile phone for both work-related and personal calls.</p> <p>What were the last 3 work-related calls that you made? What were the last 3 work-related calls that you received? When do you use text messages versus voice calls for work-related communication?</p> <p>How much do you spend per week on work-related calls from your mobile phone? Who pays for this? How would existing practices change if calls were free? In what ways do you think mobile phones could be used to support your work? [Brainstorm possibilities]</p> <p>In your district, what changes have occurred as a result of mobile phone use? How can mobile phones be used to improve health outcomes and quality of care? In what ways do you think mobile phones can be used for information transfer at the district level? Nationally?</p>
4	<p>What is the existing referral system for your facility in general? On average, how many referrals do you complete in a week? What are the types of cases that you refer? How often do you find yourself in emergency situations and how do you manage these general cases? How often are these related to maternal and child health? What are the most common causes?</p>
5	<p>When you encounter a challenging situation, who do you contact? How often do you consult with this person? What do you generally contact them about?</p> <p>Who is your supervisor? When do you contact this person? How often? How often does this</p>

	<p>person contact you? If there are any, what are the barriers to communicating with your supervisor? How might these be overcome?</p>
6	<p><i>I am now going to ask you to tell me more about forms and registers that you use at the CHPS compound and in the community (please make sure to note the presence of registers in which data is kept).</i></p> <p>What formal registers and forms do you use to document your activities? What informal registers and forms do you use to document your activities? Who provides them? What is your process for capturing data about each patient that you see (if necessary, ask where they note the information)? How do you deal with missing patient information, especially in relation to immunizations? How does the data collection process impact your daily routine? What are the benefits of the data that you collect? How would you simplify the existing data collection process?</p> <p>How do you complete and process health insurance forms?</p> <p>When you run out of forms, booklets, and registers, how do you replenish them and how long does it take? What forms do you find most useful? Why? What forms do you find the least useful? Why? How can mobile phones be used to collect the information that you capture in the registers?</p>
7	<p><i>I would like to ask you some questions about reporting and how the data is used once you have captured it in the registers.</i></p> <p>How many reports do you complete at the end of each month? What types of these reports do you complete at the end of each month? How many reports do you complete everyday? How do you use the various booklets in completing the monthly reports? How many hours does it take for you to complete all the monthly reports? What do you think about the current monthly reporting process? How do you get your reports to the district? How do you use the information you collect and report to improve your work and decision-making [Probe on their knowledge on indicators such as immunization rates, neonatal & maternal health, etc.]? What feedback do you receive from your supervisor on the reports that you submit? Based on the reports you submit, what would be the most useful information to receive from your supervisor?</p>
8	<p><i>I would now like to get a better sense of how you manage supplies and equipment.</i></p> <p>What are the current practices for cold-chain supply and management? How is the inventory maintained? How often do you experience vaccine stock outs? How is stock-out managed?</p> <p>How often do you experience drug stock outs? What are the factors that lead to stock outs? How long does it take to get new stocks of vaccines and drugs?</p> <p>How are mobile phones being used for the supply of vaccines? How are mobile phones being</p>

	used for maternal drugs management?
9	<p><i>To summarize this interview, I will now ask some questions that focus specifically on the use of mobile phones for health.</i></p> <p>In what ways do you think mobile phones can be used for health especially as it relates to pregnant women and newborns?</p>
10	<p>What additional information would you like to share? What questions do you have for me?</p> <p>Thank you very much for your time and patience!</p>

MoTECH In-depth Interview Guide-Community Health Volunteer (CHV)

1	<p>To begin this interview, please tell me what your job responsibilities are. What do you do in the facility? What do you do in the community? For how many days per month do you volunteer?</p> <p>What are your activities on a normal day? On average, how many people do you see and/or visit in a week? What factors influence this number?</p> <p>How is each activity organized? Usually, how many households are you supposed to visit in a week when you go to the communities? How many communities are you supposed to visit in a week? How often are you supposed to conduct household rounds? What are some of the barriers you face in your community outreach and household visits work?</p> <p>If any, what types of training do you receive? How often? [Probe on training about perinatal / neonatal health] Please comment on how this training has influenced your work.</p>
2	<p>How do you identify and monitor pregnant women in your catchment area? What types of services do you provide to pregnant women? On average, how many encounters are you supposed to have with a pregnant woman during her pregnancy? What are some of the reasons why this might not be achieved? What types of advice do you give to pregnant women?</p> <p>What labor and delivery support do you provide? What types of safe delivery advice do you give? How do you ensure the health of women immediately following birth? What about the baby? How do you work with CHOs when it comes to pregnancy? How do you work with CHOs when it comes to newborn health? How do you work with TBAs when it comes to pregnancy? How do you work with TBAs when it comes to newborn health?</p> <p>What types of education do you provide for newborn health [Probe on perinatal and neonatal specific education – i.e. exclusive breastfeeding, warming, etc]? How do you track newborns (<28 days)? When do you visit newborns? What factors influence which baby to visit? What problems do you find in the household related to newborn health? How do you address them?</p> <p>What new information would you need to improve how you provide health services to newborns?</p> <p>How do you make sure that children are brought in for immunization at the recommended times? Under what circumstances do parents not bring their children in for immunization? What do you do when you find a sick child at home during your outreach visits?</p>

3	<p>Do you have a functional mobile phone? For how long have you had a mobile phone? Why did you buy it? What functions do you use (voice, text, camera, music/radio, calendar, etc.)? What network do you use? What is your experience with network quality/reception in your catchment area?</p> <p>How do you use your mobile phone to support your volunteer work? Who do you call the most frequently for work-related purposes? Why? What about for general purposes? How often do you use your personal phone to make work-related calls?</p> <p>What were the last 3 calls that you made that were related to your volunteer work? What were the last 3 work-related calls that you received? When do you use text messages versus voice calls for work-related communication?</p> <p>How much do you spend per week on work-related calls from your mobile phone? Who pays for this? How would existing practices change if calls were free? In what ways do you think mobile phones could be used to support your volunteer work? [Brainstorm possibilities]</p> <p>In your district, what changes have occurred as a result of mobile phone use? How can mobile phones be used to improve health outcomes and quality of care? In what ways do you think mobile phones can be used for information transfer at the district level? Nationally?</p>
4	<p>When you encounter a challenging situation, who do you contact? How often do you consult with this person? What do you generally contact them about?</p> <p>Who is your supervisor? When do you contact this person? How often? How often does this person contact you? If there are any, what are the barriers to communicating with your supervisor? How might these be overcome?</p>
5	<p><i>I am now going to ask you to tell me more about forms and registers that you use in the community (please make sure to note the presence of registers in which data is kept).</i></p> <p>What formal registers and forms do you use to document your activities? What informal registers and forms do you use to document your activities? Who provides them? What is your process for capturing data about each patient that you see (if necessary, ask where they note the information)? How do you deal with missing information, especially in relation to immunizations? How does the data collection process impact your daily routine? What are the benefits of the data that you collect? Where does the data go once you have collected it? How often do you submit this information? How would you simplify the existing data collection and reporting process?</p> <p>What feedback do you receive from your supervisor on the reports that you submit? Based on the reports you submit, what would be the most useful information to receive from your supervisor?</p>

	When you run out of forms, booklets, and registers, how do you replenish them and how long does it take? What forms do you find most useful? Why? What forms do you find the least useful? Why? How can mobile phones be used to collect the information that you capture in the registers?
8	<p><i>I would now like to get a better sense of how you manage supplies and equipment.</i></p> <p>What supplies and equipment are you given for your outreach work? How often do you run out of supplies? How long does it take to get new stocks of supplies?</p>
9	<p><i>To summarize this interview, I will now ask some questions that focus specifically on the use of mobile phones for health.</i></p> <p>In what ways do you think mobile phones can be used for health especially as it relates to pregnant women and newborns?</p>
10	<p>What additional information would you like to share? What questions do you have for me?</p> <p>Thank you very much for your time and patience!</p>

MoTECH In-Depth Interview Guide: District Health Management Team

1	<p><i>To begin we would like to get an understanding of the CHPS Program in Dangme West.</i></p> <p>Please provide an overview of CHPS Program in Dangme West. Who are all of the actors in the CHPS Ecosystem? What are their specific roles and responsibilities? What services are provided at the compounds? What services are provided in the communities?</p> <p>When do CHPS nurses initiate home visits? How do they determine when they are made? What about community outreach? How do they get to the communities? What can be done to encourage them to do this more often? (Probe on the use of motorbikes).</p> <p>What is your specific role in relation to the CHPS program? What is the relationship between the district and sub-districts and the respective management teams?</p> <p>What are the general challenges with managing the CHPS Program?</p> <p>What are the other health service delivery outlets? How do these relate to the CHPS program?</p>
2	<p><i>Next we will focus on maternal and child health priorities and practices.</i></p> <p>What are the public health priorities for mothers and newborns in the district? What are the standard protocols for caring for pregnant women? What are they for newborns? What indicators are measured at the district when it comes to the continuum of care specifically related to pregnancy, ANC, delivery, and post-natal care?</p>
3	<p><i>To better understand how mobile technology may be leveraged to support health objectives in Dangme West, we will now ask some questions that first focus on communication and then information patterns followed by a series of questions related to mobile phone practices.</i></p> <p>We will begin by asking questions that focus on consultation and referral practices.</p> <p>What are the current consultation practices- specifically focusing on pregnant women, delivery processes, and newborns? What are some of the issues (medical and non-medical) for which CHPS nurses initiate consultation?</p> <p>What is the existing referral system in Dangme West for pregnant women and newborns? How often are referrals made by CHPS nurses (weekly / monthly)? How many referrals are recorded on a weekly / monthly basis? What are some of the key challenges with the referral system? How are mobile phones being</p>

	<p>used within the referral process? How might mobile technology be leveraged to overcome challenges?</p> <p>What is the process for managing emergencies in general and for pregnant women and children specifically? Please describe the existing practices for managing obstetric emergencies in the district. How about those related to newborns? How are mobile phones being used to address emergencies? How might mobile technology be leveraged to overcome challenges?</p> <p>If there were no cost to calls, what would be different?</p>
4	<p><i>Now, we will focus on supervision.</i></p> <p>What is the existing supervisory and performance monitoring system (informal and formal)? How often do nurses initiate interaction with supervisors? How do nurses reach their supervisors to address their needs/concerns? How often do supervisors initiate interaction with nurses? How do supervisors reach nurses to address needs/ concerns/ performance? Does it change based on the urgency of the need? What are some of the key challenges with supervision? How are mobile phones being used within the supervisory process? How might mobile technology be leveraged to overcome challenges? If there were no cost to calls, what would be different?</p> <p>Specifically, how are CHVs managed? How is their work supervised? How would you characterize the relationship between CHOs and CHVs? What can or needs to be done to improve the CHO/CHV relationship?</p>
5	<p><i>We will now ask some questions about performance monitoring and capacity building.</i></p> <p>How is data used to improve practice? What process do you use for assessing CHPS nurses, CHOs and volunteers? What is the informal and formal reward system for CHPS workers (compensation/benefits)? What are the current practices for training and capacity building of health care personnel (formal and informal)? What targets do nurses have and how are they set?</p> <p>Specifically, what training do CHPS nurses receive in newborn health in general? What training to they receive in how to educate families in home practices related to newborn health?</p>
6	<p><i>We will now ask you questions about information and data flow.</i></p> <p>What is the existing reporting system (informal and formal)? What data is submitted, to whom, and with what frequency? How is data validated? What quality control systems are in place? What types of information do you capture?</p>

How do you go about collecting the data? How do you perceive all the forms that CHPS nurses are currently fill out? What are the most useful forms? What are the more onerous forms? How much of the data collected is used? What can be done to improve the data collection process? What can be done to improve data use?

What information do you have access to? What information do you find the most useful for your work? What additional information would you as the like to have access to? Why? In what ways do you think mobile phones can be used to compliment/ replace forms?

What additional information do you currently collect on pregnant women and newborns? What additional information do you think should be collected on pregnant women? Newborns?

7 *We will now focus the discussion on **mobile phone practices**.*

How are mobile phones being used to support health-related activities in Dangme West? What trends in the health sector have developed as a result of mobile phones? How are these trends influencing health service delivery? What has been the response to these trends? What aspects of health service delivery and public health have been impacted as a result of the use of mobile phones by the general population? What has been the most significant change within the health sector since the introduction of mobile phones?

8 Please discuss in more detail the current use of mobile phones related to:

- Care for pregnant women
- Care for newborns
- Accessing emergency transportation and services
- Health service delivery
- Management within the health sector
- Accessing health information

9	<p>How are mobile phones specifically being used by the DHMT- with respect to CHPS nurses? How comfortable do you feel using your mobile phone? What functions do you feel more comfortable with (e.g., texting, voice, internet)? What are the general areas where mobile phones are being used? What have been some of the barriers to more strategic engagement? How might one overcome some of these barriers?</p> <p>In communicating with CHOs, what phone functions do you think would be most effective (voice, text, etc.)? What about messages to pregnant women and new mothers?</p>
10	<p>Who pays for professional calls? On average how much do you spend per day on professional calls? How would existing practices change if there were no cost implications?</p>
11	<p>In what ways do you think text messaging should be used for information transfer related to maternal and newborn cares? What about voice?</p>
12	<p>In what ways would or could mobile phones be used to improve the quality of care for pregnant women and newborns?</p>
13	<p>In what ways would or could mobile phones improve health outcomes related to pregnant women and newborns?</p>
14	<p>What could be some of the benefits to using mobile technology in the health sector? Please comment on whether basic mobile phone use or use of applications have affected or have the potential to affect:</p> <ul style="list-style-type: none"> • Time or financial management • Confidence in skill set or ability to deliver health services • Patient access to health services • Quality and/or efficiency of health system

MoTECH Observation Guide

Name of CHPS Compound:

Observer Name:

Observation Date:

Observation Start Time:

Observation End Time:

Observer Instructions:

Each facility should be observed for a 3 hour period, optimally during the anticipated period of highest patient attendance in the day. The data will be captured by writing down what the clinic-based staff do related to the care of patients as well as the use of registers and forms to record their interactions. In conducting direct observation of CHOs, data will be captured manually. The primary objectives for the observations are: 1) setting, 2) observation of patient interactions; and 3) observation of nurses recording information - forms used, completion, and review of submitted data. The observer should not interfere with activities being conducted by the clinic staff.

Description of the Setting (this will require some discussion with staff members):

- Describe the community in which the facility is based- farming, fishing, etc. What is the catchment area of the facility and how large is the population served?
- Provide a detailed description of the CHPS Compound, including how many rooms and what is contained in each room.
- Draw a picture of the outside of the facility as well as each room inside the facility along with a description of what each room is used for.
- What registers are located in each room and why are they there? Also, describe what staff members are present.

****Where possible take photos of each room at the clinic and each of the registers that are used.**

Observation Areas:

- For each patient that comes in during the observation period, record the time that the patient enters the clinic and the time at which the formal interaction begins.
- Who interacts with the patient? What is said to the patients and how they respond?
- What actions does the staff member take?
- How does the patient respond to these actions?
- What does the staff member write down and where is this written?
- What information is shared with the patient?
- Record the end time of the patient interaction.
- What does the patient do after they are finished?
- What does the staff member do after she is finished with the patient?
- Summarize: What registers are used during each interaction and how are the registers used during the patient encounter? How are the registers used after the patient leaves?
- Record any other interactions that take place in the clinic during and in between patient interactions.

GENERAL POPULATION

FOCUS GROUP DISCUSSION GUIDE FOR WOMEN AND MEN

We want to have a discussion with you about where people go to for health care in this community

1. Where do people in this community go to seek health care? Probe for
 - a. All places traditional and orthodox
 - b. Special reasons why care is sought from that source
 - c. The most preferred source of care and reasons
2. What are some of the things people in this community will consider before choosing a place for health care? Probe for
 - a. Cost, Quality, access, waiting time, Health Insurance, competence of provider
3. How has the health insurance scheme helped people in this community
4. At what stage during an illness episode would a person decide to seek care? Ask for reasons

Now we want to focus on pregnant women. We want to know about women who get pregnant for the first time and also women who have more than one child

5. At what stage of a pregnancy is it okay to make it known
 - a. Probe for the spouse, close relatives, other people
6. There are special reasons why people do not make their pregnancy known till it is obvious. What are some of the special reasons
7. What do pregnant women do to stay healthy
 - a. Probe for barriers
8. What do women do to keep their children healthy before they are one year old
 - a. Probe for barriers
9. What is the difference in health care need for a first time pregnant woman and those who have had more than one child
10. Where do first time pregnant women go to seek health care? Probe for
 - a. All places traditional and orthodox
 - b. Special reasons why health care is sought from that source.
 - c. Most preferred source of care and reasons.
 - d. Who she will turn to for advise on her pregnancy
11. Ask the same questions above for women who have more than one child.

We are interested in how you get Information on health in this community

1. How do you get information on health
2. What is your preferred source of information
3. What kind of health information do you get from the sources you mentioned
4. What other information will you like to hear on health

Mobile phones have become popular these days so we want to talk about using them for health information.

1. What kind of network do you get in this community
2. How do people make and receive phone calls
 - a. Probe for public phone
 - b. Private individual phone calls
 - c. Private household phone
3. Apart from personal calls what information do people in this community?
 - a. Give out on the phone
 - b. Receive on the phone
4. How do you think we can use cell phones to give health information to
 - a. Pregnant women, Women with young children
5. What kind of health information can we give to these women using cell phones
6. Who is the best person to send the information to these women
7. What is the best way of sending the information through the phone. Probe for
 - a. Voice, sms, pictures, song
8. How can information be given to them if they don't have a personal phone
9. What are some of the possible difficulties of using this approach to send health information to the women were are talking about
10. How can these be overcome?

MoTECH Interview Guide- General Population

- 1 *To begin this interview, I would like to ask some general questions about your experience in seeking health care.*

When was the last time you were ill? What did you do in your home? What did you do outside of the home? What were some of the challenges that you faced in improving your condition?

In the last year, how many times did you go to a health facility and why? Where did you go [Make sure they distinguish between CHPS compound, clinic, district hospital]? What was the outcome? What barriers did you face in seeking treatment?

How were mobile phones used during this process? How do you feel about using mobile phones for health?

[ASK QUESTIONS 2a – 5a to **MOTHERS ONLY**, otherwise skip to 6]

- 2 *I would like to ask you some questions focusing on women's care during pregnancy and childbirth.*

During your last pregnancy, what did you do to stay healthy? What did you do in your home? What did you do outside of the home? What antenatal care services did you access? How often? ***For those who did not seek antenatal care services- probe on why they did not go.***

With whom did you talk to for advice about the pregnancy? Why? What did you talk about? What do you think are the risks of pregnancy?

- 3 What problems did you encounter during the pregnancy? What did you do to address them? ***Probe on the use of CHPS compound, clinic, district hospital.*** What were the results? What role did your husband play in supporting you during your pregnancy?

How were mobile phones used during the pregnancy?

- 4 For the birth of your child, where did the delivery take place? Why? Who delivered the baby? Why this person? What training does this person have? What did the person use to deliver the baby? How were mobile phones used during the delivery process? How might mobile phones be used? For women with other children, where did the delivery of previous children take place?

	Why?
5	<p>In the first week after the birth of your last child, what did you do to support your baby's health at home? What did you do outside of the home? What health services did you access after delivery? Where? How often? Why? What health problems did the child experience after the birth? What did you do to address them? What were the results? With whom did you talk to for advice about the health problems? Why? What did you talk about? Which health staff (CHO, TBA, etc.) came to visit you and your newborn at home? How were mobile phones used for your baby's health in the first week after the birth?</p> <p><i>For those who did not seek newborn care services- probe on why they did not go.</i></p>

[ASK QUESTIONS 6-12 to ALL RESPONDENTS]

6	<p>Next I will ask some general questions about how you and/or your household use your mobile phone.</p> <p>When did your household first buy a mobile phone? How many phones do you have in this household? How many are working? What network do you use? Why were they purchased? Who uses them the most? Who in the household does not use it? Why Not?</p> <p>How much airtime or credit do you carry on your phone at any given time? Why? How much airtime do you purchase per week? How do you recharge the phone battery? How often? Do you charge your phone at a phone charging business? If so, how much does it cost? Whom do you call most frequently? For what purpose? When do you use voice calling and when do you use text messaging?</p> <p>Probe on the nature of use for each user and the use of phone charging businesses.</p>
7	<p>More specifically, ... What were the last 3 calls that you made? What were the last 3 calls you received? With whom did you speak? What did you discuss? How long was each call?</p> <p>What were the last 3 text messages you sent? What were the last 3 texts you received? What were the texts about?</p>
8	<p>What communication centers or 'space to space' are there in your community?</p>

	<p>How far is this service from your home? How much does this service cost per minute? When do you use this service? How have you used this service for health-related communication? What are the hours of operation of this call service?</p>
9	<p>What are the top 5 health topics that most interest you? How do you get information about these health issues?</p> <p>With whom do you first talk to about health-related issues? Why? With whom else do you speak? Why? How have you used your mobile phone to obtain health-related information?</p> <p><i>Probe on use of mobile phones for emergency services and police as well as use of mobile phones to talk to family members, health professionals, etc. to obtain health-related information.</i></p>
10	<p><i>To learn more about how people pay for health services, I will ask you some questions about cost of health services and health insurance.</i></p> <p>What role does money play in when and where you seek treatment? How much did you pay for treatment? How much did you pay for transport? What is your opinion of the health insurance program? In what ways has health insurance changed the way you seek treatment?</p> <p>How might mobile phones be used to reduce the cost of care?</p>
11	<p><i>To summarize this interview on how mobile technology may be used to support health, I will now ask some questions that focus specifically on the use of mobile phones for health.</i></p> <p>In what ways have you used your mobile phone to access health services, transportation, and information? In what ways do you think mobile phones can be used for health? What types of services would you like to see delivered through a mobile phone for health?</p>
12	<p><i>We have now completed the questions. Do you have any questions for me or any other information that you would like to add? If not, thank you very much for your time and patience in participating in this interview.</i></p>

APPENDIX B: MOTTECH CODEBOOK

MoTECH CodeBook: General Population, CHOs, & CHVs		
GENERAL HEALTH		
GH_PLA_	Places for seeking health care	Code all excerpts in which respondent describes ____ as to where people go to seek health care
GH_PLA_HM	Places for seeking health care, herbal medicine	Code all excerpts in which respondent describes herbal medicine as to where people go to seek health care
GH_PLA_HF	Places for seeking health care, health facility	Code all excerpts in which respondent describes a health facility as to where people go to seek health care
GH_PLA_R	Places for seeking health care, religious	Code all excerpts in which respondent describes a place to worship (church or mosque) as to where people go to seek health care
GH_PLA_F	Places for seeking health care: Family	Code all excerpts in which respondent describes a family location as to where people go to seek health care
GH_PLA_D	Places for seeking health care: Drug store	Code all excerpts in which respondent describes a drug store as to where people go to seek health care
GH_HBC_	Home-based care remedy for illness:	Code all excerpts in which respondent describes ____ as home remedy for illness.
GH_HF_X	Number of times visited a health facility	Code all excerpts in which respondent reports the number of times s/he visited a health facility.
GH_V_CHPS	Number of Visits to a CHPS	Code all excerpts in which respondent reports the number of times s/he visited a CHPS.
GH_V_C	Number of Visits to a Clinic	Code all excerpts in which respondent reports the number of times s/he visited a clinic.
GH_V_DH	Number of Visits to a District Hospital	Code all excerpts in which respondent reports the number of times s/he visited a district hospital.

GH_HF_R_I	Reason for visiting health facility: Illness	Code all excerpts in which respondent describes an illness as a reason why visited a health facility.
GH_HF_R_FU	Reason for visiting health facility: Follow up visit	Code all excerpts in which respondent describes a follow up visit as a reason why visited a health facility.
GH_HF_R_MI	Reason for visiting health facility: Medication or immunization	Code all excerpts in which respondent describes medication and immunization as a reason why visited a health facility.
GH_HF_R_T	Reason for visiting a health facility: Lab Testing	Code all excerpts in which respondent describes testing as a reason why visited a health facility
GH_HF_R_E	Reason for visiting a health facility: Emergencies	Code all excerpts in which respondent describes emergencies as a reason why visited a health facility
GH_HF_R_P	Reason for visiting a health facility: Proximity	Code all excerpts in which respondent describes proximity as a reason why visited a health facility
GH_HF_R_	Reason for visiting a health facility:	Code all excerpts in which respondent describes ___ as a reason why visited a particular health facility
GH_O_D	Health Outcome: Diagnosis	Code all excerpts in which respondent describes disease diagnosis as an outcome.
GH_O_	Health Outcome:	Code all excerpts in which respondent describes _____ as an outcome.
GH_BT_X_	Barriers to treatment:	Code all excerpts in which respondent describes ___ as a barrier to treatment.
GH_BT_X_HFC	Barriers to treatment: Health facility costs	Code all excerpts in which respondent describes health facility costs as a barrier to treatment.
GH_BT_X_T	Barriers to treatment: No Transportation	Code all excerpts in which respondent describes lack of transportation as a barrier to treatment.

GH_BT_X_TS	Barriers to treatment: No technical skills	Code all excerpts in which respondent describes lack of technical skills as a barrier to treatment.
GH_BT_X_IT	Barriers to treatment: Inadequate technology	Code all excerpts in which respondent describes lack of adequate technology as a barrier to treatment.
GH_ST_X_I	Money as criteria in seeking treatment: Important	Code all excerpts in which respondent describes money as an important criteria in seeking treatment.
GH_ST_X_NI	Money as criteria in seeking treatment: Not Important	Code all excerpts in which respondent describes money as not an important criteria in seeking treatment.
GH_ST_X_NO	Money as criteria in seeking treatment: No opinion	Code all excerpts in which respondent has no opinion about money as a criteria in seeking treatment.
GH_INO_I	Opinion about insurance: Important	Code all excerpts in which respondent describes health insurance as an important issue.
GH_INO_NI	Opinion about insurance: Not Important	Code all excerpts in which respondent describes health insurance as a not important issue.
GH_INO_NO	Opinion about insurance: No Opinion	Code all excerpts in which respondent does not have an opinion about health insurance.
GH_CHIM_C	Challenges to improving health condition: Costs	Code all excerpts in which respondent describes costs as a challenge to improving health condition.
GH_CHIM_E	Challenges to improving health condition: Lack of education	Code all excerpts in which respondent describes lack of relevant education as a challenge to improving health condition.
GH_CHIM_A	Challenges to improving health condition: Lack of Access	Code all excerpts in which respondent describes a lack of access as a challenge to improving health condition.

GENERAL POPULATION PRACTICES: PRE-NATAL CARE		
GP_ANC_FP_Y	First pregnancy, Yes	Use to code when respondent describes first pregnancy.
GP_ANC_FP_N	First pregnancy, No	Use to code when respondent describes a pregnancy that is not the first pregnancy.
GP_ANC_OH_W	Pre-Natal care activity outside home: Walking	Use to code when respondent describes walking as a pre-natal activity outside the home.
GP_ANC_OH_	Pre-Natal care activity outside home:	Use to code when respondent describes _____ as a pre-natal activity outside the home.
GP_ANC_HBC_S	Pre-natal care activity at home: Stretching	Use to code when respondent describes stretching as a pre-natal activity at home.
GP_ANC_HBC_N	Pre-natal care activity at home: Napping	Use to code when respondent describes napping as a pre-natal activity at home.
GP_ANC_HBC_	Pre-natal care activity at home:	Use to code when respondent describes _____ as a pre-natal activity at home.
GP_ANC_PR_	Pre-natal care problems:	Use to code when respondent describes ___ as a pre-natal problem.
GP_ANC_PR_B	Pre-natal care problems: Bleeding	Use to code when respondent describes bleeding as a pre-natal problem.
GP_ANC_PR_BP	Pre-natal care problems: Body pain	Use to code when respondent describes body aches and pain as a pre-natal problem.
GP_ANC_PR_N	Pre-natal care problems: Nausea	Use to code when respondent describes nausea as a pre-natal problem.
GP_ANC_PR_GB	Pre-natal care problems: Gestational diabetes	Use to code when respondent describes gestational diabetes as a pre-natal problem.
GP_ANC_PR_V	Pre-natal care problems:	Use to code when respondent describes vomiting as a pre-natal problem.

	Vomiting	
GP_ANC_PRA_HF	Activity done when there was a problem during pregnancy: Visit health facility	Use to code when respondent describes visiting a health facility when there was a problem during pregnancy.
GP_ANC_PRA_HBR	Activity done when there was a problem during pregnancy: Home-based remedy	Use to code when respondent describes applying home remedies when there was a problem during pregnancy.
GP_ANC_HR_S	Husband role during pregnancy: Supportive	Use to code when respondent describes a supportive role of husband.
GP_ANC_HR_NS	Husband role during pregnancy: Non-supportive	Use to code when respondent describes a non-supportive role of husband.
GP_ANC_K_	Activity done when female aware of pregnancy	Use to code when respondent describes ___ when she finds out she is pregnant
GP_ANC_K_ANC	Activity done when female aware of pregnancy: ANC	Use to code when respondent describes receiving care when she finds out she is pregnant
GP_ANC_K_N	Activity done when female aware of pregnancy: No change	Use to code when respondent describes no change in behaviors when she finds out she is pregnant
GP_ANC_K_F	Activity done when female aware of pregnancy, Eating behaviors	Use to code when respondent describes eating or nutrition behaviors when she finds out she is pregnant

GP_ANC_K_E	Activity done when female aware of pregnancy, Exercising behaviors	Use to code when respondent describes exercising behaviors when she finds out she is pregnant
GENERAL POPULATION PRACTICES: LABOR AND DELIVERY		
GP_LD_DS_H	Site of infant delivery: Home	Use to code when respondent describes home as the site of infant delivery.
GP_LD_DS_RH	Site of infant delivery: Relative's home	Use to code when respondent describes relative's home as the site of infant delivery.
GP_LD_DS_HF	Site of infant delivery: Health facility	Use to code when respondent describes health facility as the site of infant delivery.
GP_LD_DS_	Site of infant delivery:	Use to code when respondent describes ___ as the site of infant delivery.
GP_LD_PR_	Labor and delivery problems:	Use to code when respondent describes ___ as a labor and delivery problem
GP_LD_HBC_	Labor and Delivery activity at home:	Use to code when respondent describes _____ as a labor and delivery activity at home.
GP_LD_HBC_F	Labor and Delivery activity at home: Eating	Use to code when respondent describes eating or nutrition as a labor and delivery activity at home.
GP_LD_HBC_E	Labor and Delivery activity at home: Exercising	Use to code when respondent describes exercising as a labor and delivery activity at home.
GP_LD_P_MW	Delivery person: Midwife	Use to code when respondent describes midwife as the delivery person.
GP_LD_P_CHW	Delivery person: Community health worker	Use to code when respondent describes community health worker as the delivery person.
GP_LD_P_	Delivery person:	Use to code when respondent describes _____ as the delivery person.

GP_LD_M_N	Method used of delivery person: Natural	Use to code when respondent describes a natural delivery.
GP_LD_M_C	Method used of delivery person: C-Section	Use to code when respondent describes a C-section.
GP_LD_LV_	Level of training of person who delivered infant:	Use to code when respondent describes person delivering as having a ___level of training.
GP_LD_LV_HS	Level of training of person who delivered infant: High School	Use to code when respondent describes person delivering as having a high school education.
GP_LD_LV_V	Level of training of Delivery person: Post HS/Vocational	Use to code when respondent describes person delivering as having a Post HS and/or vocational level of education.
GP_LD_LV_C	Level of training of Delivery person: College	Use to code when respondent describes person delivering as having a college level education.
GP_LD_MP_T	Usage of Mobile Phone during L&D: Arranging transportation	Use to code when respondent describes using the mobile phone to arrange transportation.
GP_LD_MP_HF	Usage of Mobile Phone during L&D: Contacting Health Facility (Non-Emergency)	Use to code when respondent describes using the mobile phone to contact a health facility (non-emergency).
GP_LD_MP_F	Usage of Mobile Phone during L&D: Contacting Family	Use to code when respondent describes using the mobile phone to contact family.

GP_LD_MP_E	Usage of Mobile Phone during L&D: Reporting Emergency	Use to code when respondent describes using the mobile phone to report an emergency.
GENERAL POPULATION PRACTICES: POST-NATAL CARE		
GP_PNC_B	Caretaking activities in 1st week after delivery: Breastfeeding	Use to code when respondent describes breastfeeding as a caretaking activity in the 1st week after delivery.
GP_PNC_	Caretaking activities in 1st week after delivery	Use to code when respondent describes _____ as a caretaking activity in the 1st week after delivery.
GP_PNC_1W	Caretaking activities after 1st week after delivery	Use to code when respondent describes _____ as a caretaking activity after the 1st week after delivery.
GP_PNC_1W_B	Caretaking activities after 1st week after delivery: Breastfeeding	Use to code when respondent describes breastfeeding as a caretaking activity after the 1st week after delivery.
GP_PNC_HS_HF	Post-natal health services: Visiting Health Facility	Use to code when respondent describes visiting a health facility postnatally.
GP_PNC_HS_C	Post-natal health services: Post natal classes	Use to code when respondent describes attending post natal classes.
GP_PNC_HS_CHW	Post-natal health services: Consultation with a Community Health Worker	Use to code when respondent describes consulting a Community Health Worker.
GP_PNC_PR_A	Post-natal health problem: Afterpains	Use to code when respondent describes afterpains as a post-natal problem.

GP_PNC_PR_B	Post-natal health problem: Bleeding	Use to code when respondent describes bleeding as a post-natal problem.
GP_PNC_PR_D	Post-natal health problem: Depression	Use to code when respondent describes depression as a post-natal problem.
GP_PNC_PR_	Post-natal health problem:	Use to code when respondent describes ___ as a post-natal problem.
GP_PNC_PRS_PD	Solution addressing PN health problem: Drugs	Use to code when respondent describes taking drugs, pills or pharmaceuticals for post-natal problems.
GP_PNC_PRS_HF	Solution addressing PN health problem: Visit Health Facility	Use to code when respondent describes visiting a health facility for post-natal problems.
GP_PNC_PRS_HR	Solution addressing PN health problem: Home based remedies	Use to code when respondent describes conducting a home-based remedy for post-natal problems.
GP_PNC_PRS_CHW	Solution addressing PN health problem: Consult with CHW	Use to code when respondent describes consulting with a community health worker for post-natal problems.
GP_PNC_PA_D	Person who delivered advice about health problems after delivery: Doctor	Use to code when respondent describes asking a doctor for PNC advice.
GP_PNC_PA_N	Person who delivered advice about health problems after delivery: Nurse	Use to code when respondent describes asking a nurse for PNC advice.

GP_PNC_PA_MW	Person who delivered advice about health problems after delivery: Midwife	Use to code when respondent describes asking a midwife for PNC advice.
GP_PNC_PA_CHW	Person who delivered advice about health problems after delivery: Community Health Worker	Use to code when respondent describes asking a Community Health Worker for PNC advice.
HEALTH SECTOR ACTIVITIES (FACILITY BASED CARE): PRE-NATAL CARE		
FBC_ANC_E	Facility-base care perinatal activities: Exams and check-ups	Use to code when respondent describes perinatal exams and checkups.
FBC_ANC_ED	Facility-base care perinatal activities: Perinatal education	Use to code when respondent describes perinatal education classes.
HEALTH SECTOR ACTIVITIES (FACILITY BASED CARE): LABOR AND DELIVERY		
FBC_LD_P_D	Person at health facility who delivered the infant: Doctor	Use to code when respondent describes a doctor delivering the infant.
FBC_LD_MW	Person at health facility who delivered the infant: Midwife	Use to code when respondent describes a midwife delivering the infant.
FBC_LD_N	Person at health facility who delivered the infant: Nurse	Use to code when respondent describes a nurse delivering the infant.

FBC_LD_LHW	Person at health facility who delivered the infant: Lay Health Worker	Use to code when respondent describes a lay health worker delivering the infant.
FBC_LD_LT_HS	Level of training of person who delivered infant at health facility: High School	Use to code when respondent describes the level of training as high school.
FBC_LD_LT_V	Level of training of person who delivered infant at health facility: Post HS/Vocational	Use to code when respondent describes the level of training as post high school/vocational.
FBC_LD_LT_C	Level of training of person who delivered infant at health facility: College	Use to code when respondent describes the level of training as college level.
FBC_LD_MP_Y	Mobile phones used during labor and delivery at facility-based care: YES	Use to code when respondent reports that a mobile phone was used during labor and delivery at the health facility.
FBC_LD_MP_N	Mobile phones were not used during labor and delivery at facility-based care: NO	Use to code when respondent reports that a mobile phone was NOT used during labor and delivery at the health facility.
GENERAL POPULATION: EXISTING MOBILE PHONE PRACTICES		
GP_MP_RC	Reason for calling	Use to code when respondent explains a reason for using mobile phone

GP_MP_S	Suggestions for improving existing MP practices	Use to code when respondent makes a suggestion to improve existing MP practices for health
GP_MP_I	Other existing methods of information sharing	Use to code when respondent describes other existing information sharing methods
GP_MP_FPTF_0.5	First purchased mobile phone: W/in 6 months	Use to code when respondent describes the time frame in which s/he first purchased a mobile phone as within the past 6 months.
GP_MP_FPTF_1	First purchased mobile phone: 1 year	Use to code when respondent describes the time frame in which s/he first purchased a mobile phone as within the past 1 year.
GP_MP_FPTF_2	First purchased mobile phone: 2 years	Use to code when respondent describes the time frame in which s/he first purchased a mobile phone as within the past 2 years.
GP_MP_HH	Number of MP in HH	Use to code when respondent reports how many mobile phones are in his/her household.
GP_MP_STS	Space to space	Use to code when respondent describes space to space
GP_MP_T	Texting	Use to code when respondent describes texting
GP_MP_P	Usage of other types of phones	Use to code when respondent describes landline or other household phone
GP_MP_ATP	Amount of airtime purchased weekly	Use to code when respondent reports the amount of airtime s/he purchases weekly.
GP_MP_NW_	Networks used:	Use to code when respondent describes his/her networks used.
GP_MP_NW_S	Strength of Networks	Use to code when respondent describes strength of mobile phone networks
GP_MP_RE_EM	Reason purchased: Emergencies	Use to code when respondent describes the reason in which s/he first purchased a mobile phone for emergencies.
GP_MP_RE_RC	Reason purchased: To be Reachable	Use to code when respondent describes the reason in which s/he first purchased a mobile phone to be reachable.

GP_MP_RE_TR	Reason purchased: Travel	Use to code when respondent describes the reason in which s/he first purchased a mobile phone for travel purposes.
GP_MP_RE_RA	Reason purchased: Relatives Abroad	Use to code when respondent describes the reason in which s/he first purchased a mobile phone to communicate with relatives abroad.
GP_MP_RE_WK	Reason purchased: Work	Use to code when respondent describes the reason in which s/he first purchased a mobile phone for work.
GP_MP_RE_SP	Reason purchased: Social Pressure	Use to code when respondent describes the reason in which s/he first purchased a mobile phone for work.
GP_MP_RE_GF	Reason purchased: Gift	Use to code when respondent describes the reason in which s/he has a mobile phone as a gift.
GP_MP_BCM_	Method of Battery Charging:	Use to code when respondent describes_____as a method of battery recharging.
GP_MP_BCC	Cost of Battery Charging	Use to code when respondent reports the cost of battery recharging.
GP_MP_PMF_FM	Person most frequently called: Family Member	Use to code when respondent describes calling a family member most frequently.
GP_MP_PMF_F	Person most frequently called: Friend	Use to code when respondent describes calling a friend most frequently.
GP_MP_PMF_B	Person most frequently called: Business Partner	Use to code when respondent describes calling a business partner most frequently.
GP_MP_PMF_HCW	Person most frequently called: Health Care Worker	Use to code when respondent describes calling a health care worker most frequently.
GENERAL POPULATION PRACTICES: MOBILE PHONE HEALTH-RELATED USES		
GP_MP_AH_U	Attitude about MP in Health-related matters: Useful	Use to code when respondent describes useful attitude about using mobile phones in health-related matters.

GP_MP_AH_C	Attitude about MP in Health-related matters: Not useful; Complicated	Use to code when respondent describes a not useful attitude about using mobile phones in health-related matters.
GP_MP_HR_	Health-related uses:	Use to code when respondent describes using mobile phone for ____ as a health-related use
GP_MP_HR_EM	Health-related uses: Emergencies	Use to code when respondent describes using mobile phone for emergencies.
GP_MP_HR_P	Health-related uses: Police	Use to code when respondent describes using mobile phone for contacting the police.
GP_MP_HR_HCW	Health-related uses: Contacting Health Care Worker	Use to code when respondent describes using mobile phone for contacting a health care worker.
GP_MP_HR_HF	Health-related uses: Contacting Health Facility	Use to code when respondent describes using mobile phone for contacting a health facility.
GP_HT	Top 5 Most Interesting Health Topics:	Use to code when respondent describes ____ as among the top 5 most interesting health topics to him/her.
GP_HT_P_FM	Person you speak to first about health-related issues: Family	Use to code when respondent describes a family member as the person s/he speaks to first about health-related issues.
GP_HT_P_F	Person you speak to first about health-related issues: Friend	Use to code when respondent describes a friend as the person s/he speaks to first about health-related issues.
GP_HT_P_HCW	Person you speak to first about health-related issues: Health Care Worker	Use to code when respondent describes a health care worker as the person s/he speaks to first about health-related issues.

GP_PNC_MP_HF	Mobile phone use after 1 week of delivery: Contacting Health Facility	Use to code when respondent describes contacting a health facility.
GP_PNC_MP_CHW	Mobile phone use after 1 week of delivery: Contacting CHW	Use to code when respondent describes contacting a community health worker.
GP_PNC_MP_F	Mobile phone use after 1 week of delivery: Contacting Family Member	Use to code when respondent describes contacting family members.
GP_CC_CPM_	Communication center cost per minute	Use to code when respondent reports the cost per minute of using the communication center services.
GP_CC_TU	Communication center time of usage:	Use to code when respondent reports the time of day s/he uses a Communication Center.
GP_CC_R	Reasons why using Communication Center	Use to code when respondent describes ____ as a reason to use the communication center.
GP_MP_TM_H	Last 3 text messages sent: Health-related	Use to code when respondent describes sending mostly health-related text messages.
GP_MP_TM_FM	Last 3 text messages sent: Family	Use to code when respondent describes sending mostly family-related text messages.
GP_MP_TM_F	Last 3 text messages sent: Friend	Use to code when respondent describes sending mostly friend-related text messages.
GP_MP_CM_H	Last 3 Calls Made: Health-related	Use to code when respondent describes making mostly health-related calls.
GP_MP_CM_FM	Last 3 Calls Made: Family	Use to code when respondent describes making mostly family-related calls.
GP_MP_CM_F	Last 3 Calls Made: Friend	Use to code when respondent describes making mostly friend-related calls.

GP_MP_CR_H	Last 3 Calls Received: Health-related	Use to code when respondent describes receiving mostly health-related calls.
GP_MP_CR_FM	Last 3 Calls Received: Family	Use to code when respondent describes receiving mostly family-related calls.
GP_MP_CR_F	Last 3 Calls Received: Friend	Use to code when respondent describes receiving mostly friend-related calls.
COMMUNITY HEALTH OFFICER: ROLE AND RESPONSIBILITY		
CHO_RR_DT	Roles and responsibilities: Diagnosis and Treatment	Use to code when respondent describes diagnosis and treatment as principle role and responsibility.
CHO_RR_S	Roles and responsibilities: Supervision	Use to code when respondent describes supervision as principle role and responsibility.
CHO_RR_R	Roles and responsibilities: Referral	Use to code when respondent describes making referrals as principle role and responsibility.
CHO_RR_C	Roles and responsibilities: Consultation	Use to code when respondent describes providing consultation as principle role and responsibility.
CHO_RR_L	Roles and responsibilities: Labs	Use to code when respondent describes conducting lab tests as principle role and responsibility.
CHO_HHW_	Number of Households visit per week	Use to code when respondent reports the number of households visited each week.
CHO_HH_B_T	Barriers to household visits: No transportation	Use to code when respondent describes transportation as the main barrier to visiting households.
CHO_HH_B_WL	Barriers to household visits: Workload	Use to code when respondent describes workload as as the main barrier to visiting households.
CHO_IM_CR	Method of identifying and monitoring pregnant women: Clinic Record	Use to code when respondent describes using the clinic record as a method to identify and monitor pregnant women.

CHO_ED_B	Type of Pre-natal Education: Breastfeeding	Use to code when respondent describes breastfeeding as a type of pre-natal education provided.
CHO_IST_ANC	Types of in-service training: Pre-natal Care	Use to code when respondent describes pre-natal care as a type of in-service training received.
CHO_IST_LD	Types of in-service training: Labor and Delivery	Use to code when respondent describes labor and delivery care as a type of in-service training received.
CHO_IST_PNC	Types of in-service training: Post-natal Care	Use to code when respondent describes post-natal care as a type of in-service training received.
COMMUNITY HEALTH OFFICER: PRE-NATAL PRACTICES		
CHO_ANC_E	Pre-natal Activity: Providing education	Use to code when respondent describes education as a pre-natal activity provided.
CHO_ANC_	Pre-natal Activity:	Use to code when respondent describes ___ as a pre-natal activity provided.
CHO_ANC_PW	Number of pregnant women consulted per week	Use to code when respondent reports how many pregnant women s/he consults each week.
CHO_ANC_RN_NS	Reasons why not able to consult with pregnant woman: Appt no-show	Use to code when respondent describes appointment no-show as a reason why s/he was not able to consult with pregnant woman.
CHO_ANC_RNC_I	Reasons for not continuing pre-natal care: Lack of Interest of mother	Use to code when respondent describes lack of interest from the pregnant mother as a reason for not continuing pre-natal care.
CHO_ANC_RNC_S	Reasons for not continuing pre-natal care: Scheduling problems	Use to code when respondent describes scheduling problems as a reason for not continuing pre-natal care.

CHO_ANC_RNC_C	Reasons for not continuing pre-natal care: Cost	Use to code when respondent describes cost problems as a reason for not continuing pre-natal care.
CHO_ANC_RV_E	Role of volunteer during pre-natal care activities: Assist with education	Use to code when respondent describes assisting with providing education as the main role of the volunteer.
CHO_ANC_RV_DC	Role of volunteer during pre-natal care activities: Data collection	Use to code when respondent describes data collection as the main role of the volunteer.
CHO_ANC_RV_RW	Role of volunteer during pre-natal care activities: Report writing	Use to code when respondent describes report writing as the main role of the volunteer.
COMMUNITY HEALTH OFFICER: LABOR AND DELIVERY PRACTICES		
CHO_LD_SV	Type of LD services:	Use to code when respondent describes ____ as Labor and Delivery activity performed.
CHO_LD_A	Types of activities performed following delivery	Use to code when respondent describes ____ as activity performed following delivery.
COMMUNITY HEALTH OFFICER: POST NATAL CARE PRACTICES		
CHO_PNC_M	Post-natal care activities for mothers	Use to code when respondent describes ____ as post natal activity performed for mothers.
CHO_PNC_NB	Post-natal care activities for newborns	Use to code when respondent describes ____ as post natal activity performed for newborns.
CHO_PNC_NB	Post-natal care activities for newborns	Use to code when respondent describes ____ as post natal activity performed for newborns.
NB_TM_CR	Post natal care newborn tracking method: Clinic Record	Use to code when respondent describes the clinic record as a tracking method for newborns.
NB_TM_	Post natal care newborn tracking method:	Use to code when respondent describes the ____ as a tracking method for newborns.

NB_E_B	Type of newborn education: Breastfeeding	Use to code when respondent describes breastfeeding as a type of newborn education.
NB_E_	Type of newborn education:	Use to code when respondent describes _____ as a type of newborn education.
NB_CL	Number of newborns in clinic per month after 1st week	Use to code when respondent reports the number of newborns brought into clinic the first week after birth per month.
NB_HP_A	Newborn health problems: Asphyxia	Use to code when respondent describes asphyxia as a newborn health problem.
NB_HP_P	Newborn health problems: Pre-term/LBW	Use to code when respondent describes pre-term/LBW as a newborn health problem.
NB_HP_S	Newborn health problems: Sepsis	Use to code when respondent describes sepsis as a newborn health problem.
NB_I_ANC	Information needed to improve health care delivery for newborns: Pre-natal education for CHO	Use to code when respondent describes pre-natal education for CHOs as information needed to improve health care delivery for newborns.
NB_I_PNC	Information needed to improve health care delivery for newborns: Post-natal education for CHO	Use to code when respondent describes post-natal education for CHOs as information needed to improve health care delivery for newborns.
NB_MI_CR	Methods of monitoring immunizations: Children < 1: Clinic record	Use to code when respondent describes the clinic record as a method of how to monitor immunization to children <1.
NB_MI_R_	Method of ensuring Immunization appt f/u: Calling Mothers	Use to code when respondent describes calling mothers as a way to ensure that children are brought in for immunization at recommended times.

COMMUNITY HEALTH OFFICER: MOBILE PHONE PREVALENCE AND USAGE		
CHO_MP_Y	CHOs with mobile phone	Use to code when respondent reports that s/he has a mobile phone.
CHO_MP_N	CHOs w/o mobile phone	Use to code when respondent reports that s/he does not have a mobile phone.
CHO_MP_U_P	Uses of mobile phone for CHO work: Contacting patients	Use to code when respondent describes contacting patients as a work-related mobile phone use.
CHO_MP_U_S	Uses of mobile phone for CHO work: Contacting supervisor	Use to code when respondent describes contacting supervisor as a work-related mobile phone use.
CHO_MP_U_HF	Uses of mobile phone for CHO work: Contacting Health Facility	Use to code when respondent describes contacting health facility as a work-related mobile phone use.
CHO_MP_U_EM	Uses of mobile phone for CHO work: Emergencies	Use to code when respondent describes reporting emergencies as a work-related mobile phone use.
CHO_MP_F_VF	User frequency: Mobile Phones: Very Frequent	Use to code when respondent describes very frequent use of a mobile phone for work reasons.
CHO_MP_F_NF	User frequency: Mobile Phones: Not Frequent	Use to code when respondent describes a not frequent use of a mobile phone for work reasons.
CHO_MP_F_AF	User frequency: Mobile Phones: Average Frequency	Use to code when respondent describes an average frequent use of a mobile phone for work reasons.
CHO_MP_L3M_S	Last 3 work-related calls made: Supervisor	Use to code when respondent describes calling mostly his/her supervisor.
CHO_MP_L3M_HF	Last 3 work-related calls made: Health facility	Use to code when respondent describes calling mostly the health facility.
CHO_MP_L3M_P	Last 3 work-related calls made: Patient	Use to code when respondent describes calling mostly the patient.

CHO_MP_L3R_S	Last 3 work-related calls received: Supervisor	Use to code when respondent describes receiving mostly calls from his/her supervisor.
CHO_MP_L3R_HF	Last 3 work-related calls received: Health facility	Use to code when respondent describes receiving mostly calls from the health facility.
CHO_MP_L3R_P	Last 3 work-related calls received: Patient	Use to code when respondent describes receiving mostly calls from the patient.
CHO_MP_C	CHO cost per week on work-related calls from mobile phone	Use to code when respondent reports the weekly cost of maintaining a mobile phone for work-related purposes.
CHO_MP_S_FW	Advantages of MP to support work: Facilitates Work	Use to code when respondent describes using a mobile phone as a way to help facilitate work.
CHO_MP_S_ST	Advantages of MP to support work: Saves time	Use to code when respondent describes using a mobile phone as a way to save time.
CHO_MP_S_I	Advantages of MP to support work: Relays information quickly	Use to code when respondent describes using a mobile phone as a way to relay information quickly.
CHO: EXISTING COMMUNICATION PRACTICES: SUPERVISION AND CONSULTATION		
CHO_S_	Supervisor	Use to code when respondent reports the name of his/her supervisor.
CHO_S_R_NS	Reason to Contact Supervisor: Need support	Use to code when respondent describes needing support as a reason to contact supervisor.
CHO_S_R_EM	Reason to Contact Supervisor: Report Emergency	Use to code when respondent describes reporting an emergency as a reason to contact supervisor.

CHO_S_VF	Frequency of contacting supervisor: Very Frequent	Use to code when a respondent describes a high frequency of contacting supervisor.
CHO_S_NF	Frequency of contacting supervisor: Not Frequent	Use to code when a respondent describes a low frequency of contacting supervisor.
CHO_S_AF	Frequency of contacting supervisor: Average Frequency	Use to code when a respondent describes an average frequency of contacting supervisor.
CHO_S_BC_NN	Barriers to contacting supervisor: No available network	Use to code when a respondent describes no available network.
COMMUNITY HEALTH OFFICER: DATA COLLECTION PROCESSES		
CHO_FR_	Forms and registers used:	Use to code when a respondent describes _____ as the forms and registers used for work.
CHO_FR_PR_	Forms and Register Provider:	Use to code when a respondent describes _____ as the provider of the forms and registers used for work.
CHO_FR_DCP_CI	Data Collection Process: Clinical Interview	Use to code when a respondent uses a clinical interview as a method to collect data about the patient.
CHO_FR_DCP_	Data Collection Process:	Use to code when a respondent uses a _____ as a method to collect data about the patient.
CHO_FR_MI_	Missing Information Action Taken:	Use to code when a respondent describes _____ a way to deal with missing information.
CHO_FR_IM_TC	Impact of Data Collection on Daily Routine: Time-Consuming	Use to code when a respondent describes a time-consuming impact from data collection on daily routine.
CHO_FR_IM_NTC	Impact of Data Collection on Daily Routine: Not Time-Consuming	Use to code when a respondent describes a not very time-consuming impact from data collection on daily routine.

CHO_FR_B_TM	Benefits of data collection: Improved tracking and monitoring	Use to code when a respondent describes tracking and monitoring as a benefit of data collection.
CHO_FR_B_K	Benefits of data collection: Knowledge of health problems in area	Use to code when a respondent describes gaining knowledge of the health problems in the area as a benefit of data collection.
CHO_FR_SDC_E	Recommendation to Simplify Data Collection: Collect electronically	Use to code when a respondent describes gathering data electronically as a way to simplify data collection.
CHO_FR_SDC_	Recommendation to Simplify Data Collection:	Use to code when a respondent describes _____ as a way to simplify data collection.
CHO_FR_HI_	Completion Process of Health Insurance forms:	Use to code when a respondent describes _____ as a way to complete health insurance forms.
CHO_FR_R_	Method of Replenishing Forms:	Use to code when a respondent describes _____ as a way to replenish forms.
CHO_FR_MU	Most Useful Forms:	Use to code when a respondent describes _____ as the most useful forms.
CHO_FR_LU	Least Useful Forms:	Use to code when a respondent describes _____ as the least useful forms.
COMMUNITY HEALTH OFFICER: REPORTING PROCESSES		
CHO_R_1M	Number of reports completed at end of each month	Use to code when a respondent reports the number of reports completed each month.
CHO_R_1D	Number of reports completed at end of each day	Use to code when a respondent reports the number of reports completed each day.
CHO_R_HM	Number of hours required to complete report	Use to code when a respondent reports the number of hours required to complete a report.

CHO_R_O	Opinion about monthly reporting process:	Use to code when a respondent describes a _____ opinion about the monthly reporting process.
CHO_R_D_IP	District Report Transfer Method: In person	Use to code when a respondent describes him/herself transferring the report to the district in person.
CHO_R_D	District Report Transfer Method:	Use to code when a respondent describes him/herself transferring the report to the district by _____.
CHO_R_T	Types of Monthly Reports Completed:	Use to code when a respondent describes ____ as the type of reports completed each month.
CHO_R_T	Types of Monthly Reports Completed:	Use to code when a respondent describes ____ as the type of reports completed each month.
CHO_R_IM	Recommendation : Improve Work and Decision-Making:	Use to code when a respondent describes ____ as a way information can help improve their work and decision making skills.
CHO_R_FS_P	Supervisor Feedback of Report: Positive	Use to code when a respondent describes positive report feedback from his/her supervisor.
CHO_R_FS_N	Supervisor Feedback of Report: Negative	Use to code when a respondent describes negative report feedback from his/her supervisor.
CHO_R_FS_NF	Supervisor Feedback of Report: No Feedback	Use to code when a respondent describes no report feedback from his/her supervisor.
CHO_R_FSU_	Most useful feedback received from supervisor	Use to code when a respondent describes _____ as the most useful feedback from his/her supervisor.