FINAL REPORT

PERFORMANCE MONITORING AND ACCOUNTABILITY 2020 - MATERNAL AND NEWBORN HEALTH IN SOUTHERN NATIONS, NATIONALITIES AND PEOPLES' REGION (SNNPR) - ETHIOPIA

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Performance Monitoring and Accountability 2020

PMA2020 MNH Final Report

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Executive Summary

Ethiopia has achieved remarkable success in reducing neonatal and maternal mortality in recent decades, but still has a very high neonatal mortality rate (29 deaths per 1,000 live births) and maternal mortality ratio (412 deaths per 100,000 live births). The country is among the 10 countries that account for 59% of global maternal deaths. About 87,000 babies die each year during the neonatal period and 11,000 women die from pregnancy and delivery complications each year in Ethiopia. Many of these deaths are preventable through proven, cost-effective interventions. The standard national surveys, including the Demographic and Health Surveys (DHS) and UNICEF's Multiple Indicators Cluster Surveys (MICS), do not collect data on many high impact intervention indicators; and, monitoring the utilization and coverage of these interventions is problematic. There are additional concerns that the reporting of events around delivery and immediate postpartum care is subjected to high recall bias and the cross-sectional DHS and MICS surveys that collect data based on the recall of events up to five years prior to survey date may have low reliability.

Utilizing a longitudinal study design, the Perfomance Monitoring Accountability 2020 Maternal and Newborn Health (PMA-MNH) study was conducted in Southern Nations Nationalities and Peoples Region (SNNPR) of Ethiopia with the following objectives:

1. Monitor the use of proven, effective and cost-effective interventions and the practice of healthy behaviors aimed at reducing maternal and neonatal mortality in Ethiopia, using the Bill and Melinda Gates Foundation's and the Ethiopian Federal Ministry of Health's (FMoH) priority MNH indicators;
2. Assess the validity of maternal recall of pregnancy, delivery, and neonatal care information over a six-month period;
3. Evaluate the quality of maternal, newborn child health (MNCH) data and validate the information in the Family Folders, which are used by the FMoH as a routine data collection tool for documenting family-centered Health Extension Program (HEP) service activities; and,
4. Evaluate the feasibility of conducting follow-up interviews on maternal, newborn health care over mobile phones instead of face-to-face.

The study utilized the existing data collection platform of PMA2020, which has been operating in Ethiopia since 2014 and has conducted four rounds of surveys tracking Family Planning (FP) progress. PMA2020 employs local women, referred to as resident enumerators (RE), to collect data using smartphones. PMA-MNH was conducted in SNNPR, where the project had a high percentage of enumerators living close to selected enumeration areas (EAs), thus minimizing cost. The study was implemented in 44 EAs, which were originally selected in the PMA2020 survey through a two-stage stratified cluster sampling procedures with probability proportion to size selection method. All households in the sample EAs were interviewed to list all residents and identify women in

reproductive age (15-49 years). All consented women were individually interviewed by REs to ascertain their pregnancy status, and women who were six or more months pregnant were identified as eligible for enrollment in the study. The study interviewed 10,399 households; 10,140 (98.7%) completed the survey. Within these households, 9,713 (98.4%) women completed the female survey interviews.

In total, 329 women who were six or more months pregnant were identified as eligible for the study and all of them (100%) consented to enroll in the longitudinal study. After the initial screening interview at enrollment, each woman received three follow-up interviews at seven days, six weeks, and six months postpartum.

Maternal Health

Receipt of any antenatal care (ANC) is generally high, but only half of all women received four or more antenatal care visits, the minimum number originally recommended by the World Health Organization (WHO) and the guidance currently followed by the FMoH of Ethiopia. Among those women who did receive ANC care, approximately half saw an ANC provider for the first time six months or more into their pregnancy. Amongst women who received any ANC, 71.1% reported receiving ANC from a health extension worker (HEW) at least once during their pregnancy, with 30.2% receiving ANC exclusively from an HEW and 40.9% receiving care from an HEW and at least one other skilled health provider. Coverage of specific components of ANC varies substantially. Fewer than 1 in 10 women were tested, counseled, and received syphilis test results. Provision to screen preeclampsia through urine testing was sub-optimal. Additional outreach to increase frequency of ANC and decrease the time to first antenatal care is necessary, including to ensure that pregnant women receive all screening services.

About 53% women delivered at a health facility and were attended by a skilled provider. High parity and older women were less likely to deliver at health facility. Additional outreach may be necessary for higher parity and older women to encourage continued use of maternal and neonatal care services after the first birth.

Approximately 39.5% of women reported that they received an injection immediately after birth to prevent excessive bleeding, presumably an oxytocin injection. Thirty-eight percent of women reported a delivery complication and 76.8% of them sought treatment for a complication. Prevalence of any reported complication was similar across urban and rural geographies. The most common delivery complications reported among all women were severe bleeding during delivery (22.0%), prolonged labor (16.7%), and leaking/rupture of membrane with no delivery for over twenty-four hours (6.4%).

Approximately one quarter of women said that they intended to deliver in a facility during the screening interview but reported that they delivered at home during the first follow-up interview. More information, ideally through qualitative follow-up, is needed to understand the familial, social,

structural and health system barriers in delivering at health facilities among those that express an intention to do so.

Coverage of postnatal care visits that discuss the health of the mother remains low, with fewer than one in ten women receiving a postnatal care visit from a health worker within the first week postpartum. Of those that received a visit, 30% were in the first two days postpartum, equivalent to approximately 3% of all women. By six weeks postpartum, 15% of women had received any check on their health since delivery and by six months, this number increased to 30%. This shows the region is not on track to achieve the national coverage of 95% for postnatal care by 2020.

Neonatal Health

We examined immediate thermal care and resuscitation. Forty percent of all babies were placed naked on the mother's chest immediately after delivery. Kangaroo mother care was highest for urban and first-born children, compared to rural and multiparous mothers. While most infants received their first bath more than twenty-four hours after birth (61.9%), 23.6% reported first bath within 24 hours, and 13.3% reported first bath immediately after birth. Delayed first bath was more common among rural mothers than urban mothers (62.0% vs. 46.7% reporting first bath after twenty-four hours).

Among the 20 births (6%) who did not appear to breathe normally, some form of resuscitation was performed in three-fourths (76.6%) of the cases. Neonatal resuscitation was highest among first births (95.7%), compared to women of parities 2-3 (48.8%) and 4+ (77.7%).

About one-third of all live births were reported to be weighed at birth. Almost all neonates that were weighed were born in a health facility (97%). Being weighed at the health facility is not universal, however; among all neonates born in a health facility, approximately 25% of mothers reported that the infant was not weighed and another 20% reported that they did not know if the infant was weighed (not shown).

Approximately 62% of babies were put to the breast within one hour after birth, with a slightly higher percentage of urban women reporting immediate breastfeeding compared to rural women.
By one-week postpartum, 15% of newborns were no longer exclusively breastfed and this number dropped by an additional 10% by the 6-week follow-up visit. By the end of the six-month period, 16% of newborns were exclusively breastfed.

About 23% babies were reported to have developed an illness by the 7-day interview. The common symptoms were cold/cough (11.4%), vomiting (4.2%), skin rash/lesion (3.9%) and difficulty in breathing (2.0%). By the 6-week interview, 46.5% of infants were reported to have developed an illness, and about half (52%) of mothers reported that care was sought (15% at home, 19% at public hospital/health center, 6.6% from private clinics, and 7.6% from a traditional healer); 22.4% received referral for treatment.

The low provision of postnatal care is reflected in the low vaccination rates for BCG and oral polio that were reported at the 7-day visit. About one in ten neonates received an oral polio vaccination within the first week of life and fewer received BCG vaccination. By the 6-month interview, fewer than half of mothers (41%) showed their vaccination card during the interview. Of those that did, vaccination coverage for BCG, oral polio, pentavalent, PCV, and rotavirus was over 85%. Among women who self-reported vaccination coverage, coverage was much lower, with approximately half of newborns having received the oral polio, pentavalent, PCV, or rotavirus vaccination. In total, only about 70% of newborns were reported to have received each vaccine.

Postpartum Family Planning

Approximately forty percent of women had received counseling for postpartum family planning by the 6-month interview, though at time of interview, only one-quarter reported that their menses had returned. About 44% of women were using family planning by the 6-month interview and approximately one-quarter of all women started using family planning within three months of birth. About 88% of women had resumed sexual activity by six months postpartum, with most women (52.2%) resuming sexual activity between two to three months after the birth of the baby.

Among postpartum family planning users, the injectable was the most commonly used method (66.0%), followed by the implant (22.4%) and the pill (5.4%). Over three-quarters of postpartum family planning users obtained their method from a government provider–either a health center, health post, hospital, or HEW.

Recall Bias in MNH Reporting

The longitudinal nature of the study allowed us to examine the reliability of reporting at different interview rounds. Our study shows that women's reporting of MNH indicators relating to complications and care have moderate to high recall bias. The reporting at the 6-week postpartum period regarding the complications during pregnancy had overall low sensitivity, ranging from a low of 26.7 for vaginal bleeding to a high of 69.8 for edema, but high specificity from 94.6 for migraine to 100.0 for high blood pressure. The receiving operative curve (ROC) and kappa values suggest that the overall level of reliability in reporting pregnancy complications was fair to moderate. The reporting at 6-month had even lower sensitivity for some indicators. An MNH survey attempting to measure complications based on long recall history is likely to be unreliable with high recall bias.

Family Folder

Results not available in online version

Phone Survey Follow-up

To test the feasibility of conducting the survey remotely via phone, all women who were enrolled in the study were screened for mobile phone access. Women who said that they had regular access to a mobile phone were randomized into two arms; in one arm, the survey was conducted face-to-face and in the other, the survey was conducted by the resident enumerator over the phone. We found significant differences in the socioeconomic characteristics of women who did not have access to a phone compared to women who did, but no significant differences between the women who were randomized to face to face versus phone follow-up. Similarly, there were no statistically significant between groups when reporting on a range of health interventions (e.g., modern contraceptive use, postpartum care, exclusive breastfeeding). There were statistically significant differences, however, when reporting on presence or absence of a vaccination card in the home. Indicators that rely on confirmation through observation are not suitable for phone-based follow-up.

We discuss the study limitations and strengths in this report. We also provided a set of recommendations and directions to future research in the discussion section of this report.

Introduction

Maternal and Neonatal Mortality

Since the beginning of the child survival revolution in 1982, under-five mortality has declined substantially, predominantly through the development and successful implementation of the growth monitoring, oral rehydration, breastfeeding, and immunization (GOBI) strategy (Ahmad, Lopez, & Inoue, 2000). While the under-5 mortality rate dropped 53% since 1990 (from 91 deaths per 1,000 live births to 43 deaths per 1,000 live births in 2015), it fell short of the two-thirds decline that was proposed for the Millennium Development Goals (MDGs) (UNICEF and World Health Organization, 2015). Much of the decline in under-5 mortality was a result of declines in deaths during the post-neonatal period, after the first 28 days of life, which can be effectively prevented by GOBI. Deaths in the neonatal period, during the first 28 days, have declined at a much slower rate. Pre-term births and neonatal complications now account for approximately 45% of all deaths to children under-5 and are concentrated in developing countries (Victora et al. 2016). In developed countries, three out of every 1,000 newborns die during the neonatal period; the risk is seven times higher in developing countries where the neonatal mortality rate is 21 neonatal deaths per 1,000 live births (Lawn et al., 2016). In addition to the world's 2.7 million neonatal deaths, 2.6 million stillbirths occur every year, accounting for more than 5 million infant deaths during the perinatal period each year.

Additionally, another 303,000 women die from pregnancy and delivery related complications annually (UNICEF and World Health Organization, 2015). While there has been success in reducing maternal mortality in recent years, preventable maternal deaths remain high. The maternal mortality ratio (MMR) fell by almost half between 1990 and 2015 (from 385 deaths per 100,000 live births to 216 deaths per 100,000 live births (Kassebaum et al., 2017)) and the number of deaths worldwide due to pregnancy and childbirth declined from approximately 523,000 (Horton, 2008) per year to 303,000 (Kassebaum et al., 2017). While laudable, the decline of 44% again fell far short of the goal of a 75% reduction in the MMR set by the MDGs.

Overall, the perinatal period remains the most vulnerable period for the survival of mothers and children. As the development agenda shifts towards achievement of the Sustainable Development Goals (SDGs) by 2030, significant progress remains to be made in reducing maternal and neonatal mortality. The MMR must decline at an annual rate of 7.5% to achieve a global MMR of 70 deaths per 100,000 live births, a decline more than double the rate achieved from 2000-2015 (Kassebaum et al., 2017). Neonatal and under-5 mortality must also continue to rapidly decline to reach the SDG goal of reducing neonatal and under-5 mortality to 12 per 1,000 live births and 25 per 1,000 live births, respectively, in all countries.

There is recognition that "we know what works" to prevent neonatal and maternal deaths and that proven, effective, and cost-effective interventions are available. Several Lancet series in the previous decade have focused on maternal and neonatal health (MNH) and have identified a range of interventions across the continuum of care that have demonstrated effectiveness in reducing maternal and neonatal mortality (Neonatal Survival Series 2005, Maternal Survival Series 2006, Maternal and Child Undernutrition 2008, Every Newborn 2014, Maternal Health 2016). Figure 1, abstracted from Bhutta's 2012 review, summarizes several of these interventions across the Reproductive, Maternal, Newborn, and Child Health (RMNCH) Continuum and specifies the intervention's distribution mechanism (community, outreach and clinical) (Bhutta, Cabral, Chan, & Keenan, 2012).

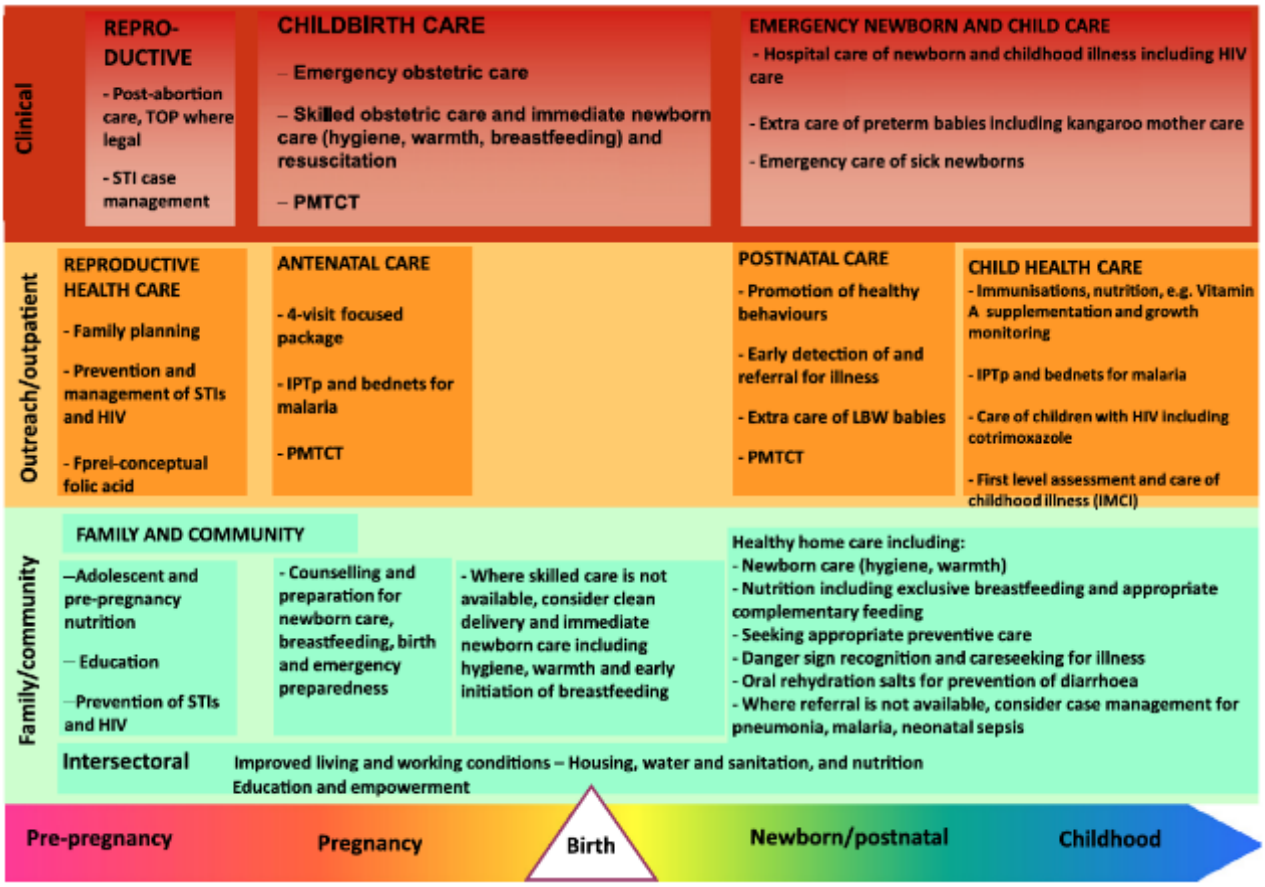

Figure 1: Interventions in reproductive, maternal, newborrn, child health (RMCH) continuum of care

Source: Bhutta, Z A, S Cabral, C W Chan, and W J Keenan. 2012. "Reducing Maternal, Newborn, and Infant Mortality Globally: An Integrated Action Agenda." *Int J Gynaecol Obstet* 119 Suppl: S13-7.

Though integration of RMNCH strategies is preferable to vertical delivery of services, disagreement over whether resources should be allocated to community- versus facility-based services has curtailed the development of a clear strategy for integrated care at the primary level. Community-

based preventative care strategies cannot address the complications of obstetrical emergencies and many maternal health advocates have argued that a facility-based intra-partum care strategy is the most effective way to reduce maternal mortality (OCampbell & Graham, 2006). Interventions such as skilled birth attendance, cesarean section, blood transfusion, and more generally, access to and use of facilities that offer basic and comprehensive emergency obstetric care are critical to reduce maternal mortality and morbidity, as well as perinatal deaths.

Limited resources and poor health system infrastructure in many countries limit the feasibility of enacting this strategy. The majority of women in many countries deliver at home, and reliance on community-based interventions are necessary until health systems can be improved and universal health facility delivery achieved (Gottlieb & Lindmark, 2002). Family planning counseling and provision, safe abortion care, and antenatal care (ANC), including micronutrient supplementation and counseling on the importance of delivering with a skilled birth attendant (SBA), are all effective community based interventions that have the potential to impact maternal mortality and morbidity (Campbell & Graham, 2006; Gilmore & McAuliffe, 2013; Jolly, Rahman, Afsana, Yunus, & Chowdhury, 2016). Additionally, evidence suggests that women who receive high-quality community-based interventions, such as ANC or linkages with traditional birth attendants (TBA), are more likely to deliver with a SBA in a health facility than women who do not, further justifying the need for quality community-based interventions (Chukwuma, Wosu, Mbachu, & Weze, 2017a; Midhet & Becker, 2010).

Neonatal advocates, however, have long prioritized interventions that are best distributed through community-based interventions, citing increasing evidence of their effectiveness in reducing neonatal and perinatal mortality (Acuin et al., 2011; Bang, Bang, Baitule, Reddy, & Deshmukh, 1999; Gilmore & McAuliffe, 2013; Karim et al., 2013; Lassi & Bhutta, 2015; Lassi, Haider, & Bhutta, 2010; Lassi, Salam, Das, & Bhutta, 2014; Midhet & Becker, 2010). Community-based health interventions include clean delivery practices, clean umbilical cord care (use of a sterile blade for cutting the cord, sterile thread for tying, and applying chlorhexidine to the cord), thermal care (immediate drying and wrapping of the baby after delivery, delaying bath/wash more than six hours, and skin-to-skin contact with baby, especially for low-birth weight and preterm birth), and immediate and exclusive breastfeeding. A 2010 review found that birth spacing, birth and newborn care preparedness via community-based intervention packages, and emergency obstetrical care were among the most effective interventions to reduce perinatal mortality; additionally, early initiation of breastfeeding and birth and newborn care preparedness could effectively reduce neonatal mortality (Bhutta, Lassi, Blanc, & Donnay, 2010). Adam and colleagues (2005) found that the most cost-effective interventions to reduce neonatal and maternal mortality were community-based newborn care package (including early initiation of breastfeeding), followed by ANC (including vaccination with Tetanus Toxoid, screening for pre-eclampsia, and screening and treatment of syphilis), skilled attendance at birth, first level maternal and neonatal care around childbirth, and emergency obstetric care around and after birth were found to be the most cost-effective in reducing neonatal mortality. While many of these key interventions are often considered easily attainable, the utilization and coverage of these interventions are very low in settings with high neonatal and maternal mortality.

As with maternal care, community-based strategies alone will not eliminate perinatal or neonatal morbidity and mortality. In the same cost-effectiveness study that highlighted the effectiveness of community-based interventions, Adam and colleagues (2005) found that universal access to clinical facility-based health services was necessary to halve levels of maternal and newborn mortality. Similarly, Darmstadt and colleagues (2005) estimated that globally 18-37% of neonatal deaths could be averted through 90% coverage of effective community care strategies, but only after facility-based interventions are included could reductions in neonatal mortality reach 36-67%. Given that both community- and facility-based interventions are critical to reducing neonatal and maternal mortality and the utility of each depends on the strength of the health system, no universal primary health care strategy has been adopted or consensus reached on which high impact interventions should be prioritized. This lack of consensus has thus hampered the ability of the global RMNCH community to both identify priority interventions to distribute and reach consensus on how best to measure and track coverage.

Improving the coverage of effective and proven interventions and reducing inequities in access to life-saving treatment will be key to achieving the SDGs. However, there are at least three major challenges to achieving and tracking SDGs: low utilization of effective interventions, lack of data on intervention indicators, and low validity and reliability of MNH intervention indicators.

Low Utilization of Effective Interventions

Countdown 2030 has compiled global information on coverage for priority maternal and under-5 health interventions for which there is information available. Of the range of interventions discussed above (clean delivery practices, clean umbilical cord care, thermal care, immediate and exclusive breastfeeding, screening for pre-eclampsia, and screening for syphilis), only early and exclusive breastfeeding for the first six months is identified among the 24 priority indicators by Countdown 2030 (Victora et al. 2016). Coverage of exclusive breastfeeding ranges from 3% in Chad to 85% in Rwanda while early initiation ranges from 17% in Guinea to 95% in Malawi. Among the remaining 22 interventions for which Countdown 2030 presents national coverage estimates, interventions range from a low of 24% median coverage (intermittment preventative treatment of malaria for pregnant women) to 90% (at least one visit of antenatal care). The only intrapartum indicator, skilled attendant at delivery, is estimated at 65% median coverage; with a low of 16% in Ethiopia.

Of the interventions presented by Countdown 2030, only six have achieved median coverage over 80% (at least one ANC visit, neonatal tetanus protection, DPT vaccination, measles vaccination, Hib vaccination, and vitamin A supplementation). The range of coverage across countries is, however, extremely wide. At least one visit of antenatal care ranges from 40% in South Sudan to almost universal coverage in South Korea. Neonatal tetanus protection ranges from 55-96%, DPT vaccine

from 24-99%, first dose measles immunization from 22-99%, Hib immunization from 20-99%, and vitamin A supplementation from 0% in Rwanda and Sudan to 99% in multiple countries.

Beyond increasing overall coverage of high impact interventions, there is the additional challenge of expanding and ensuring coverage to the poorest and most difficult to reach populations. For almost all current interventions for which coverage is measured, there are systematic inequities within countries by wealth (Hosseinpoor et al., 2016; Ronsmans & Graham, 2006; Cesar G. Victora et al., 2012). These inequities are largest for interventions that require contact with a health facility or repeated contact with a trained provider and tend to be lower for interventions that can be delivered via community-based distribution and counseling (Barros et al., 2012). For example, in 2015, only 2.4% of women in the poorest wealth quintile in Ethiopia were attended by a SBA at their last birth, compared to 46.3% of the wealthiest women; in comparison, 49.6% of the poorest women initiated early breastfeeding compared to 58.4% of the wealthiest (Equity Working Group, 2015). To achieve overall improvements in health, reaching the poor, particularly with community-based strategies, is critical. The largest gains in the reduction of maternal and neonatal deaths remain in the poorest groups and improving intervention coverage among the poor is critical to reducing mortality (Acuin et al., 2011; Akseer et al., 2016). Countries that made the most progress in improving intervention coverage are those that have effectively reached the poorest families (Horton, 2008). There is clear room for improvement in increasing the coverage of maternal and newborn health interventions, both across countries, evidenced by the range of estimates shown by Countdown 2030 and within, where reaching the poor remains a critical priority.

Lack of Data on Maternal and Neonatal Health (MNH) Intervention Indicators

Though Countdown 2030 leads the RMNCH community in tracking the coverage of RMNCH interventions, many indicators are based on relatively few data sources. For example, coverage for Hib immunization is based on data from 13 countries and the coverage of first line antimalarial treatment is based on data from 21 countries. Despite valiant efforts to provide estimates of coverage, they note "important gaps remain in the availability and frequency of coverage data collected through household surveys" (UNICEF and World Health Organization, 2015). Most estimates of maternal and neonatal intervention coverage come from household surveys, primarily the Demographic and Health Survey (DHS) and the Multiple Indicator Cluster Survey (MICS); however, even within these surveys, there are relatively few questions that monitor the coverage of MNH interventions. The independent Expert Review Group (iERG) found that of the 75 countries that collectively account for 95% of all deaths among women and children, only 11 have recent data on all eight coverage indicators recommended for global monitoring: met need for contraception, ANC coverage, antiretroviral prophylaxis for prevention of mother-to-child transmission (PMTCT) of HIV, skilled

attendance at birth, postnatal care for mothers and babies, exclusive breastfeeding, three doses of DPT3/tetanus, and antibiotic treatment of pneumonia (iERG, 2012). The Commission on Information and Accountability for Women's and Children's Health found that only 56 of the same 74 countries conducted a survey to collect data on child mortality during 2006-2010 period (Commission on Information and Accountability for Women's and Children's Health, 2011). Additionally, only 32 countries had conducted a survey to collect data on maternal mortality in the same time. At the time of survey design, BMGF had identified 11 high-impact MNH indicators (listed in Table 1 below) for four high-priority geographies (Ethiopia, Northeast Nigeria, Bihar, Indi, and Uttar Pradesh, India) and found that there are currently no large-scale surveys that routinely measure coverage of these high impact practices.

Where health record-keeping systems are unavailable or incomplete, household surveys such as the DHS and MICS provide self-reported population-level data on coverage of some of the key MNH interventions (Bryce et al., 2013). In instances where medical records exist, the likelihood of their containing data on interventions delivered in homes/communities is low. Further, in countries where institutional childbirth is not universal, and where disparities in facility-based deliveries are evident, for instance, along wealth gradients and/or geographic locations, data from household surveys are more representative of the general population (Liu et al., 2013). Given these practical and methodological constraints, there is a lack of research in low-and middle-income countries (LMICs) evaluating the validity of self-report against a referent standard, such as medical records or participant observation. Yet, as health systems undergo reform, the potential for routine health data to (a) track and monitor service coverage, and (b) record medically relevant information that can identify persons in need of care and inform subsequent actions, has become evident. With the expansion of the health workforce, particularly within communities, the possibility of collecting health data alongside service delivery is gaining traction. In Ethiopia, the development of a family folder system (detailed below) implemented by health extension workers (HEWs), offers an opportunity to compare data obtained through a community health information system (CHIS) and that obtained via self-report.

Low Validity and Reliability of MNH Intervention Indicators

The challenge of improving coverage estimates is compounded by the difficulty of developing valid and reliable MNH intervention indicators. Only recently has there been a focus on the methodological challenges of measuring RMNCH coverage, resulting in relatively little published literature on the testing of alternative indicators, suitability of questions, and analytical techniques (Bryce et al., 2013; Hancioglu & Arnold, 2013). Recent research suggests that the ability of women to accurately report on interventions received during and after delivery depends on the intervention itself, on the delivery experience, on characteristics of women, and on the time elapsed since receipt of services. Women are able to report care-seeking behaviors, such as place of delivery, or invasive interventions, such

as cesarean section, with more accuracy than interventions that occurred immediately after childbirth, e.g. whether or when the newborn was dried (Bryce et al., 2013; Stanton et al., 2013). Several indicators of maternal and newborn care have been shown to have low sensitivity (<80%) when household report is compared to health records, including whether labor was induced, whether the newborn was placed skin-to-skin on the mother's chest, and whether the newborn was immediately dried (Blanc et al., 2016; Stanton et al., 2013). After reviewing both sensitivity and specificity, in addition to levels of "don't know", Stanton and colleagues identified 13 indicators for peri-partum care they recommended for inclusion into household surveys, including whether the blood pressure of the mother was taken, whether the newborn was placed skin-to-skin with the mother, and for those babies not placed skin-to-skin, whether they were dried. The majority of these indicators, however, have either not been included into large-scale surveys or have not yet been fielded on a large scale.

Even for those interventions for which there are established and frequently measured indicators, the issue of recall bias is of potential concern. The DHS traditionally collected data retrospectively on pregnancy, delivery, and postpartum care for all live births in the previous five years. Postnatal care indicators were until recently only collected for those births that occurred at home, under the assumption that women who delivered in a facility would be unable to answer questions about care that neonates received immediately after birth. Recent work by Moran and colleagues (2013) has resulted in a change to these recommendations; postnatal care questions in both the DHS and MICS are limited to births within the last two years and are asked of all births, regardless of delivery location. This change has only recently been implemented, however, and the majority of survey results rely on a recall period of up to five years. While Moran and colleagues found that at the population level reporting of postnatal care did not seem to be affected by time since birth, given the cross-sectional nature of the DHS and MICS, they were not able to demonstrate whether individual responses were consistent over time. The majority of work that has focused on women's ability to accurately report on intra- and postpartum events over time has been done in developed countries (Stanton et al., 2013); research that has been conducted in less developed settings have been largely cross-sectional, focusing more on the validity of women's report in comparison to health facility records than on the consistency of report over time (Seoane, Castrillo, & O'Rourke, 1998; Stewart & Festin, 1995). Evidence has been mixed on whether the recall period has an effect on the ability of women to report accurately; Stanton and colleagues found that recall within a twelve-month period was problematic, which is a significantly shorter time period than the two- to five-year window used by large scale surveys, while Stewart and colleagues found no relationship between the recall period and the validity of women's report. None of the studies, however, reviewed consistency of reporting over time and whether consistency of reporting varied by time, indicator, or background characteristics of the respondent.

A longitudinal study design is the best study design to address recall bias and has been used extensively in neonatal health research (Baqui et al., 2008; Kumar et al., 2008); however, conducting longitudinal research necessitates repeated contact and can be expensive. The increased penetration of mobile phones worldwide, particularly in low and middle-income countries (LMICs), has the

potential to transform longitudinal data collection through increasing repeated contact with respondents at potentially lower cost. Though mobile technology holds great promise and there has been a proliferation in the various ways mobile technology can be used in data collection (Dabalen et al., 2016; Smith & Kim, 2015), there is still little published research on the validity and reliability of using mobile phones for continuous data collection in developing settings. A recent systematic review found only 10 studies that compared remote data collection to at least one other method of data collection in LMICs (Greenleaf, Gibson, Khattar, Labrique, & Pariyo, 2017). While the authors concluded that overall there was concordance in results between different modes of data collection, including remote mobile data collection versus face-to-face, they noted that no studies were conducted in sub-Saharan Africa. There remains a significant lack of research on the consistency and accuracy of remote data collection compared to traditional face-to-face surveys, particularly in sub-Saharan Africa.

Priority Indicators

Despite the lack of global agreement on a set of priority interventions, donors, governments, and implementing partners have independently moved forward to identify and prioritize high impact interventions. At the time of study design, the BMGF had identified 11 high priority interventions to reduce maternal and neonatal mortality, listed in Table 1 below[1]. Many of the indicators do not have available estimates from population-based surveys and coverage remains unknown.

[1] At the time of publication of this report, the BMGF had refined their priority indicators; however, the study was designed to measure, when possible, the indicators reported in Table 1. The updated list of indicators is attached as Appendix 1.

Table 1: High-priority interventions to reduce maternal and neonatal mortality

	High impact interventions
Antenatal	Magnesium sulfate ($MgSO^4$) for pre-eclampsia
	Syphilis diagnosis/treatment
Intrapartum	Neonatal resuscitation
	Active management of third stage of labor (AMTSL) (uterotonics)
	Antibiotics for premature rupture of membrane (pPRoM)
	Antenatal corticosteroids
	Immediate drying
Postnatal	Thermal care
	Exclusive breastfeeding
	Injectable antibiotics

Similarly, the Ethiopian government identified several high impact MNCH interventions in the 2005 National Strategy for Newborn and Child Survival in Ethiopia listed in Table 2 and an additional set of interventions that were adopted after the launch, Table 3. Both tables include the proposed delivery mode. These indicators span interventions that can be implemented at the family and household level, such as water, sanitation, and hygiene, to complex clinical management.

Table 2: Key High Impact Interventions for children under-five in Ethiopia, 2005 (National Strategy for Child Survival in Ethiopia)

	Delivery Modes	**Key Interventions**
Health Services Extension Program	**1.Family/ Community based Care**	Clean delivery
		Temperature management and kangaroo mother care (KMC)
		Insecticide-treated net (ITN) for pregnant women

		Exclusive breastfeeding 0-6 months
		Breastfeeding 6-11 months
		Water/Sanitation/Hygiene
		ITN for U5 children
		Complementary feeding
		Oral rehydration therapy (ORT)
		Zinc for diarrhea management
		Supplementary feeding for malnourished children
		Supplementary nutrition for malnourished pregnant women
		Anti-malarial
	2. Population oriented outreach services	Family planning
		Tetanus toxoid
		Folate supplementation in pregnancy
		Routine DPT3/Measles immunization
		Vitamin A – sup
		Hib vaccine
3. Clinical Care		Delivery by skilled Attendant
		PMTCT: Nevirapine
		Antibiotics for pRoM
		Antibiotics for pneumonia
		Vivax malaria treatment
		Antibiotics for dysentery
		Neonatal resuscitation

	Treatment for iron deficiency in pregnancy
	Anti-malarials (ACT)
	Ampciline/gentamycin for neonatal sepsis
	Management of complicated malaria

Table 3: Child survival interventions adopted/on process of adoption after the launch of the 2005 national child survival strategy

SN	Intervention or delivery mechanism	Expected impact	Year of implementation
1.	Pentavalent vaccine	Prevention of 5 diseases including pneumonia due to Hib	2007
2.	Long term family planning by health extension workers (HEWs)	Increasing birth spacing to improve birth weight and survival of children	2008
3.	Community case management of pneumonia	Community-based pneumonia case management is estimated to result in a 20% reduction in all cause of under one mortality & a 24% reduction in all causes of under-five mortality.	2010
4.	Community case management of uncomplicated severe acute malnutrition	Believed to significantly improve access to the treatment of uncomplicated severe acute malnutrition at community level.	2008
5.	Pneumococcal Vaccine (PCV)	A PCV conjugate vaccine is expected to prevent about 26% of radiologically confirmed pneumonia (a severe morbidity proxy for mortality).	2011
6.	Helping babies breathe	Improving management of newborn asphyxia	2010

7.	MgSO4 for management pregnancy induced hypertension (PIH)	Improved management of PIH and reduced risk of preterm birth	2010
8.	Zinc for management of diarrhea	Improve treatment outcome of diarrhea diseases	2011
9.	Rotavirus vaccine	Effectiveness against the fraction of diarrhea deaths attributable to rotavirus is estimated to be 74% (95% CI: 35–90%).	2013
10.	Option B+ for PMTCT	Believed to significantly increase the numbers of pregnant women on ART and increase the likelihood that infants born to HIV-positive mothers will be born HIV-negative.	2013
11.	Community case management of neonatal sepsis	Community-based packages with management of neonatal sepsis by HEWs achieved large reductions in NMR of 34% to 62% in research studies in India and Bangladesh.	2013
12.	Chlorhexidine for cord care	Cleansing a newborn's umbilical cord with chlorhexidine can reduce an infant's risk of infection of the cord by 68% and death during the first weeks of life by 23%	2014
13.	Antenatal corticosteroids for preterm labor	Provision of antenatal steroids decreases neonatal mortality among preterm infants (<36 weeks gestation) by 31%.	2014

As with the indicators identified by the BMGF, several interventions identified by the Ethiopia FMoH do not have up-to-date coverage estimates. Though not all indicators identified above are amenable to survey measurement at the household level, many have the potential to be measured at the household level but have not been tested. In addition to providing coverage estimates for new indicators, the ability to measure longitudinally for interventions such as exclusive breastfeeding and vaccine coverage can generate reliable important information regarding duration and uptake.

Research Objectives

The Performance Monitoring and Accountability 2020 - Maternal and Newborn Health Study (PMA-MNH) addressed several of the issues raised above. Building upon the existing data collection structure of PMA2020, described in detail below, PMA-MNH aimed to estimate the coverage of priority MNH interventions and evaluate the extent to which individual reports of receipt of interventions changed over time. Additionally, we compared face-to-face versus remote data collection using mobile phones, as well as household survey responses to health facility records. This was done by conducting a longitudinal study in Southern Nations Nationalities and Peoples Region (SNNPR) of Ethiopia, where maternal and neonatal mortality levels are high. The specific research objectives were to:

1. Monitor the use of proven, effective and cost-effective interventions and the practice of healthy behaviors aimed at reducing maternal and neonatal mortality in Ethiopia, using the Bill and Melinda Gates Foundation's and the Ethiopian Federal Ministry of Health's (FMoH) priority MNH indicators;
2. Assess the validity of maternal recall of pregnancy, delivery, and neonatal care information over a six-month period;
3. Evaluate the quality of maternal, newborn child health (MNCH) data and validate the information in the Family Folders, which are used by the FMoH as a routine data collection tool for documenting family-centered Health Extension Program (HEP) service activities; and,
4. Evaluate the feasibility of conducting follow-up interviews on maternal, newborn health care over mobile phones instead of face-to-face.

Methodology

Study Design

The Bill & Melinda Gates Institute for Population and Reproductive Health at the Johns Hopkins Bloomberg School of Public Health (JHSPH) launched the PMA2020 program in 2013 to track progress in family planning program indicators in eleven priority geographies (Zimmerman, Olson, Tsui, & Radloff, 2017). PMA2020 trains women, referred to as Resident Enumerators (REs), who are often recruited from within selected study communities, to use smartphones to collect and transmit data from face-to-face interviews with women and health service providers. Questionnaires are programmed for use on the smartphone using Open Data Kit (ODK). Unlike standard surveys, where

centrally located interviewers travel to selected households over an extended interview period, PMA2020 attempts to identify local women within each enumeration area (EA) to collect the data. After two weeks of rigorous hands-on training, they use the phones to list their assigned areas and are responsible for carrying out the household, female, and private health facility interviews within each EA. Supervisors oversee the activities of the REs for data quality assurance and conduct supplemental data collection. Data collection is undertaken every six months to a year within the same EAs, with a new random sample of households and women drawn in each round.

PMA2020 has several comparative advantages over conventional population survey methods. The REs are familiar with the local contexts, cultural practices, and health problems; are better trusted by the respondents for sharing personal health issues and problems; and speak the local languages. In Ethiopia, PMA2020 has been operational since 2013 and has completed multiple rounds of data collection under the supervision of the PMA2020 implementing partners, Addis Ababa University (AAU) and Ethiopia Public Health Association (EPHA). PMA2020-Ethiopia thus served as an excellent platform for the collection of information on MNH care in community settings.

The study was conducted in SNNPR, which is one of the nine regions in Ethiopia and discussed in more detail below. The study design was a longitudinal household survey to collect knowledge, practice, and coverage information of MNH. The study was implemented in 44 enumeration areas (EAs) that were used in rounds one through four of the PMA2020 core survey. Additional information on sampling is described below.

The study first conducted a census of all households in 44 EAs. All household members were enumerated and all women between the ages of 15-49 were screened. Women who were six or more months pregnant, by self-report of gestational age, were eligible for participation in the longitudinal study. A household and individual questionnaire were completed at the time of enrollment. During the postpartum period, REs returned to administer questionnaires in-person at seven days and six weeks postpartum, and either called or visited in person at six months postpartum to administer the final questionnaire.

To assess the reliability and feasibility of conducting women's interviews over the phone, we randomized study participants who reported access to a mobile phone into two arms. During the initial screening, women were asked to identify if they had regular access to a mobile phone. Of all women who reported they had access, one arm was randomized to conduct the final interview 6-month interview) via face-to-face interaction and the other via a mobile phone-based interview. Randomization was done through a random number generator within ODK. Women who reported that they did not have access to a mobile phone were interviewed face-to-face.

Once data collection within an EA was completed (final 6-month interview conducted), supervisors contacted the local health post and, with permission of the FMoH of Ethiopia, identified the Family Folder, a paper-based health record for the household. Information from specific indicators was

entered into a questionnaire on the smartphone and linked to the respondent for a comparison of self-report versus health record report.

Ethical approval for the study was given by the Ethiopian Public Health Institute (EPHI) and the JHSPH Institutional Review Boards.

Study Site

Maternal and Newborn Health in Ethiopia

In recent years, Ethiopia has made great strides in addressing under-5 mortality. MDG Goal 4, reducing the under-5 mortality rate by two-thirds between 1990 and 2015, was achieved in 2013 - two years ahead of schedule. In 1990, the under-5 mortality rate was amongst the highest in the world at 204 deaths per 1,000 live births and dropped to 64 per 1,000 live births by 2013 (Ethiopian Public Health Institute (EPHI), Federal Democratic Republic of Ethiopia (FMoH), Countdown to 2015, 2015). This success is due largely to improved access to and utilization of essential care services, brought about through a comprehensive and expansive community health extension program, described in more detail below.

Despite these impressive gains, neonatal and maternal mortality rates remain among the world's highest. Neonatal mortality declined at a much slower rate than overall under-5 mortality; from a high of 55 per 1,000 live births in 1990 to 28 in 2015. This in turn led to a shift in the proportion of under-5 mortality due to neonatal deaths from 26% in 1990 to 44% in 2015. The majority of these deaths are due to prematurity and neonatal asphyxia, which combined account for nearly 60% of total newborn deaths in Ethiopia (Ethiopian Public Health Institute (EPHI), Federal Democratic Republic of Ethiopia (FMoH), Countdown to 2015, 2015). Maternal mortality, similarly, has continued to decline but at a slow rate. Between 1990 and 2013, the MMR declined by approximately 1.6% per year, from 708 per 100,000 live births to 497; leaving the MMR in Ethiopia still among the highest in the world. In absolute numbers, this equates to approximately 16,740 (95% CI: 14,197-19,271) deaths in 1990 and 15,234 (95% CI: 11,378-19,871) in 2013, a statistically non-significant difference.

The declines that have occurred in maternal and infant mortality reflect improvements in the coverage of and access to maternal and infant health care services. For instance, the provision of any antenatal care by a skilled professional increased by 35 percentage points from 27% in 2000 to 62% in 2016 (ICF and Central Statistical Agency (CSA) [Ethiopia], 2016). In the same period, institutional deliveries rose from 5% to 26%, and the proportion of births delivered by a skilled birth attendant (SBA) increased from 6% to 28%. The capacity to provide caesarean sections, a life-saving intervention during obstetric emergencies is an indicator of the extent to which emergency obstetric care (EmOC) is available. The rates of caesarean section changed marginally from 1% in 2000 to 2%

in 2016. The immediate postpartum period (within 48 hours) is a critical time for maternal and infant survival, when post-delivery and neonatal complications are most likely to arise, and where early recognition of signs and symptoms, followed by timely and appropriate intervention, can be life-saving. Among live births that occurred in the two years prior to the 2016 Ethiopia DHS (EDHS), only 17% of new mothers and 13% of newborns received a postnatal health check in the two days after birth. Childhood immunization, a core public health intervention for improving infant and child survival, has been prioritized by the Ethiopian government through the Expanded Programme for Immunization (EPI). Among children aged 12-23 months, 39% had, at some point, received all their basic vaccinations (ICF and Central Statistical Agency (CSA) [Ethiopia], 2016).

Despite the largely positive trends in coverage indicators as indicated by the EDHS 2016, these summary measures mask inequities across various strata, including age, region, residence, and wealth. For instance, when disaggregated by wealth status, 85% of women in the highest wealth quintile received at least one ANC visit compared to 48% of women in the lowest wealth quintile (ICF and Central Statistical Agency (CSA) [Ethiopia], 2016). In rural Ethiopia, institutional deliveries rose by 18 percentage points (2% to 20%) from 2000-2016, while comparatively in urban areas, the increase was significantly higher, at 47 percentage points (32% to 79%). Younger mothers (<20 years) were more likely to deliver in a facility (31%), compared to mothers in the oldest (35-49 years) age group (21%). The percentage of women receiving skilled attendance at birth ranged widely from a high of 97% in Addis Ababa to a low of 16% in Afar region. Despite a very low overall cesarean section rate (2%), women in the highest wealth quintile were nearly fourteen times (8.1%) more likely to receive a caesarean section than women in the lowest wealth quintile (0.6%). Interestingly, for childhood vaccinations, a higher percentage (65%) of children living in rural areas received all basic vaccinations compared to urban residents (35%).

Figure 2: Map of Ethiopia, SNNPR higlighted in red

Maternal and Newborn Health in Southern Nations Nationalities and Peoples Region

SNNPR is in southwest Ethiopia and is one of the most populous regions, with a population of approximately 17.9 million people (Central Statistical Agency, 2013). According to the Central Statistical Agency (CSA), SNNPR is approximately 15% urban and 85% rural.

Maternal and newborn health service utilization remains low in SNNPR. According to the 2016 EDHS, approximately 30.4% of women who had a birth in the five years before the survey received no ANC care for the most recent birth. The majority (73%) of women who had a live birth in the past five years delivered in their home and only 29% reported delivery by a skilled provider. Fewer than 2% of births were delivered by caesarean section. Among women who had given birth in the previous two years before the survey, 81% received no postnatal care. Approximately 17% of women received a postnatal check for their own health during the first two days following the birth, while only 14% of women reported receiving a postnatal check specifically for the neonate. Among children age 12-23 months, one-third had received all age appropriate vaccinations. SNNPR thus demonstrates the same overall pattern seen in Ethiopia as a whole—low but increasing interaction with the formal health system for both maternal and newborn health.

Health Extension Program

Recognizing the challenge of providing comprehensive health services to a large, diverse, and predominantly rural population, the government of Ethiopia started the Health Extension Programme (HEP) in 2003. Over 38,000 HEWs have been deployed to over 15,000 health posts located in rural areas (with a catchment area population of 5,000 on average) (Ethiopian Federal Ministry of Health, 2015). The HEWs provide basic health services to Ethiopia's large, rural population, facilitating closer contact between health workers and communities and mobilizing communities to change behaviors.

Under the program, two female HEWs serve a kebele (sub-district)—which is an administrative unit bringing together two to three villages, with a combined population of 5,000—usually within walking distance of each other (Lemma et al., 2010). HEWs receive one-year pre-service training and a modest monthly salary. By design, many HEWs are recruited from their own locality. The two HEWs operate out of a health post, which is the unit of the health system closest to the population. Health posts and HEWs generally operate only in rural areas. The HEWs are expected to provide a wide range of services targeted at improving newborn health. The list of key MNH interventions HEWs are expected to provide are in Table 2 and 3 above under the "Health Services Extension Program".

HEWs are supported by the Health Development Armies (HDAs), a network of women that are led by women who have adopted better health behavior through completing all packages of the HEP. They provide a set of preventive, promotive, and curative health services packaged in four programmatic areas: the Family Health Services; Disease Prevention and Control; Environmental Hygiene and Sanitation; and Health Education and Communication. HEWs serve as the focal point of the Primary Health Care Units.

HDAs are required to establish health development teams that comprise up to 30 households in the same neighborhood. The health development team is further divided into smaller groups of six

members, called one-to-five networks. Team members select the leaders of the health development teams and the one-to-five networks. The main criteria for selection of one-to-five leaders are being a member of a model family and being trusted by the members for mobilizing the community. The formation of the health development teams and the one-to-five networks is facilitated by HEWs and the kebele administration (Admasu, 2013).

Family Folder

The Family Folder is a comprehensive data collection and documentation tool designed by the FMoH for HEWs to document both individual- and household-level data. Each family is supposed to have a Family Folder which is kept at the health post with the HEW.

The Family Folder has five basic parts: (1) Identification, (2) Household description, (3) Household characteristics, (4) HEP training status, and (5) Household implementation status. On the outside of the folder, household-level information is recorded including drinking water sources, number of insecticide treated bed nets, and latrine characteristics. Inside the Family Folder are individual health cards for household members where health services including immunizations, family planning, and tuberculosis treatment are recorded (Lemma et al., 2010).

Sample Description

Sampling Strategy

PMA2020 has been implemented in Ethiopia since 2013 and at the time of the launch of the PMA-MNH survey, had conducted four rounds of data collection in 47 enumeration areas (EAs). The enumeration areas for PMA2020 were selected using a two-stage stratified cluster sampling design and selected with probability proportional to size within urban and rural strata. After considering the logistical challenges of conducting longitudinal data collection, three enumeration areas were dropped, resulting in a total of 44 enumeration areas participating in the initial screening of households for PMA-MNH. One enumeration area had no women who were 6-9 months pregnant and subsequently dropped from the longitudinal follow-up. This was verified by the supervisor in the field. The final 43 EAs were included in all subsequent visits for PMA-MNH.

Based on the PMA2020 Round 3 data (2015), we estimated that a household census would identify approximately 340 pregnant women in their third trimester in sample EAs. Our sample size calculations suggested that we needed a minimum of 328 live births for point estimates of MNH indicators of interest that have a prevalence rate of a key MNCH indicator (e.g, thermal care of newborn) of approximately 10% with a 5% margin-of-error, 15% loss-to-follow-up (over 5 months) and a design effect of 2.0 considering a cluster-based sampling survey design.

Inclusion criteria:
At least six months pregnant at the time of household listing
Regular member/ resident of the selected household
Willing to voluntarily participate in the study

Exclusion criteria:
Not a usual member/ resident of the selected household
Persons with cognitive or hearing disabilities that would inhibit them from taking part in the interviews
Unwillingness to participate in the study

Questionnaire Development

A set of questionnaires, composed of a household screening interview, individual female screening questionnaire, 7-day follow-up interview, 6-week follow-up interview, 6-month follow-up interview and a Family Folder verification questionnaire were developed by the PMA-MNH team, led by JHSPH in collaboration with the Addis Ababa University team [Appendix II]. The list of priority indicators for both the BMGF and the Ethiopian FMoH (Tables 1-3 above) were reviewed and the team identified indicators that we thought could be measured via a household survey. Indicators that were either more appropriate to measure using health records, posed a risk of disclosure to the respondent (e.g. HIV treatment related questions), or were not relevant to measure for the delivery and neonatal period, were not included. The final list of priority indicators from both the Ethiopian FMoH and the BMGF that were included is below in Table 4. Additional indicators on other priority topics, such as complications and care-seeking, were also included, but are not listed below.

Table 4: Priority indicators included in PMA-MNH

Indicator	Interview
Household Health	
ITN in household	Female screening
Improved drinking water	Household screening
Improved sanitation source	Household screening
Antenatal Care	
Syphilis counseling, testing, and results given	7-day
Iron supplementation	7-day
Tetanus toxoid	7-day
Delivery Care	
Delivery by skilled attendant	7-day
Uterotonic injection	7-day
Immediate neonatal care	
Immediate drying	7-day
Thermal care	7-day
Chlorhexidine for cord care	7-day
Neonatal resuscitation	7-day
Weighed at birth	7-day
Postnatal Care	
Family planning	6-week, 6-month
Exclusive breastfeeding	7-day, 6-week, 6-month
Pentavalent vaccine (DPT, HepB, HiB)	6-month
Pneumococcal vaccine	6-month

When possible, questions from the standard PMA2020 household and individual screening questionnaires were used to maintain comparability across surveys. For indicators and questions that were not already measured using the standard PMA2020 survey, a review of all large scale MNH surveys with publicly available questionnaires was conducted and relevant questions were compiled. Questions were reviewed for quality and cultural appropriateness. Questions that were previously validated and field-tested were included whenever possible and modified for appropriateness to the context when necessary. For indicators for which no previously fielded questions could be identified, the team created new questions. The draft questionnaires were shared with external content experts, the FMoH, and the BMGF in March of 2016. Feedback was incorporated and the draft instruments were field tested in June 2016. Modifications were made to improve language and comprehensibility of questions and the instruments were finalized in July 2016 with input from the interview team.

Study Implementation

Each woman was visited in person, at her home, a minimum of two times after the initial screening and enrollment. The third visit was either be conducted face-to-face in the home or over the telephone. If the RE was unable to locate the woman during specified interview times, she made two more attempts to complete each interview. The household screening took approximately 20 to 30 minutes to complete, the initial screening questionnaire took approximately fifteen minutes to complete, the 7-day interview took approximately one hour to 90 minutes to complete, and the 6-week and 6-month interview took approximately twenty minutes each to complete. If an RE was unable to complete the first visit within one month of birth after at least four documented contact attempts, the woman was considered lost to follow-up and no subsequent visits were attempted. If the woman did not compete the second interview, she was still eligible to complete the third interview.

Several steps were taken to minimize loss-to-follow-up and help track participants over time. Once a selected participant had consented to be part of the study, the resident enumerator shared her contact information with the respondent and, in the event that the respondent had regular access to a cell phone, the respondent also shared her information with the RE. Additionally, the RE shared an identification (ID) card with a printed quick response (QR) code containing a unique embedded ID number. The RE wrote the woman's first name on the card for further confirmation that she was interviewing the correct woman at each follow-up visit. Upon scanning the QR code, the embedded ID was saved into the form which later served as the unique ID of the woman that linked across interviews. Each time the RE returned for a follow-up visit, she scanned the QR code and confirmed that she was interviewing the correct woman using the human readable name. Each RE kept a second copy of the ID card with the same QR code printed. If the woman was lost to follow-up and/or if the third interview was completed over the phone, the RE used her copy of the ID card to scan the QR code.

Subsequently, the RE contacted the woman at regular intervals to determine if she had given birth. Families were encouraged to contact the RE immediately after the delivery of women. Within seven days of birth, the RE returned to administer the first questionnaire. Based on the date of birth, the RE arranged to return at approximately six weeks after birth, at which time she administered the second questionnaire. The final visit was arranged to be conducted approximately six months after birth, either in person or over the phone. Women were informed at the time of enrollment whether they had been selected for phone follow-up.

The women selected for the interview over the phone were asked the same questions as those selected for face-to-face interview. Moreover, data collectors conducting interviews over the phone were trained to interview the woman in a way that her responses are not overheard. Women selected for face-to-face interviews were also advised to identify a place where she could comfortably respond to the interview without being interrupted or her voice being overheard.

At each visit, the respondent was interviewed in a quiet location that guaranteed visual and auditory privacy where the respondent was comfortable within her homestead. The RE interviewed participants in the local language. Data collection was done using mobile phones, as is consistent with PMA2020 practice, programmed with logic rules and skip patterns for quality assurance at real-time.

Once data collection was complete within an EA (ie all enrolled women had completed the final interview), the RE informed her supervisor. The supervisor then identified the health post that served the EA and conducted the family folder validation exercise. The validation of the Family Folders took approximately 30 to 40 minutes to complete. During the Family Folder validation, the supervisor entered information pertinent to pre-selected MNCH indicators from the folder into a questionnaire. This information was then cross-checked against the individual responses from the female questionnaire in the analysis stage.

Study Timeline

Training

MNH Trainer of Trainers Training for research coordinators and supervisors: July 6-9, 2016
MNH Training of REs: July 11-16, 2016

Data Collection

Screening and enrollment: July to October 2016
MNH-1 interview: August 2016 to January 2017
MNH-2 interview: September 2016 to February 2017
MNH-3 interview: January to July 2017
Family Folder Verification: June to July 2017

The timeline of the screening and MNH interviews are not mutually exclusive as the date of interview varies depending on the respondent's date of delivery.

Qualitative Operations Research

To assess operational challenges experienced during fieldwork and to gauge the feasibility of expanding the survey beyond SNNPR, focus groups were conducted with select resident enumerators near the end of data collection. The objective was to learn about both the logistical challenges that REs experienced, but also to learn more about how the interviewers felt women were able to comprehend and respond to new questions. Additionally, this was the first time that PMA2020 had

included phone follow-up as a component of data collection and understanding the unique challenges and opportunities that this provided REs was critical.

Structured interview guides were developed by the JHSPH and Ethiopian field teams (Appendix III). Focus groups were facilitated in Amharic by one member of the Ethiopian PMA central team who was not otherwise participating in the MNH study. Notes were taken by one member of the JHSPH team who speaks Amharic and is well-known to the REs given her facilitation of multiple trainings. In total, eight resident enumerators participated in one informal focus group discussion.

Analysis

Coverage Estimates

To adjust for the complex sampling design used in PMA2020, survey weights were applied to the analysis. Household weights were created based on the probability of the enumeration area being selected within urban and rural strata in SNNPR, adjusted for non-response to the household level, and normalized[2]. As all households within the EA were interviewed, there was no additional probability of selection within the enumeration area. Female weights were created by adjusting for non-response to the female interview. As all women age 15-49 in the household were interviewed, there was no additional adjustment to the female interview weight. At the first follow-up interview, the female weight was adjusted for loss to follow-up and normalized. Due to extremely low loss to follow-up following the first interview, the same weight was applied to the second and third interviews. There are thus small inconsistencies between the weighted and unweighted total counts for the second and third interview, however this should not affect interpretation. All results that are presented are weighted estimates unless otherwise noted. All analyses were conducted using Stata version 14.

In addition to total coverage, results are also presented broken down by the following sociodemographic characteristics of the respondent when the sample size allowed: age (categorized into 15-24, 25-34, and 35-49), parity (1 – indicating the child born during the study period was the first birth, 2-3, and 4+), household wealth (categorized into wealth tertiles based on information of household asset ownership and water and sanitation use gathered during the household interview), and residence (urban or rural).

[2] Additional information on the general sample design and weight construction procedures used by PMA2020 is available at http://pma2020.org/sampling-overview.

Recall

Due to small sample sizes for outcomes of interest such as maternal or neonatal illness or death, we were unable to conduct longitudinal analyses to estimate causal relationships between care received and poor health outcomes for neonates. To capitalize on the longitudinal panel, we thus chose to prioritize evaluating the consistency in reporting of specific health care seeking behaviors and receipt of specific interventions over the course of the three interviews.

We evaluated the extent of recall bias in the reporting of maternal and neonatal complications and health care seeking behaviors by testing the sensitivity, specificity and area under ROC of selected indicators. We treated the 7-day interview as the standard and compared the consistency in responses at the 6-week and 6-month interview. Sensitivity shows the reported positive responses at the seventh day postpartum interview that were correctly recalled as positive at the second and third follow-up visits on 6-week and 6-month interviews while specificity shows the negative responses at first interview correctly reported as negative at follow-up interviews. A convenient way to summarize these test measures is expressed in the area under the ROC curve. An area of 1.0 represents a perfect recall (test of matching responses) and an ROC area of 0.5 represents an unreliable response. Often, ROC range of 0.9 -1.0 is considered excellent, 0.8-0.9 as good, 0.7-0.8 as fair, 0.6-0.7 as poor, and 0.5 to 0.6 as fail.

In addition, we have used two other measures of assessing agreements: Cohen's kappa coefficient and agreements in diagonal cells. Kappa is considered more robust than the agreement measurement. In general, kappa values ranging between 0.8 to 1.0 are considered excellent, 0.6 to 0.8 are good, 0.4 to 0.6 are moderate, 0.2 to 0.4 are fair, and below 0.2 as poor agreements in responses. Weights were not applied in this one-to-one matched analysis of relibaility in reponses.

Family Folder

All analyses were unweighted as the purpose was to conduct one-to-one matched analysis of consistency between the family folder (FF) and PMA-MNH records. Of the 139 rural women interviewed, the family folders were found for 95 women at their nearest health post. We examined differentials in availability of family folders by health posts and performed Cohen's kappa and agreement analyses of selected indicators between the recordings in family folders and reporting in PMA-MNH survey interviews.

Phone Versus Face-to-face Interview

All analyses were weighted using the weights described above. We compared the background characteristics of women enrolled in each of the three study arms to identify significant differences between groups. We also compared the background characteristics of women who remained in their "treatment group" (enrolled in and completed the phone follow-up) versus those who crossed-over treatment groups (enrolled in phone follow-up but completed the interview face-to-face) to determine if there were any significant differences between groups. Then we compared rates for several indicators of interest at the third interview by each of the as-treated interview modality groups (i.e. we analyzed using the final interview modality rather than the enrollment modality): receipt of maternal postnatal care by six-months post-partum, exclusive breastfeeding at six-months post-partum, experience of any infant illness between seven days and six-month postpartum, maternal report of the presence of a vaccination card, and modern contraceptive use.

Results

Quantitative Results

Response Rates

Table 5: Results of household, female and MNH screening 7-day, 6-week and 6-month postpartum interviews (unweighted)

Number of households interviewed and response rates	
Household interviews	**Total SNNPR**
Households interviewed	10,140
Household response rate	98.7%
Female screening interviews (women ages 15-49)	
Number of eligible women interviewed	9,713
Eligible women response rate	98.4%
MNH Screening--Pregnant women ages 15-49, in the third trimester	
Number of eligible women enrolled in MNH	329
% consented	100.0%
MNH Interview 1 (7 day postpartum)	
Number of enrolled women interviewed	324
MNH1 response rate	98.5%
MNH Interview 2 (6 week postpartum)	
Number of enrolled women interviewed	322
MNH2 response rate	97.9%
MNH Interview 3 (6 months postpartum)	
Number of enrolled women interviewed	321
MNH3 Response rate	97.6%

Figure 3 below shows the number of women enrolled and lost to follow-up over the course of the study and the type of birth event and loss to follow-up of infants over the study period. Of the 10,399 households identified in the 44 EAs in which the household screening was conducted, 10,140 (98.7%) completed the survey. Within these households, 9,867 women aged 15-49 who were regular members of the household and who slept in the household the night before were identified, and of these 9,713 (98.4%) women completed the female survey interviews.

In total, 329 women who were six or more months pregnant were identified as eligible for the study and all of them (100%) consented to enroll in the longitudinal study. Between enrollment and the first interview conducted on the seventh day postpartum, 5 women were considered lost to follow-

up resulting in a response rate of 98.5%. Three hundred and twenty-two women completed the 6-week interview, a response rate of 97.9% of the original sample. One woman was lost to follow-up between the 6-week and 6-month interview, for a final response rate of 97.6%.

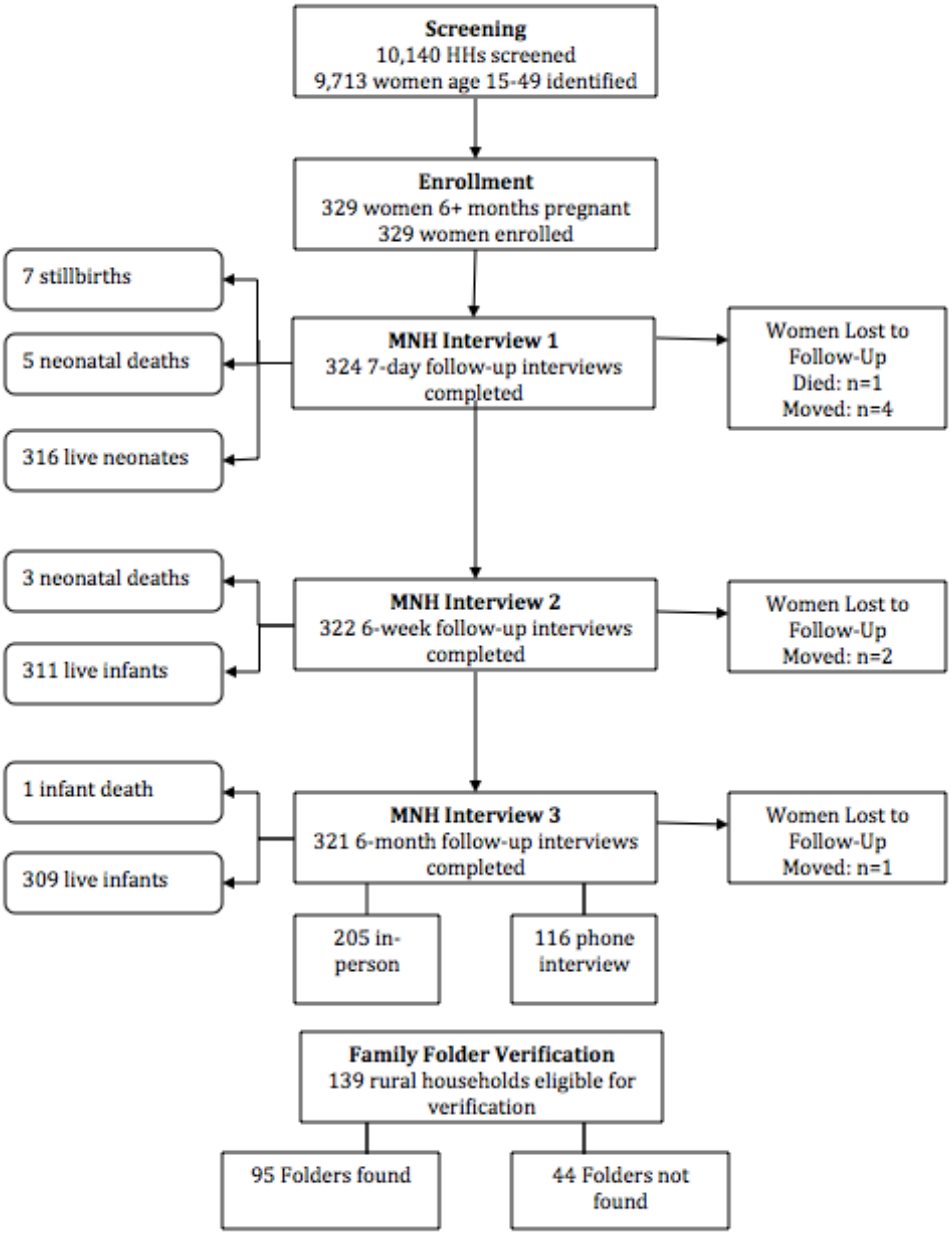

Figure 3: Flow chart for response rates and loss to follow-up for women and infants over the study period

Table 6:Infants alive and dead at each follow-up

Infant outcome	Unweighted n	Weighted n
Birth		
Born alive	321	326
Still birth	7	2
7-day interview		
Alive	316	319
Dead	5	7
6-week interview *		
Alive	311	313
Dead	3	6
6-month interview†		
Alive	309	311
Dead	1	2
* Of 316 infants with complete data at 7-day interview, 314 were followed up at 6-weeks; 2 infants lost to follow-up (household moved) † One infant lost to follow-up between 6-week and 6-month interview		

As reported by women at the 7-day interview, 321 infants were born alive and seven births were reported as stillbirths. Four sets of twins, eight newborns total, were born alive. Of the 321 live births, 316 were still alive at the 7-day interview and five had died. At the 6-week interview, two newborns were lost to follow-up due to two mothers being lost to follow-up. Of the 314 infants able to be followed up, three had died in the interim between the 7-day and 6-week interview. One newborn was lost to follow-up between the 6-week and 6-month interview and one died in the interim, resulting in 309 infants alive and included in the sample at the 6-month interview.

Background Characteristics

Table 7 summarizes the household characteristics of the 329 women originally enrolled in the study. Approximately 70% of women live in a household where all sources of drinking water are improved; however, fewer than 10% of women live in a household with an improved sanitation source. Slightly less than half of all woman enrolled in the longitudinal survey (45.4%) live in a household that has an insecticide treated bed-net.

Table 7: Household characteristics of women enrolled in MNH (n=329)

Household characteristic	Unweighted n	Weighted n	Weighed %
Wealth group			
Poor	61	123	37.4
Middle	61	110	33.5
High	206	96	29.1
Drinking water source*			
All improved sources	273	232	70.5
At least one unimproved source	55	97	29.5
Improved sanitation source			
Yes	64	30	9.0
No	265	299	91.0
Insecticide treated bednet			
Yes	150	149	45.4
No	179	180	54.6

Table 8 shows the relevant characteristics of women who were eligible for the longitudinal follow-up and provided consent. Age, marital status, and residence were collected during the initial screening visit, while education attainment, and parity (inclusive of the index birth) were collected at the first follow-up visit. Most women (51.8%) were between the ages of 25-34 and were married (97.1%). While the unweighted sample of women was approximately 50% urban, once weighted, the sample more closely matches that of SNNPR and represents a predominantly rural population.

Table 8: Respondent characteristics of pregnant women enrolled in MNH study (n=329), weighted

Respondent characteristic	**unweighted n**	**weighted n**	**weighted %**
Age group			
15-24	136	108	32.8
25-34	158	170	51.8
35-49	35	51	15.4
Proportion married	316	319	97.1
Urban	189	37	11.3
Parity†			
1	100	67	20.7
2-3	108	82	25.4
4 or more	116	175	54.0
Educational Attainment†			
Never attended	95	146	44.9
Primary	131	144	44.3
Secondary/Technical/Higher	98	35	10.8
† Data collected at 7-day postpartum interview, n=324			
** weighted n may not add up to total n			

Maternal Health Care

Antenatal Care (ANC)

Of the 324 women who participated in the first follow-up visit at seven-days postpartum, 82.9% received any ANC during their pregnancy. Slightly more than half of women (52.6%) received four or more ANC visits, which is recommended by the World Health Organization; nulliparous women and urban women were more likely to receive four or more visits, compared to multiparous and rural women.

Amongst women who received any ANC, 71.1% reported receiving ANC from an HEW at least once during their pregnancy, with 30.2% receiving ANC exclusively from an HEW and 40.9% receiving care from an HEW and at least one other health provider. Women who lived in urban areas, where health posts are not placed, were less likely to see an HEW than women who live in rural areas.

Among urban women, 70.4% exclusively saw a health provider other than an HEW, compared to only 22.8% of rural women.
Approximately 53% of women who received ANC had their first ANC visit at least six months into pregnancy, however urban women tended to access care earlier in their pregnancy than rural women. Younger women and women of increasing parity were more likely to seek ANC earlier in the pregnancy.

Coverage of specific components of ANC varies by type of indicator and by background characteristics of women. Table 10 shows the percentage of all women who received specific components of ANC, including those who received no ANC at all. Coverage is highest for counseling indicators (discussion of a place of delivery, delivery with a skilled attendant, and where to go in an emergency), while indicators that are diagnostic (counseling, testing and receiving results for HIV and syphilis) are the lowest. Less than half of women said that they were counseled about postpartum family planning, discussed transportation options in case of an emergency, or discussed the danger signs of pregnancy (47.2%, 47.0%, and 46.7%, respectively). Fewer than 1 in 10 women were tested, counseled and received syphilis test results (8.6%) While more than half of women (62.3%) reported having their blood pressure measured, only 24.5% reported having their blood pressure measured and having a urine and a blood sample taken. Women in urban areas were more likely to receive all three tests than women in rural areas (57.9% vs. 20.3%).

Approximately 20% of all women actively participated in a 1-5 group during their pregnancy. Another twenty percent were members of the group but did not participate during pregnancy, whereas sixty percent of all women were not members of a group. Prevalence of rural women participating in a 1-5 group was almost double that of urban women (19.4% vs. 11.4%).

Table 9: Antenatal Care Received by Background Characteristics, n=324

Antenatal Indicators	**Total (%)**	**Parity (%)**			**Age (%)**			**Wealth Tertiles (%)**			**Residence (%)**	
		1	2-3	4+	15-24	25-34	35-49	Lowest	Middle	Highest	Urban	Rural
Received ANC	82.9	95.7	79.9	79.5	87.8	81.7	76.7	78.9	84.9	86.0	93.3	81.6
Received 4+ ANC visits (n=318)	52.6	58.5	52.9	50.2	52.0	51.9	56.2	48.8	55.5	54.2	70.7	50.3
Source of ANC (n=269)												
HEW only	30.2	30.0	19.8	35.2	25.6	32.1	34.5	34.2	36.9	17.7	4.3	34.0
OHP only	28.8	27.3	41.5	23.6	32.2	30.9	13.6	20.8	19.2	49.7	70.4	22.8
Both HEW and OHP	40.9	42.8	38.7	41.2	42.2	37.0	51.9	45.0	43.9	32.7	25.3	43.2
Timing of first ANC visit (n=269)												
<4 months	11.2	8.7	15.7	10.3	10.8	14.1	1.9	6.2	11.7	16.8	25.2	9.2
4-5 months	42.2	44.6	31.5	46.2	41.2	43.2	41.0	39.1	45.8	41.8	47.9	41.4
6-7 months	35.5	33.4	38.6	35.0	36.3	33.7	40.1	41.6	33.7	30.4	22.8	37.4
8+ months	10.9	13.0	13.9	8.5	11.2	8.9	17.0	13.2	8.8	10.5	2.7	12.1
Iron supplementation during pregnancy	73.3	87.6	64.5	71.9	81.0	71.2	64.2	64.3	75.5	82.6	82.7	72.1
TT injection during pregnancy	51.7	55.0	43.9	54.1	50.2	55.5	41.7	43.9	52.6	60.7	68.5	49.5
TT injection dosage (n=167)												
1 dose	27.4	21.0	41.3	24.6	32.4	26.2	20.3	36.6	18.2	28.1	27.7	27.4
2+ doses	72.3	78.4	58.1	75.4	67.2	73.6	79.7	63.4	81.8	71.1	70.6	72.6
Participation in 1-5 group												
Yes	18.5	11.5	17.1	21.9	15.2	17.6	28.5	13.1	31.0	11.1	11.4	19.4
No, member but did not participate	19.5	9.3	15.5	25.3	11.0	23.8	22.9	16.0	18.6	25.4	17.5	19.8
No, not a member	62.0	79.2	67.4	52.8	73.8	58.6	48.6	70.9	50.4	63.5	71.1	60.8

Table 10: Antenatal care services received among all women by background characteristics, n=324

Antenatal Indicators	**Total (%)**	**Parity (%)**			**Age (%)**			**Wealth Tertiles (%)**			**Residence (%)**	
		1	2-3	4+	15-24	25-34	35-49	Lowest	Middle	Highest	Urban	Rural
Blood pressure measured	62.3	69.9	59.5	60.7	68.2	60.6	55.9	52.2	64.0	73.8	89.4	58.9
Urine sample taken	30.7	40.8	22.1	30.9	31.0	30.2	31.7	14.7	38.7	42.6	62.4	26.7
Blood sample taken	41.7	46.2	42.6	39.5	39.6	44.4	37.1	28.9	36.8	64.2	87.3	35.8
Composite indicator: blood pressure, urine, blood	24.5	31.3	15.7	26.1	22.7	23.8	30.9	13.1	23.3	41.0	57.9	20.3
Tested, counseled, received results for syphilis	8.6	2.2	1.9	14.2	1.4	11.0	15.4	10.3	8.7	6.2	8.7	8.6
Tested, counseled, received results for HIV	22.9	19.4	21.6	24.9	21.0	23.5	25.2	12.5	30.0	28.6	36.1	21.2
Received counseling postpartum family planning	47.2	39.8	47.7	49.8	42.0	52.9	39.1	40.7	58.5	42.7	36.1	48.7
Discussion of place of delivery	73.2	79.3	73.4	70.8	73.1	75.9	64.4	66.2	78.5	76.4	72.6	73.3
Discussion of delivery by skilled person	74.7	79.9	73.4	73.4	73.2	77.7	68.0	67.6	80.7	77.1	74.1	74.8
Discussion of where to go in case of emergency	64.5	65.6	69.8	61.6	66.1	66.4	54.8	55.8	70.2	69.4	66.3	64.3
Discussion of transport in case of emergency	47.0	34.1	50.9	50.2	42.4	48.6	51.7	43.2	48.2	50.7	50.6	46.6
Discussion of danger signs of pregnancy	46.7	53.7	47.4	43.8	43.3	54.1	29.4	43.5	51.0	45.9	51.7	46.1

Delivery Care

Table 11 shows the delivery care indicators for all women. Approximately one half of women delivered in a health facility or with a skilled birth attendant (52.6% and 52.8%, respectively). Primipara and urban women were more likely to deliver in a health facility or with a skilled attendant.

During screening interview, women were asked about their intention regarding place of delivery. Nearly seventy percent of women were able to fulfil their delivery intentions (67.6%). Half of women intended to deliver in a facility and were able to deliver in a facility (47.4%) while 20.2% of women intended to deliver at home and delivered at home. Thirty-two percent of women, however, did not deliver in the place that they intended (discordant deliveries) - 5.2% of women intended to deliver at home and delivered instead in the facility and 27.2% delivered at home when they intended to deliver in the facility.

Women who delivered at home noted several reasons for home delivery, of which experiencing a sudden delivery was most common (77.7%). Other notable reasons comprised personal/familial preference (25.3%), transportation challenges (9.6%), and poor prior experiences at a health facility (7.8%). Women who said that they delivered at home due to personal or familial preference were more likely to reside in rural areas, be from lower socioeconomic tertiles, and be multiparous.

Table 11 shows additional delivery indicators, including delivery by caesarean section, oxytocin injection after delivery, and cost of delivery, as well as prevalence of all measured delivery complications. Approximately 39.5% of women reported that they received an injection after birth to prevent excess bleeding, with the assumption that this is oxytocin. On average, women spent approximately 79 Ethiopian birr (ETB) during their pregnancy, not including any delivery costs. An additional 35 ETB was spent on delivery services. Urban and women in the wealthiest tertile paid more for both delivery and non-delivery related costs than their rural and poorer counterparts.

Table 12 looks specifically at self-reported complications experienced during delivery. Thirty-eight percent of women reported a delivery complication, and of the women experiencing any complication, 76.8% sought treatment for a complication. Prevalence of any complication was similar across urban and rural geographies.

The most prevalent delivery complications reported included severe bleeding during delivery (22.0%), prolonged labor (16.7%), and leaking/ rupture of membrane with no delivery for over twenty-four hours (6.4%). Women who reported severe bleeding tended to be multiparous, whereas prevalence of prolonged labor and premature rupture of membranes (PROM) was higher for women having their first baby.

Table 11: Delivery Indicators by Background Characteristics (n=324)[1]

Delivery Indicators	**Total**	**Parity**			**Age**			**Wealth Tertiles**			**Residence**	
		1	2-3	4+	15-24	25-34	35-49	Lowest	Middle	Highest	Urban	Rural
Delivered in health facility	52.6	80.9	46.1	44.8	58.9	50.5	46.7	45.1	52.8	62.3	86.4	48.3
Delivered with skilled birth attendant	52.8	80.3	47.6	44.8	60.2	48.9	50.7	46.8	50.8	63.2	83.1	49.0
Delivery intention and actual delivery site (n=311)												
Intended home, delivered home	20.2	3.5	16.0	28.8	12.3	22.9	27.7	29.2	16.2	12.7	1.3	22.5
Intended facility, delivered facility	47.4	68.1	44.0	41.0	48.9	46.0	48.5	38.5	45.3	62.0	87.5	42.4
Intended home, delivered facility	5.2	12.0	2.4	4.0	9.4	4.2	0.0	5.0	8.9	1.1	3.3	5.5
Intended facility, delivered home	27.2	16.4	37.6	26.3	29.4	26.8	23.8	27.3	29.7	24.2	7.9	29.6
Went to a maternity waiting home	19.4	23.8	11.8	21.2	14.5	20.5	25.6	23.0	23.6	9.3	11.1	20.4
Reasons why delivery took place at home (n=154)												
Transportation challenges	9.6	22.3	6.5	9.4	13.3	7.8	9.4	10.9	9.9	6.7	7.8	9.7
Poor prior experiences at a health facility	7.8	18.9	3.9	8.1	9.6	7.2	6.8	6.4	11.5	5.0	0.0	8.1
Personal/familial preference	25.3	3.0	30.6	25.8	26.6	27.4	16.6	38.7	15.5	13.6	12.1	25.7
Lack of knowledge	4.9	0.0	4.1	5.8	4.2	6.7	0.0	0.0	7.0	11.1	0.0	5.0
Experienced sudden delivery	77.7	82.5	82.9	74.6	86.0	74.6	73.7	78.6	74.8	79.9	87.7	77.3
Financial difficulties	1.5	0.0	4.1	1.9	4.2	0.0	6.8	2.7	3.6	0.0	0.0	2.5
Mean time (hrs) from onset of labor to seeking care (n=138)	4.7	5.0	4.8	4.3	5.6	3.9	5.3	5.6	5.0	3.6	4.0	4.8
Sought care before labor began (amongst institutional deliveries, n=170)	16.5	87.7	77.3	79.9	86.0	74.6	73.7	87.7	77.3	79.9	87.7	77.3
Delivery by caesarean section	4.2	3.2	5.9	3.8	3.9	2.9	9.0	3.2	1.9	8.2	15.1	2.8
Oxytocin injection received after birth	39.5	52.9	32.0	37.9	44.0	38.5	33.8	38.8	41.1	38.6	54.3	37.6

[1] Weighted percents unless otherwise specified

Table 12: Complications and Care Seeking by Background Characteristics (n=324)[1]

Complications Indicators	**Total**	**Parity**			**Age**			**Wealth Tertiles**			**Residence**	
		1	2-3	4+	15-24	25-34	35-49	Lowest	Middle	Highest	Urban	Rural
Suffered delivery complication												
Any complication	38.1	40.2	30.8	40.8	27.6	45.6	35.1	46.7	33.6	31.9	41.1	37.7
Severe bleeding during delivery	22.0	14.7	16.6	27.4	12.8	26.3	27.0	29.6	20.0	14.5	16.5	22.8
Prolonged labor	16.7	26.9	13.8	14.2	17.0	21.3	0.8	22.8	11.7	14.3	23.4	15.8
Leaking/rupture membrane & no delivery>24 hrs	6.4	16.5	1.0	5.2	7.0	5.6	8.1	7.9	5.3	5.9	8.1	6.2
Leaking/rupture of membrane <9months	3.5	6.3	3.3	2.5	2.1	2.8	8.7	5.3	4.1	0.5	1.2	3.8
Malpresentation of baby	1.8	1.6	0.4	2.5	1.2	2.6	0.3	1.4	0.4	4.4	4.3	1.5
Sought Treatment for complication												
Any complication (n=124)	76.8	91.8	63.2	76.0	85.5	70.7	89.0	70.3	82.0	82.9	89.2	75.1
Severe bleeding during delivery (n=71)	68.5	98.2	33.3	72.3	83.8	58.5	85.6	63.7	79.1	64.2	77.4	67.6
Prolonged labor (n=54)	92.9	100.0	97.7	85.6	100.0	89.3	100.0	87.3	100.0	98.1	97.0	92.2
Leaking/rupture membrane & no delivery>24 hrs (n=21)*	80.6	–	–	–	–	–	–	–	–	–	–	–
Leaking/rupture of membrane <9months (n=11)*	76.4	–	–	–	–	–	–	–	–	–	–	–
Malpresentation of baby (n=6)	70.0	–	–	–	–	–	–	–	–	–	–	–
Estimated mean cost of pregnancy, not including delivery	79.0	101.2	67.1	76.2	68.5	85.7	79.9	45.2	40.7	169.9	250.3	56.1
Estimated mean cost of delivery	35.2	49.2	45.5	24.7	28.1	34.7	51.1	20.8	15.1	78.5	175.1	16.7

[1] Weighted percents unless otherwise specified

*Too few observations to show comparisons by background characteristics)

Care-seeking from a medical provider for each of these complications was high, however, geographic and sociodemographic differences were observed. Women were most likely to seek care for prolonged labor (92.9%), leaking/rupture of membrane and no delivery for over twenty-four hours (80.6%), and leaking/rupture of membrane before nine months (80.6%). For each delivery complication, urban women had increased care-seeking behavior compared to rural women. Primiparous women were more likely to seek care, as were older and wealthier women.

Immediate Neonatal Care

Table 13 shows immediate neonatal care indicators based on the 7-day postpartum interview for all live births. For questions that were not asked of all births, the sample size is indicated.
Approximately one-third of infants were weighed at birth with little difference by age and parity. The percentage of urban women who reported that the infant was weighed was over twice that of rural women. Approximately half of all infants were wrapped within five minutes of birth. Higher percentages of younger women and women experiencing their first birth reported that the infant was wrapped within five minutes than older and multiparous women. Overall, there did not appear to be significant variation based on residence or wealth.

Among infants born alive, 93.1% of infants breathed normally after birth and among the 20 births who did not appear to breathe normally, some form of resuscitation was performed in three-fourths (76.6%) of the cases. Neonatal resuscitation was highest among first births (95.7%), compared to women of parities 2-3 (48.8%) and 4+ (77.7%).

Forty percent of all babies were placed naked on the mother's chest immediately after delivery (known as kangaroo mother care). Kangaroo mother care was highest for urban and first-born children, compared to rural and multiparous mothers. While most infants received their first bath more than twenty-four hours after birth (61.9%), 23.6% of women reported that infant received the first bath within 24 hours and 13.3% reported first bath immediately after birth. Delayed first bath was more common among rural mothers than urban mothers (62.0% vs. 46.7% reporting first bath after twenty-four hours).

Approximately 62% of babies were put to the breast within one hour after birth, with a slightly higher percentage of urban women reporting immediate breastfeeding compared to rural women.

Among live births at home, 95.7% of women reported that a razor blade was used to cut the baby's umbilical cord; scissors (1.3%) and bamboo strips (3.0%) were other lesser used items. One-third of participants said that the cord-cutting instrument was boiled before cutting and an additional fifty percent said that a new blade was used and had no need for boiling; however, 13.5% neither used a new blade nor sterilized the old instrument. Among rural live births at home, 13.8% used an unsterilized object for cord cutting, compared to 3.0% of urban live births at home.

Table 13: Neonatal Indicators by Background Characteristics (n=326), weighted

Neonatal Indicators	Total (%)	Parity (%)			Age (%)			Wealth Tertiles (%)			Residence (%)	
		1	2-3	4+	15-24	25-34	35-49	Lowest	Middle	Highest	Urban	Rural
Infant weighed at birth	29.8	32.7	29.6	28.9	27.0	31.8	29.5	24.6	27.8	39.1	59.1	26.2
Baby wrapped ≤ 5 minutes (n=321)	52.9	63.2	57.9	46.7	64.3	47.6	47.0	57.8	48.1	52.2	58.0	52.3
Neonatal resuscitation												
Baby cry/breathe normally after birth	93.1	89.8	93.7	94.2	93.5	94.5	88.0	95.5	92.4	90.9	94.2	93.0
Anything done to help resuscitate baby if not breathing normally (n=20)	76.6	95.7	48.8	77.7	93.5	39.2	100.0	52.2	70.3	93.0	69.2	77.3
Baby placed naked on mother's chest immediately after delivery	40.1	59.5	27.5	38.7	40.7	39.7	40.4	37.1	40.9	43.0	56.9	38.0
Infant's first bath												
Immediately after birth	13.3	8.2	14.7	14.6	12.3	14.3	12.3	11.8	12.7	16.1	10.0	13.8
Within 24 hours	23.6	26.6	26.1	21.4	26.7	21.6	23.9	18.6	19.0	35.6	41.5	21.4
After 24 hours	60.3	62.1	58.7	60.3	59.0	61.5	59.0	68.2	62.3	47.7	46.7	62.0
Baby put to breast ≤1 hour	61.9	66.3	59.2	61.4	65.1	62.5	53.5	56.3	68.7	61.1	71.0	60.7
Cord care (n=154)												
Instrument used to cut cord among live births at home												
Razor blade	95.7	83.9	100.0	95.3	100.0	94.6	92.4	93.3	100.0	94.1	100.0	95.6
Bamboo strips*	3.0	–	–	–	–	–	–	–	–	–	–	–
Scissors*	1.3	–	–	–	–	–	–	–	–	–	–	–
Instrument boiled before cutting (n=154)												
Yes	33.5	23.4	40.5	31.7	32.0	30.7	44.8	32.6	33.6	35.3	52.3	32.9
No	13.5	41.9	24.0	4.9	30.9	8.8	0.0	24.7	3.6	6.3	3.0	13.8
New blade: no need for boiling	53.0	34.8	35.5	63.5	37.1	60.5	55.2	42.8	62.8	58.4	44.7	53.3
Substance applied to cord amongst all live births												
Nothing	47.7	46.8	42.8	50.2	40.4	49.5	56.1	49.0	45.2	48.7	51.1	47.2
Antibiotic/alcohol/gentian violet	3.9	10.0	2.8	2.2	8.4	1.3	3.6	3.3	7.3	0.9	2.5	4.1
Chlorhexidine*	1.1	–	–	–	–	–	–	–	–	–	–	–
Butter	24.8	17.6	34.6	23.0	32.3	21.0	22.2	29.7	20.6	23.4	18.3	25.6
Petroleum jelly/Dung/Other	9.2	7.1	8.3	10.4	10.8	10.7	0.0	1.7	19.1	7.5	4.0	9.9
Don't know	17.2	24.8	14.8	15.4	16.2	17.5	17.9	18.3	12.1	21.5	24.9	16.2

*Too few observations to show comparisons by background characteristics)

Post-neonatal (7-day postpartum)

Maternal postnatal care

Postnatal care indicators for both the mother and infant recorded at the 7-day interview are presented in Table 14. By the first interview, less than 10% of women reported that they had been visited by an HEW in the time since delivery. Among women who had been visited by an HEW, approximately one third reported that this visit took place within the first two days, whereas two-thirds reported that it took place more than two days after delivery. Due to the small number of women and infants who received postnatal care, it is not possible to show variation by background characteristics.

Table 14: PNC indicators

Maternal Healthcare (n=324, weighted)	**Weighted %**
HEW* visit to mother since delivery	9.3
Number of days after delivery that HEW* visited (n=30)	
≤ 2 days	32.4
> 2 days	67.6
Received counseling for family planning on this visit (n=30)	61.7
Received counseling for exclusive breastfeeding (n=30)	90.1
Received counseling for immunization (n=30)	84.1
Received counseling on childcare including feeding, growth and development (n=30)	75.5
Infant Healthcare (n=319, weighted)	
BCG vaccination	7.6
Oral polio vaccination	10.6
Exclusive breastfeeding in the previous 24 hours	85.4

While overall reporting of postnatal HEW visits within 7-days was low, most women reported receiving at least one type of counseling during the visit. Among women who were visited by an HEW after delivery, 90.1% of women received counseling for exclusive breastfeeding; 84.1% received counseling for immunization; 75.5% received counseling on child care including feeding, growth, and development; and, 61.7% of women received counseling for family planning.

Neonatal Postnatal Care

At the 7-day interview, 85.4% mothers reported that they had exclusively breastfed their neonate in the previous twenty-four hours. No substantial differences were observed in exclusive breastfeeding by parity, age, wealth, or residence.

Two neonatal vaccination indicators were reported at the first interview: BCG vaccination and oral polio vaccination. Vaccination rates at 7-days were low for both BCG (7.6%) and oral polio (10.6%).

Neonatal Complications and Care-seeking

Table 15: Postnatal infant illnesses amongst live born infants

Post-neonatal infant illness	**Weighted %**
Any infant postnatal illness reported	23.1
Poor feeding or unable to suck	0.8
Diarrhea	0.2
Pus in the umbilicus	0.7
Redness of the umbilicus	0.9
Red eye/passage of pus from eyes	1.5
Hypothermia (temp 35 C)	1.3
Jaundice	0.0
Convulsion	0.0
Skin rash/Skin lesion	3.9
Baby doesn't cry/breathe	0.6
Fever (temp more than 38 C)	1.0
Unconscious	0.0
Fast breathing	1.2
Sore throat/Tonsillitis	0.9
Difficulty in breathing	2.0
Chest in drawing	0.0
Doesn't pass urine	1.3
Doesn't pass stool	0.8
Cold/cough	11.4
Vomiting	4.2
Reduced alertness (lethargy)	0.0
Constipation	1.7

All infants that were born alive are included in Table 15, regardless of survival status at the first follow-up. Nearly one-quarter (23.1%) of women reported that their neonate had some illness within the first week of birth. Prevalence of specific neonatal illnesses were relatively low (Table 15); the most commonly reported symptoms were: cold/cough (11.4%), vomiting (4.2%), skin rash/lesion (3.9%), and difficulty breathing (2.0%). All other complications, including bowel issues, fever, and reduced alertness, were less than two percent. Prevalence of specific complications was too low for further disaggregation by demographic characteristics of the respondent.

Postnatal (6-week)

Maternal Postnatal Care

Of the 324 women who participated in the second follow-up interview, 48 women (14.9%) reported receiving any health check specifically for their own health since delivery. Of these women, 72.0% received a check from a health extension worker, 31.0% received a check from a professional health care provider, and 3.6% received a health check from elsewhere. Women could select multiple providers if they had received more than one health check. Most women who received a health check (68.5%) were seen in their home, while approximately 30% were seen in the government health system. Only 5.2% of women reported receiving services from a private health care provider. Of women who received a health check, almost all (93.7%) received the check two or more days after delivery.

Table 16: Maternal postnatal healthcare indicators from 6-week interview (n=324 women), weighted

Indicator	**Weighted %**
Maternal health check since delivery	14.9
Maternal health check service provider (n=48)*	
Doctor	9.1
Health officer	0.0
Nurse/midwife	9.5
Skilled worker, can't distinguish	12.5
Health extension worker (HEW)	72.0
Health development army (HDA)	0.0
Traditional birth attendant	0.0
Other	3.6
Maternal health check service delivery location (n=48)*	
Home	68.5
Government hospital	11.7
Government health center	14.6
Government health post	3.6
Private hospital/clinic	5.2
NGO/Faith-based health facility	0.0
Traditional healer/medicine	3.6
Number of days after delivery to first maternal health check	
≤ 2 days	2.1
> 2 days	93.7
Don't know	4.2
*Multiple response options could be selected for this question	

Postpartum Family Planning

At the 6-week interview, additional questions were asked on initiation of sexual activity and postpartum family planning. At six weeks postpartum, 18.5% of women reported having resumed sexual activity with their partner. Approximately one-quarter (22.4%) of respondents had received counseling on postpartum family planning since delivery, however, only 11.8% of women reported using any method of family planning, including traditional methods, at the time of interview. Among women who reported using family planning, almost half reported using injectables (48.7%), followed by lactational ammenorrhea method (LAM) (34.7%) and implants (13.3%).

Table 17: Maternal family planning related indicators from 6-week interview (n=324 women), weighted

Indicator	**Weighted %**
Received counseling on family planning since delivery	22.4
Resumed sexual activity since delivery	18.5
Currently using family planning	11.8
Method of family planning using (n=38)	
Female Sterilization	0.0
Male Sterilization	0.0
Implant	13.3
IUD	0.0
Injectables	48.7
Pill	2.0
Emergency Contraception	0.0
Male Condom	0.0
Female Condom	0.0
Std. Days/Cycle beads	0.0
LAM	34.7
Rhythm method	0.0
Withdrawal	0.0
Other traditional methods	0.0
Discussion on family planning with husband/partner (n=38)	74.8
Contraceptive decision-making (n=38)	
Woman's	37.3
Husband's/Partner's	0.0
Joint	62.8
Provider forced contraception (n=38)	19.8
Contraceptive decision-making non-use (n=286)	
Woman's	28.2
Husband's/Partner's	1.0

Joint	57.5
Other	13.3

Newborn Postnatal Care

Only one-quarter of the 313 infants alive at the 6-week interview had received a newborn health check since delivery. As with maternal care, most newborn care was provided through health extension workers (70.8%) followed by a skilled health professional (41.4%). Multiple providers could be selected for newborn care. Slightly less than half of neonatal care was provided in the home (48.7%), with a greater proportion of postnatal care sought in the public health system (61.7%). Vaccination coverage remained low at the 6-week interview, with only 25.6% and 29.1% of neonates having received a BCG or oral polio vaccine, respectively. By six weeks postpartum, slightly over one quarter of infants were no longer exclusively breastfed (27.1%).

Table 18: Infant healthcare indicators from 6-week interview (n=313 infants), weighted

Indicator	**Weighted %**
BCG vaccination	25.6
Oral polio vaccination	29.1
Exclusive breastfeeding in the previous 24 hours	72.9
Neonatal health check since delivery	25.7
Neonatal health check service provider (n=80)*	
Doctor	10.6
Health officer	0.9
Nurse/midwife	29.9
Skilled worker, can't distinguish	11.0
Health extension worker	70.8
Health development army	0.0
Traditional birth attendant	0.0
Other	4.3
Neonatal health check service delivery location (n=80)*	
Home	48.7
Government hospital	10.6
Government health center	24.8
Government health post	26.3
Private hospital/clinic	13.4
Other private medical sector	4.9
NGO/Faith-based health facility	0.0
Traditional healer/medicine	4.3
Number of days after delivery to first neonatal health check	
≤ 2 days	3.2
> 2 days	94.3

Don't know	2.5
*Multiple response options could be selected for this question	

Complications and Care-seeking

In the second follow-up interview, women answered questions about any illnesses that occurred between the 7-day visit and the 6-week visit. Women could report more than one illness. Of all infants alive at the 7-day follow-up, 46.5% experienced at least one illness between the 7-day and 6-week interview. Cold or cough was the illness most often reported, with 31.1% of newborns having experienced symptoms, followed by fever (8.6%) and diarrhea (5.8%).

Table 19: Post-neonatal infant illnesses and care seeking from MNH 6-week postpartum interview (n=319), weighted

Post-neonatal complications	**%**
Any neonatal illness suffered since 7-day interview	46.5
Sought care for any complication, (n=148)	52.2
Poor feeding or unable to suck	2.5
Sought care for complication, (n=8)	73.6
Diarrhea	5.8
Sought care for complication, (n=18)	72.5
Pus in the umbilicus*	0.9
Redness of the umbilicus*	0.0
Red eye/passage of pus from eyes*	0.7
Hypothermia (temp 35 C)*	0.7
Jaundice*	0.0
Convulsion*	0.0
Skin rash/Skin lesion	3.2
Sought care for complication, (n=10)	83.0
Baby doesn't cry/breathe*	0.0
Fever (temp more than 38 C)	8.6
Sought care for complication, (n=27)	47.6
Unconscious*	0.0
Fast breathing	2.0
Sought care for complication, (n=6)	34.7
Sore throat/Tonsillitis	5.3
Sought care for complication, (n=17)	84.0
Difficulty in breathing*	0.8
Chest in drawing*	0.7

Doesn't pass urine*	0.7
Doesn't pass stool*	1.0
Cold/cough	31.1
Sought care for complication, (n=99)	39.6
* Too few observations to show distribution of care-seeking	

Amongst neonates who were reported to have experienced an illness, respondents reported seeking care in approximately half of the cases (52.2%). Almost 20% of neonates with complications received care through the government health system and another 15% received care at home. Amongst newborns who experienced any complication between the 7-day and 6-week interview and for whom the mother sought treatment (n=169), 22.4% received a referral to a health post or health center. Amongst those who received a referral (n=38), approximately equal percentage received a referral from a friend or family member as from a skilled professional (i.e. a doctor, nurse, or midwife) (43.8% and 44.1%, respectively). Health extension workers accounted for 14.6% of referrals given.

Table 20: Care seeking locations for postnatal infant illnesses and neonatal illness referrals

Indicator	**Weighted %**
Place sought care for any complication since 7-day interview (n=148)	
Home	14.8
Government hospital/health center	19.3
Private hospital/clinic	6.6
Traditional healer/medicine	7.6
Nowhere, no treatment sought	48.7
Any referral for neonatal illness since birth (n=169)	22.4
Person referred (n=38)	
Doctor	13.7
Nurse/midwife	30.4
Skilled worker, can't distinguish	9.2
Health extension worker	14.6
Health development army	0.0
Traditional birth attendant	0.0
Husband/partner	11.7
Family/friend	43.8

Post-neonatal (6-month)

Maternal postnatal care

Maternal postnatal care indicators reported at the 6-month follow-up vists are presented in Table 21; stratified results are not presented due to the small sample size of women who had received a maternal health check. At the 6-month interview, approximately one-third (30.5%) of women had received a post-delivery maternal health check. Among women who reported a maternal health check within the first six months, the majority (58.3%) of maternal health checks were performed by an HEW though a considerable number of health checks were performed by an indistinguishable skilled health professional (28.0%) or nurse (17.8%). While maternal health checks most often occurred at a government health post (47.6%) or government health center (34.5%), a substantial number of health checks also occurred within the home (19.1%). Less than ten percent of health checks occurred within the private sector. Of those who received a health check, almost all women reported the check occurred more than two days after delivery.

Table 21: Maternal healthcare indicators from 6-month interview (n=324 women), weighted

Indicator	**Weighted %**
Maternal health check since delivery	30.5
Maternal health check service provider (n=99)	
Doctor	2.0
Health officer	3.0
Nurse/midwife	17.8
Skilled worker, can't distinguish	28.0
Health extension worker	58.3
Health development army	0.0
Traditional birth attendant	0.0
Maternal health check service delivery location (n=99)	
Home	19.1
Government hospital	3.7
Government health center	34.5
Government health post	47.6
Private hospital/clinic	8.6
Other private medical sector	1.0
NGO/Faith-based health facility	0.8
Traditional healer/medicine	0.0
Number of days after delivery to first maternal health check (n=99)	
≤ 2 days	1.0
> 2 days	98.0

Postpartum Family Planning

Additional postpartum family planning questions were added to the 6-month interview and results are presented in Table 22. Approximately forty percent of women had received counseling for postpartum family planning at the 6-month interview, though at time of interview, only one-quarter reported that their menses had returned. Regardless of counseling received and return of the menses, 44% of women were using family planning by the 6-month interview and approximately one-quarter of all women started using family planning within three months of birth. Moreover, 88% of women had resumed sexual activity by six months postpartum, with most women (52.2%) resuming sexual activity between two to three months after the birth of the baby.

Among postpartum family planning users, the injectable was the most commonly elected method (66.0%), followed by the implant (22.4%) and the pill (5.4%). Over three-quarters of postpartum family planning users obtained their method from a government provider, either a health center, health post, hospital, or HEW.

Approximately ninety percent of women using family planning reported that they discussed their decision to use with their husband or partner and nearly three-quarters stated that the decision to use family planning was a joint decision. Among contraceptive non-users, approximately half of women said that the decision not to use was joint, whereas 29.4% said that it was their own choice, 4.6% said that it was their husband's, and 11.0% said that it was another person's choice.

Table 22: Maternal family planning-related indicators (n=324 women), weighted

Indicator	**Weighted %**
Received counseling on family planning since delivery	41.2
Resumed sexual activity since delivery (n=318)	
Not resumed	11.8
<2 months	19.1
2-3 months	52.2
4+	16.9
Currently using family planning	43.8
Method of family planning using (n=142)	
Female Sterilization	0.0
Male Sterilization	0.0
Implant	22.4
IUD	0.5
Injectables	66.0
Pill	5.4
Emergency Contraception	0.0
Male Condom	0.0
Female Condom	0.0

Std. Days/Cycle beads	0.0
LAM	2.7
Rhythm method	1.9
Withdrawal	0.0
Other traditional methods	1.2
Place obtained contraception (n=137)	
Public Sector: Govt. Hospital	8.5
Public Sector: Govt. Health Center	20.3
Public Sector: Govt. Health Post/HEW	55.7
Public Sector: Other Public	3.2
NGO: NGO Health Facility	0.0
Private Medical Sector	7.9
Other Source: Friend/Relative	4.0
Months after delivery began using contraception (n=321)	
Not using	56.5
<3	25.5
3-6	17.2
6+	0.8
Menstrual cycle resumed	23.0
Discussion on family planning with husband/partner (n=142)	91.0
Contraceptive decision-making (n=142)	
Woman's	21.7
Husband's/Partner's	3.4
Joint	74.6
Provider forced contraception (n=142)	1.3
Contraceptive decision-making non-use (182)	
Woman's	29.4
Husband's/Partner's	4.6
Joint	55.0
Other	11.0

Newborn Postnatal Care

Newborn postnatal care indicators are presented in Table 23, with vaccine data presented separately in Table 23. Approximately half of mothers reported that their newborn had been checked on since delivery, and among those receiving a health check, the check was most often provided by a HEW (76.9%). These checks were most likely to occurs at government health posts (50.1%), government health centers (30.8%), or government hospitals (19.2%), though nearly thirty percent (27.5%) of health checks took place in either the family's home or another home. Among those receiving newborn health checks, 94% reported that these checks took place more than two days after delivery. Among all women interviewed at the 6-month interview, 16.3% reported that they had exclusively breastfed their newborn within the last 24 hours.

Table 23: Infant healthcare indicators from 6-month interview (n=311 infants), weighted

Indicator	**Weighted %**
Exclusive breastfeeding in the previous 24 hours	16.3
Neonatal health check since delivery	52.9
Neonatal health check service provider (n=164)	
Doctor	14.9
Health officer	2.1
Nurse/midwife	26.9
Skilled worker, can't distinguish	22.3
Health extension worker	76.8
Health development army	0.0
Traditional birth attendant	0.0
Neonatal health check service delivery location (n=164)	
Home	27.5
Government hospital	19.2
Government health center	30.8
Government health post	50.9
Private hospital/clinic	6.8
Other private medical sector	1.6
NGO/Faith-based health facility	0.4
Traditional healer/medicine	0.0
Other	1.1
Number of days after delivery to first neonatal health check (n=164)	
≤ 2 days	5.7
> 2 days	94.3

Complications and Care-seeking

In the third follow-up interview, conducted six months after birth, women answered questions about any illnesses that occurred between the 6-week visit and the 6-month visit. Women could report more than one symptom. Of all infants alive at the 6-week follow-up, 64.4% experienced at least one illness between the 6-week and 6-month interview. Cold or cough was the symptom most often reported, with 62.2% of newborns having experienced cold or cough, followed by diarrhea (18.0%) and vomiting (13.6%).

Table 24: Infant illnesses and care seeking since 6w visit from MNH 6-month postpartum interview (n=313), weighted

Post-neonatal complications	**Weighted %**
Any infant illness since 6-week interview	64.4
Sought care for illness	70.8
Poor feeding or unable to suck	1.1
Diarrhea	18.0
Sought care for illness	85.9
Pus in the umbilicus	0.0
Redness of the umbilicus	0.0
Red eye/passage of pus from eyes	2.9
Sought care for illness	27.6
Hypothermia (temp 35 C)	0.0
Jaundice	0.0
Convulsion	0.0
Skin rash/Skin lesion	8.7
Sought care for illness	90.9
Baby doesn't cry/breathe	0.0
Fever (temp more than 38 C)	11.0
Sought care for illness	94.4
Unconscious	0.0
Fast breathing	3.6
Sought care for illness	100.0
Sore throat/Tonsillitis	2.3
Sought care for illness	100.0
Difficulty in breathing	0.8
Chest in drawing	0.8
Doesn't pass urine	0.0
Doesn't pass stool	0.3
Cold/cough	37.3
Sought care for illness	62.2
Vomiting	13.6
Sought care for illness	81.4
Reduced alertness/lethargy	0.0

Amongst neonates who were reported to have experienced an illness, care was sought in approximately 70% of the cases. Although cold and cough were the most common symptoms, care

was sought for only 62% of the cases where cold and cough was recorded. Higher care seeking was seen for symptoms such as fever, sore throat, rash and fast breathing.

Table 25: Care seeking locations for infant illness since 6-week visit, (n=201) weighted

Indicator	**Weighted %**
Place sought care for any illness since 6-week interview*	
Home	9.7
Government hospital/health center	47.7
Private hospital/clinic	10.4
Traditional healer/medicine	10.5
Nowhere, no treatment sought	30.5
* Multiple response options could be selected for this question	

Almost half of newborns with complications received care through the government health system (47.7%). Approximately equal percentages of care was sought in the home, in the private sector, or through a traditional healer. About one-third of newborns who experienced symptoms were not taken for treatment.

Vaccines

Infant vaccination was reported by two modalities--per vaccination card or per self-report. Women were first asked to present the vaccination card; if the vaccination card was missing entirely or if the individual vaccination was not filled in, then she was asked if her child had received the vaccination. Responses to vaccination per vaccination card or per self-report were mutually exclusive--vaccine modalities and totals are presented in Table 26.

Approximately three-quarters of newborns received the BCG, oral polio, pentavalent, PCV, and rotavirus vaccinations.

Table 26: Infant vaccination indicators from 6-month interview (n=311 infants), weighted

Indicator	**Weighted %**
Showed vaccination card	45.1
BCG vaccination	
Received as per vaccination card, (n=128)	88.4
Received as per self-report, (n=183)	63.7
Total	74.0
Oral polio vaccination	
Received at least one dose as per vaccination card, (n=128)	96.9
Received at least one dose as per self-report, (n=183)	56.2
Total	73.0
Pentavalent	
Received at least one dose as per vaccination card, (n=128)	89.5
Received at least one dose as per self-report, (n=183)	58.9
Total	71.4
PCV	
Received at least one dose as per vaccination card, (n=128)	95.1
Received at least one dose as per self-report, (n=183)	48.1
Total	67.2
Rotavirus	
Received at least one dose as per vaccination card, (n=128)	94.8
Received at least one dose as per self-report, (n=183)	50.9
Total	68.8

Recall

At each follow-up interview, women were asked to report complications they experienced during pregnancy, delivery, and in the immediate post-partum period and to report on whether the neonate was wrapped, immediately put to breast, placed naked on the chest immediately after birth and if the neonate experienced any symptoms of illness in the first seven days of life. We compared women's report at the first and second and first and third visit for these reports. Table 27 below shows the consistency in reporting the experience of any complications during pregnancy, delivery, and immediately post-partum. Only those women who reported a complication were asked if they sought treatment. For those women who reported a complication during only one interview, their report of care-seeking is thus missing in the comparison interview. For example, only the 115 women who reported a pregnancy complication in both the first and second interview contributed data to assess the consistency of care-seeking, although in total, 187 women reported a complication in either the first or second interview. This restriction significantly reduced the number of women who contributed information for care-seeking, particularly for post-partum complications. Of note,

women who reported that they experienced a complication and received treatment at home were recorded as receiving treatment. Due to the small sample size, we do not show estimates for care-seeking for post-partum complications in Tables 28 and 29 below.

Table 27: . Frequency of report of experience of any complication during pregnancy, delivery, post-partum or report of neonatal illness in first seven days by interview

			6-week			**6-month**	
7-day			Yes	No		Yes	No
	Pregnancy complications	Yes	115	55		106	64
		No	17	135		16	135
	Delivery complications	Yes	69	56		61	64
		No	15	182		19	178
	Post-partum complications	Yes	53	46		37	61
		No	27	196		28	195

Table 28 and 29 show measures of recall accuracy between the first and second visit (7-day and 6-week) and first and third visit (7-day and 6-month interviews), respectively. The reporting at 6-week postpartum regarding experience of complications during pregnancy had overall low sensitivity, ranging from a low of 26.7 for vaginal bleeding to a high of 69.8 for edema, but high specificity from 94.6 for migraine to 100.0 for high blood pressure. The ROC and kappa values suggest that the overall level of reliability in reporting pregnancy complications was fair to moderate. The agreements between the reporting of complications at 7-day and 6-weeks were reasonably high. Reporting of treatment received for complications from a hospital or health center had relatively low sensitivity, specificity and overall reliability. The reporting on complications at 6-month had even lower reliability.

The reporting of complications during the delivery and postpartum period had low to fair level of reliability at both 6-week and 6-month follow-up interviews. Specificity was high for almost all reported complications. Reporting of receipt of treatment has reasonably lower specificity. While it appears that the sensitivity and specificity for receiving care for complications is high, these results are only among women who were consistent in reporting experience of complications. As we did not ask questions about care-seeking for women who did not experience complications, these observations are treated as missing; it is likely, however, that sensitity and specifity are significantly lower than shown here.

Of the three immediate newborn care indicators, two (immediate placement of the baby on mother's chest with skin to skin contact, and breastfeeding started within one hour) had high sensitivity, but low specificity. Overall, the reliability of reporting was good. Newborn being wrapped immediately (< 5 minutes) had lower levels of reliability estimates.

The reporting of neonatal complication was low. The specificity estimates were reasonably high, but sensitivity was low. Agreements were high. Overall, 6-month reporting had slightly lower reliability than the 6-week reporting.

Table 28: Validation results of MNH complications and care seeking reporting at 6-week postpartum period

Variable	N	Reported at 1st visit (7 days)	Reported at 2nd visit (6 weeks)	Sensitivity (95 CI)	Specificity (95 CI)	ROC (95 CI)	Agreement (%)	Kappa (95 CI)
Pregnancy complications								
Abnormal discharge	322	5.0	4.3	56.3 (29.9-80.2)	98.4 (96.2-99.5)	0.77 (0.65-0.9)	96.0	0.56 (0.45-0.67)
Abdominal pain	321	21.8	14.9	50.0 (37.8-62.2)	94.8 (91.4-97.2)	0.73 (0.67-0.79)	85.2	0.51 (0.41-0.62)
Convulsion	322	7.5	7.5	45.8 (25.6-67.2)	95.6 (92.8-97.7)	0.71 (0.61-0.81)	92.0	0.42 (0.31-0.52)
Edema	322	18.6	15.8	68.3 (55.0-79.7)	96.2 (93.1-98.2)	0.83 (0.77-0.89)	91.1	0.68 (0.59-0.81)
Fever	322	13.7	11.2	45.5 (30.4-61.2)	94.2 (90.9-96.7)	0.69 (0.62-0.77)	87.3	0.42 (0.32-0.53)
High blood pressure	309	4.8	2.9	60.0 (32.3-83.7)	100.0 (98.8-100)	0.8 (0.67-0.93)	98.1	0.74 (0.63-0.85)
Migraine	322	23.3	14.9	46.7 (35.1-58.6)	94.8 (91.3-97.2)	0.71 (0.65-0.77)	83.7	0.47 (0.37-0.58)
Vaginal bleeding	322	4.3	1.6	28.6 (8.4-58.1)	99.7 (98.2-100)	0.63 (0.52-0.75)	96.3	0.39 (0.29-0.48)
Any complication	322	52.8	41.0	67.6 (60.1-74.6)	88.8 (82.7-93.3)	0.79 (0.74-0.83)	77.9	0.56 (0.46-0.67)
Received treatment	115	65.9	58.3	75.3 (64.2-84.4)	71.1 (54.1-84.6)	0.73 (0.64-0.82)	73.9	0.44 (0.26-0.62)
Delivery complications								
Excessive bleeding	320	19.0	13.5	53.2 (40.1-66.9)	95.8 (92.6-97.9)	0.75 (0.68-0.81)	87.7	0.55 (0.44-0.66)
Leaking membrane 24hr	322	7.0	3.7	21.7 (7.5-43.7)	97.7 (95.3-99.1)	0.6 (0.51-0.68)	92.3	0.25 (0.15-0.35)
Leaking membrane <9m	322	2.1	0.6	14.3 (0.4-57.9)	99.7 (98.3-100)	0.57 (0.43-0.71)	97.9	0.21 (0.12-0.3)
Malposition	321	3.4	2.5	50.0 (18.1-81.3)	99.4 (97.7-99.9)	0.77 (0.62-0.92)	97.8	0.62 (0.51-0.73)
Prolonged labor	322	20.1	13.5	55.4 (42.5-67.7)	96.9 (94.1-98.7)	0.76 (0.7-0.82)	88.7	0.6 (0.49-0.7)
Any complication	322	38.8	26.2	55.6 (46.4-64.4)	92.4 (87.8-95.7)	0.74 (0.69-0.79)	78.1	0.51 (0.41-0.61)
Received treatment	69	84.0	88.1	100.0 (93.8-100.0)	63.6 (30.8-89.1)	0.82 (0.67-0.97)	94.2	0.75 (0.52-0.98
Postpartum complications								
Postpartum hemorrhage	322	12.5	9.5	43.9 (28.5-60.3)	95.4 (92.3-97.5)	0.7 (0.62-0.77)	89.0	0.44 (0.33-0.55)
Fever	322	18.6	14.7	49.2 (36.1-62.3)	93.2 (89.5-95.9)	0.71 (0.65-0.78)	85.0	0.46 (0.35-0.57)
Retained placenta	316	5.2	4.3	52.9 (27.8-77)	98.7 (96.7-99.6)	0.76 (0.64-0.88)	96.2	0.58 (0.47-0.69)
Any complication	322	30.6	25.1	54.5 (44.2-64.6)	87.9 (82.9-91.9)	0.71 (0.66-0.77)	77.6	0.45 (0.34-0.56)

Newborn care								
Immediately placed baby on mother's chest with skin to skin contact	313	50.0	51.7	91.7 (86.2-95.5)	87.9 (81.7-92.6)	0.9 (0.86-0.93)	89.8	0.8 (0.68-0.91)
Wrapped immediate (<=5 minutes)	319	55.1	49.2	67 (59.6-73.9)	72.7 (64.7-79.8)	0.7 (0.65-0.75)	69.6	0.39 (0.28-0.5)
Breastfeeding started in 1 hour	319	83.2	84.0	94 (90.4-96.5)	64.8 (50.6-77.3)	0.79 (0.73-0.86)	89.0	0.6 (0.49-0.71)
Newborn complications								
Cold	315	10.1	5.7	28.1 (13.7-46.7)	96.8 (94-98.5)	0.62 (0.54-0.7)	89.8	0.31 (0.2-0.41)
Difficult breathing	315	1.6	1.6	60.0 (14.7-94.7)	99.4 (97.7-99.9)	0.8 (0.56-1)	98.7	0.59 (0.48-0.7)
Eye infection	315	2.2	1.3	42.9 (9.9-81.6)	99.7 (98.2-100)	0.71 (0.51-0.91)	98.4	0.54 (0.43-0.64)
Fast breathing	315	1.3	0.6	33.3 (0.8-90.6)	99.7 (98.2-100)	0.67 (0.34-0.99)	99.0	0.4 (0.29-0.5)
Fever	315	1.3	2.5	75 (19.4-99.4)	98.4 (96.3-99.5)	0.87 (0.62-1)	98.1	0.49 (0.39-0.6)
Jaundice	315	0.0	0.0	-.-	-.-	-.-	-.-	-.-
Do not cry	315	0.6	0.6	100 (2.5-100)	99.7 (98.2-100)	1 (-1)	99.7	0.67 (0.56-0.77)
No urine pass	315	0.6	0.3	50 (1.3-98.7)	100 (98.8-100)	0.75 (0.26-1)	99.7	0.67 (0.56-0.77)
Other illness	315	1.6	2.5	40 (5.3-85.3)	98.1 (95.8-99.3)	0.69 (0.45-0.93)	97.1	0.29 (0.19-0.4)
Poor feeding	315	1.6	2.2	50 (6.8-93.2)	98.4 (96.3-99.5)	0.74 (0.46-1)	97.8	0.35 (0.25-0.46)
Pus in umbilicus	315	1.3	0.3	25 (0.6-80.6)	100 (98.8-100)	0.63 (0.38-0.87)	99.0	0.4 (0.31-0.49)
Redness umbilicus	315	0.9	0.3	33.3 (0.8-90.6)	100 (98.8-100)	0.67 (0.34-0.99)	99.4	0.5 (0.4-0.59)
Skin lesion	315	2.5	1.6	62.5 (24.5-91.5)	100 (98.8-100)	0.81 (0.63-0.99)	99.0	0.76 (0.66-0.87)
Sore throat	315	1.3	1.3	75 (19.4-99.4)	99.7 (98.2-100)	0.87 (0.63-1)	99.4	0.75 (0.64-0.86)
Unconscious	315	0.0	0.0	-.-	-.-	-.-	-.-	-.-
Vomit	315	6.6	5.7	47.6 (25.7-70.2)	97.3 (94.7-98.8)	0.72 (0.61-0.83)	94.0	0.48 (0.37-0.59)
No illness	315	74.5	81.1	94.1 (90.2-96.7)	57 (45.3-68.1)	0.76 (0.7-0.81)	84.8	0.56 (0.45-0.67)

Table 29: Validation results of MNH complications and care seeking reporting at 6-month postpartum period

Variable	N	% Reported at 1st visit (7 days)	% Reported at 2nd visit (6-months)	Sensitivity (95 CI)	Specificity (95 CI)	ROC (95 CI)	Agreement (%)	Kappa (95 CI)
Pregnancy complications								
Abnormal discharge	321	5.0	3.7	43.8 (19.8-70.1)	98.4 (96.3-99.5)	0.71 (0.58-0.84)	95.7	0.48 (0.37-0.59)
Abdominal pain	320	21.9	9.3	29.6 (19.3-41.6)	96 (92.9-98.1)	0.63 (0.57-0.68)	81.5	0.32 (0.22-0.42)
Convulsion	321	7.5	5.0	20.8 (7.1-42.2)	96.3 (93.6-98.2)	0.59 (0.5-0.67)	90.8	0.2 (0.1-0.31)
Edema	321	18.7	15.3	66.7 (53.7-78)	96.6 (93.6-98.4)	0.82 (0.76-0.88)	90.8	0.68 (0.57-0.79)
Fever	321	13.7	6.9	22.2 (11.2-37.1)	95.4 (92.2-97.5)	0.59 (0.53-0.65)	85.2	0.22 (0.12-0.32)
High blood pressure	306	4.8	2.9	40 (16.3-67.7)	99 (97-99.8)	0.69 (0.57-0.82)	96.1	0.48 (0.37-0.59)
Migraine	321	23.4	15.3	38.7 (27.6-50.6)	91.6 (87.4-94.7)	0.65 (0.59-0.71)	79.4	0.34 (0.24-0.45)
Vaginal bleeding	321	4.4	3.7	42.9 (16.3-67.7)	97.7 (95.4-99.1)	0.69 (0.56-0.82)	95.1	0.4 (0.29-0.51)
Any complication	321	53.0	38.0	63.2 (55.6-70.4)	89.4 (83.4-93.8)	0.76 (0.72-0.81)	75.4	0.52 (0.41-0.62)
Received treatment	106	65.9	67.2	77.3 (66.2-86.2)	61.3 (42.2-78.2)	0.69 (0.59-0.79)	72.6	0.37 (0.18-0.56)
Delivery complications								
Excessive bleeding	319	18.8	10.9	39.3 (27.1-52.7)	95.4 (92.1-97.6)	0.67 (0.61-0.74)	84.8	0.41 (0.31-0.52)
Leaking membrane 24hr	321	6.9	3.1	9.1 (1.1-29.2)	97.4 (94.9-98.9)	0.53 (0.47-0.59)	91.4	0.09 (-0.01-0.19)
Malposition	318	3.1	3.8	54.5 (23.4-83.3)	97.7 (95.4-99.1)	0.76 (0.61-0.92)	96.3	0.48 (0.37-0.59)
Prolonged labor	320	19.9	14.1	48.4 (35.8-61.3)	94.6 (91.1-97)	0.72 (0.65-0.78)	85.5	0.48 (0.38-0.59)
Any complication	321	38.6	24.9	49.6 (40.5-58.7)	90.5 (85.5-94.2)	0.7 (0.65-0.75)	74.7	0.43 (0.32-0.53)
Received treatment	61	83.9	90.0	100.0 (93.4-100.0)	57.1 (18.4-90.1)	0.79 (0.59-0.98)	95.0	0.70 (0.46-0.94)
Postpartum complications								
Postpartum hemorrhage	325	12.5	7.1	27.5 (14.6-43.9)	95.8 (92.8-97.8)	0.62 (0.55-0.69)	87.4	0.28 (0.18-0.39)
Fever	325	18.6	12.3	36.1 (24.2-49.4)	93.2 (89.4-95.9)	0.65 (0.58-0.71)	82.5	0.34 (0.23-0.44)
Retained placenta	321	5.2	3.7	35.3 (14.2-61.7)	98 (95.8-99.3)	0.67 (0.55-0.78)	94.7	0.39 (0.28-0.49)
Any complication	321	30.6	20.5	39.2 (29.4-49.6)	87.5 (82.4-91.5)	0.63 (0.58-0.69)	72.9	0.29 (0.19-0.4)

Newborn care								
Immediately placed baby on mother's chest with skin to skin contact	312	50.0	57.1	95.5 (90.9-98.2)	82.2 (75.3-87.8)	0.89 (0.85-0.92)	88.8	0.78 (0.67-0.89)
Wrapped immediate (<=5 minutes)	318	55.1	43.7	57.1 (49.5-64.6)	72.7 (64.7-79.8)	0.65 (0.6-0.7)	64.2	0.29 (0.18-0.4)
Breastfeeding started in 1 hour	318	83.2	85.8	93.6 (89.9-96.2)	51.9 (37.8-65.7)	0.73 (0.66-0.8)	86.5	0.49 (0.38-0.6)
Newborn complications								
Chest drawn	312	0.0	0.0	-.-	-.-	-.-	-.-	-.-
Cold	312	10.1	5.7	16.1 (5.5-33.7)	95.4 (92.2-97.5)	0.56 (0.49-0.62)	87.5	0.14 (0.04-0.25)
Convulsion	312	0	0	-.-	-.-	-.-	-.-	-.-
Difficult breathing	312	1.6	1.6	60 (14.7-94.7)	99.3 (97.7-99.9)	0.8 (0.56-1)	98.7	0.59 (0.48-0.7)
Fast breathing	312	1.3	1.0	25 (0.6-80.6)	99.4 (97.7-99.9)	0.62 (0.38-0.87)	98.4	0.28 (0.17-0.39)
Fever	312	1.3	2.5	50 (6.8-93.2)	98.4 (96.3-99.5)	0.74 (0.46-1)	97.8	0.35 (0.25-0.46)
Hypothermia	312	0.6	1.0	100 (15.8-100)	99.7 (98.2-100)	1 (1-1)	99.7	0.8 (0.69-0.91)
Jaundice	312	0.0	0.0	-.-	-.-	-.-	-.-	-.-
Lethargy	312	0.0	0.3	-.-	-.-	-.-	99.7	-.-
Do not cry	312	0.6	1.3	100 (15.8-100)	99.4 (97.7-99.9)	1 (0.99-1)	99.4	0.66 (0.56-0.77)
Other illness	312	1.6	1.6	20 (0.5-71.6)	98.7 (96.7-99.6)	0.59 (0.4-0.79)	97.4	0.19 (0.08-0.3)
Poor feeding	312	1.6	2.9	60 (14.7-94.7)	98 (95.8-99.3)	0.79 (0.55-1)	97.4	0.42 (0.31-0.52)
Skin lesion	312	2.5	2.2	37.5 (8.5-75.5)	98.7 (96.7-99.6)	0.68 (0.5-0.86)	97.1	0.39 (0.27-0.5)
Sore throat	312	1.3	1.9	50 (6.8-93.2)	98.7 (96.7-99.6)	0.74 (0.46-1)	98.1	0.39 (0.28-0.5)
Vomit	312	6.6	2.5	20 (5.7-43.7)	98.6 (96.5-99.6)	0.59 (0.5-0.68)	93.6	0.26 (0.16-0.36)
No illness	312	74.5	79.6	88.5 (83.7-92.3)	46.2 (34.8-57.8)	0.67 (0.61-0.73)	77.9	0.37 (0.26-0.48)

Family Folder (FF)

Results not available in online version

Phone Follow-up

Table 33 below shows the number of women enrolled and the number of women who completed the third interview by interview type. Unweighted counts are shown. Among women enrolled in the phone interview arm, one respondent refused to participate in the phone interview but consented to complete the interview face-to-face and 18 interviews were unable to be completed over the phone but were completed in-person. These 19 respondents are included in the face-to-face interview group when calculating non-response.

Table 30: Completion and response rates by mode of interview (unweighted)

	No Phone: F2F	**Phone Access: F2F**	**Phone Access: Phone**	**Total**
	Unweighted N	**Unweighted N**	**Unweighted N**	**Unweighted N**
Enrollment	77	132	120	329
Lost to follow-up over 6 months	2	2	4	8
MNH-3 Interview type	75	130	116	321
Final response rate	97.4%	98.5%	96.7%	97.6%

We compared the socioeconomic characteristics of the 329 women who completed enrollment to assess if there were differences between women who did and did have access to a phone (Table 34). Women who did not have access to a phone were younger, poorer, less educated and more likely to live in a rural area than women who did have access to a phone. All differences were statistically significant. Analyses were weighted using the survey weights described above. Differences in frequencies between Table 33 and 34 are due to apoplication of the survey weights.

Table 31: Socioeconomic characteristics of women who do and do not have access to a phone (weighted)

	No Phone	**Have Phone**
	n=126	n=203
Age (mean in years)	26.3	27.9
Residence		
Urban	2.8	16.7

Rural	97.3	83.3
Wealth		
Lowest	64.4	20.7
Middle	27.0	37.5
Highest	8.5	41.8
Education		
None	59.2	35.8
Primary	37.1	48.9
Secondary/higher	3.7	15.0

Table 35 below shows the socioeconomic characteristics of the 203 women who reported access to a phone and who were randomized into face-to-face versus phone interview. To demonstrate the effectiveness of using randomization within the ODK application, we show the original enrollment distribution (i.e we retained the enrollment status of 19 women who were originally randomized into the phone interview group). There were no statisticaly significant differences in the any of the background characteristics of the groups.

Table 32: Socioeconomic characteristics of women randomized to face-to-face versus phone interview (weighted)

	F2F	**Phone**	**P-value***
	n=84	**n=119**	
Age (mean in years)	27.4	28.4	.54
Residence			
Urban	18.5	84.6	.44
Rural	81.5	15.4	
Wealth			.59
Lowest	17.2	23.1	
Middle	39.0	36.5	
Highest	43.8	40.4	
Education			.98
None	36.4	35.5	
Primary	48.3	49.3	
Secondary/higher	15.3	15.3	
*P-value is based on Rao and Scott second order corrected chi square, adjusting for clustering and weighting			

To assess if any bias would be introduced by conducting an as-treated analysis, we assessed whether there were any systematic differences between women who were randomized to the phone follow-up group and completed over the phone (treated) and women who were randomized to the phone follow-up and completed face-to-face (cross-over). Due to small sample sizes in the cross-over group,

we collapsed wealth and education into binary classifications. The analysis was weighted and results are presented in Table 36 below.

Table 33: Background characteristics by treated versus cross-over (weighted)

Variables	**Have Phone**		**P-value***
	Treated	**Cross-over**	
	n=96	**n=19**	
Age (mean in years)	28.8	27.6	.51
Residence (%)			
Urban	16.5	9.3	.31
Rural	83.5	90.7	
Wealth/SES			
Above mean	38.6	40.9	.86
Below mean	61.4	59.1	
Education			
None	35.7	35.0	.97
Primary/higher	64.3	65.0	
*P-value is based on Rao and Scott second order corrected chi square, adjusting for clustering and weighting			

There were no statistically significant differences between the two groups, although the small sample size of women who crossed-over groups is small. Although there was no statistically significant difference between the groups, a larger percentage of women who crossed-over did reside in rural areas. This likely reflects poor phone connection in these areas. As there were no systematic differences between the groups, no bias was introduced by proceeding with the as-treated analysis.

Once weighted, there were no statistically significant differences in the percentage of respondents in each arm that reported receipt of maternal postnatal care by the 6-month interview, the percentage of women who exclusively breastfed in the previous 24 hours, the percentage of respondents with an infant alive at the 6-month interview who reported an illness since the 7-day visit, or the percentage that reported currently using a method of contraception. There were, however, statistically significant differences in the percentage of women who reported having a vaccine card between those who were interviewed in person and those who were interviewed over the phone. A challenge for this question was that the presence of the vaccination card could not be confirmed over the telephone.

Table 34: Estimates of selected indicators by mode of interview (as-treated), weighted

Variables	**No Phone**	**Have Phone**		**P-value**
	F2F	**F2F**	**Phone**	
	n=126	**n=102**	**n=96**	

Receipt of maternal postnatal care	27.1	34.9	30.3	.64
Exclusive breastfeeding	16.4	13.4	19.8	.74
Any infant illness	62.5	66.2	64.0	.95
No vaccine card	39.4	34.7	12.1	<.001
mCPR	41.7	45.5	40.1	.88

Qualitative Results

Summary

This section of the report highlights the key operational challenges faced by the field team and draws from experiences of resident enumerators and the supervisory team. The information from this section was drawn from a focus group discussion with selected REs and from feedback given to the supervisory team during data collection. The lessons learned focus largely on the operational challenges and experiences of the data collectors and data quality control team.

Feedback on the Study Tools

The MNH survey was the first longitudinal study under the PMA2020 project. The study identified and followed women in the late second trimester of pregnancy. A crucial screening question to determine eligibility for the study was the gestational age of the woman at the time of screening. To aide in determining gestational age, the date of the woman's last menstrual period (LMP) was also recorded. Recording the LMP and number of months pregnant required significant probing. The majority of data collectors did not encounter respondents who recorded/tracked the days of their menstrual. The REs felt that the respondents did a lot of guessing on this screening question. While recording accurate LMP and months of completed pregnancy was a challenge for field staff, a handful of REs were able to use various religious and cultural events as reference points. In some parts of the region, there are specific instances where women are excluded from participating in various activities because of having their menstrual cycle at the time of these celebrations. This practice of excluding women from various activities was not common practice in most parts of the study area, however, and thus could not be used by many data collectors as a point of reference to help the respondent.

In addition to challenges recording date related questions, REs felt that questions on the first follow-up interview were the hardest for the respondents. The first week postpartum is a hectic time for families and respondents. The REs felt that often respondents were exhausted with all the changes in their life and at times and could seem distracted and unable to focus during the administration of the questionnaire. Mothers were not getting much sleep at this time and the number of questions

seemed overwhelming to the mother. Simultaneously, the neonate could be very demanding. For first follow-up interview, the REs felt that they had to be especially patient and allow the woman to rest, take her time with the interview and go as slow as the respondent wanted.

The first interview posed additional difficulty in administration of the survey because of customary practices throughout Ethiopia where women are made to rest in privacy for the postpartum period. During this period, the woman is often kept in one room of the house so that she can focus on breastfeeding, keep the baby away from evil spirits/evil eye, and regain her strength. During this time visitors can come by the house, but it is rare for people to view and interact with the baby and the mother, particularly those who are not close family members. To help gain entry and trust the REs would call before coming and always come to the house with gifts – often these were groceries (bananas, oranges, sugar, and coffee). The respondents and their families were far more receptive and willing to allow the interviews to take place when the RE came with gifts for the woman and her family. Because of the gestures (i.e., gifts, food etc.) and frequent calls to check on the women (not only to schedule calls) the REs were seen almost like family and were able to navigate the difficult situations and questions, as well as build trust in the respondents, their husbands and families.

For the reasons outlined above, the REs felt that MNH-2 may have been the interview with the most accurate responses as the mother was somewhat more accustomed to caring for and responding to the infant.

Experiences with Loss to Follow-Up and Tracking Women

While the field staff noted some inherent difficulties with a longitudinal study, of which tracking and staying in touch with women was one, they noted that the repeated contact and constant follow-up allowed them to develop relationships with the respondents. The REs felt that they were able to develop meaningful and personal relationships because of this repeated contact and this in turn made the respondent feel more comfortable and truthful in their responses.

While the REs reported that their repeated contact with respondents allowed for relationship building, they did experience challenges with tracking respondents, particularly for the last interview at six months postpartum. This was particularly a challenge in urban areas, where the population is more transient.

Others reported that because of the traditional practice of pregnant women returning to their maternal home for the delivery and the immediate postpartum period, tracking respondents within the first six weeks was challenging. By six months postpartum, women returned to their homes within the selected EAs.

Feedback on Challenging Questions

While questions on LMP and other date related questions were not easy for respondents to accurately recall, the field staff reported back that questions on child death were the hardest to ask. One RE

reported back of a particularly difficult experience. The RE had scheduled an agreed upon time to conduct the first follow-up visit with the respondent and on the day of the interview, when the RE returned to the respondent's home she learned that the infant had recently died and the day of the scheduled interview was the burial day for the infant. This RE called her supervisor who advised her to follow-up in a couple of days. The RE interviewed the mother a few days after the funeral, as per the advice of her supervisor. This RE said that this was the most difficult interview she had to conduct. Days and weeks after the funeral there were still many people coming in and out of the house to visit the mother and family and pay their respects. During the interview, the mother was distant and asked to be alone and not speak to anyone. She did not refuse to participate in the interview; she was just very distant and unable to concentrate on the questions.

Despite the limited recorded instances of child death in the survey, every data collector who had to interview a mother who lost her infant(s) expressed incredible difficulty asking the questions. For the REs, it was trying to have to remain composed in the face of the mother's pain. The experience was even harder for an RE who had to conduct MNH-3 with a mother who lost a child via phone follow-up. The respondent closed the phone on the RE multiple times and raised her voice asking, "*why are you asking questions about a dead child and bringing back the painful memory*". The RE tried her best to console the woman while at the same time collecting the needed data. However, as this was a phone interview, it was hard to read physical cues and body language, adjust the questions, and know when to pause.

All the REs asked for there to be an exception regarding the time to follow-up when there are instances of child deaths so that the interviews can be conducted at least 2 weeks or more after the death.

Lessons Learned from Phone-based Follow-up

Approximately 116 MNH-3 interviews were conducted over the phone. While the majority reported that these phone-based interviews had their benefits to the respondent and the data collector, they also presented a unique set of challenges to the field team. The most commonly reported challenges among those who have conducted a phone interview included the fact that very few women owned a phone. Phone ownership was most common among the husbands/partners. The REs had to schedule the interviews at a time when the husband was available, and this was often hard to coordinate. The REs found that the husbands were willing to have their wives participate, but the challenge was having the men commit to the time and to be home/near his wife at the scheduled time.

In addition, a key study protocol for phone-based and in-person interviews is to ensure auditory privacy. However, for phone interviews this was hard to ensure**.** Many data collectors could hear the respondent talking to children and others in the background in between questions.

Other challenges reported back to the central team were that in some of the rural EAs there is no electricity and charging stations are far from the homesteads, so interviews would get cut off. When

this would happen, they would have to give time for the husband to charge his phone and then keep trying to call back, or schedule call back on market days when the phones would be charged.

Lastly, it was hard to read certain cues over the phone, assess how engaged a respondent really was and know when to pause and probe. The REs said they struggled with this a little because they felt that their respondents could be easily get distracted and want to get off the phones faster. The REs felt that there was a clear contrast between the in-person interviews and the phone-based and that they were more comfortable with difficult questions in-person.

Suggestions from Field Staff to Improve Data Collection Process for Future Rounds of the Survey

REs requested that the study team re-examine the protocol regarding the time for a follow-up interview in cases where the infant/baby has died. They requested that they be allowed an extended period for follow-up (at least two weeks after the funeral of the child) for the scheduled interview.

In addition, field staff feel a strong need to re-examine the compensation given to respondents. Respondents were given a small amount of airtime for phones as a gesture of gratitude for their participation. As phone ownership is relatively low among the respondents, however, this was viewed in large part as being an inappropriate gift. REs also spent their own money on transport and meals to maintain frequent contact with respondents and encourage participation in the various questionnaires. All of these were out of pocket expenses for field staff. The data collection team requested that the compensation structure and package be revised ahead of the next round of data collection.

Discussion

Exigence of high maternal and neonatal mortality in resource poor settings requires routine monitoring of MNCH care utilization so that intervention programs may respond to deficiencies and target low performance areas. Large percentages of women continue to deliver at home in low-resource settings, however, and readily available clinical data from health facilities are not informative for population level indicators. Cross-sectional surveys such as Demographic and Health Surveys (DHS) and Multiple Indicator Cluster Surveys (MICS), which are generally employed every five years, are also not suitable to capturing information on detailed events around delivery due to recall bias and retrospective report that may mask recent changes to MNCH care patterns (Campbell, Benova, Gon, Afsana, & Cumming, 2015) The objective of PMA-MNH was to monitor the coverage of several high impact interventions through implementation of a longitudinal, cohort study. Priority MNCH indicators were identified by the Ethiopian Federal Ministry of Health, the Bill and Melinda Gates Foundation, and the PMA2020 research team. The study was implemented in the Southern Nations Nationalities and Peoples Region (SNNPR) of Ethiopia. While some indicators, particularly those that do not rely on clinical knowledge or intervention, have achieved relatively

high coverage, overall there remains substantial room for improvement. Additionally, while overall coverage is improving, disparities in intervention coverage continue to exist and are particularly stark between urban and rural women, and rich and poor women, and their neonates.

Household Health

Most pregnant women enrolled in the study were living in households with improved drinking water sources, however there were substantial inequities by urban and rural residence. Almost all women living in urban areas (97.6%) exclusively used an improved drinking water source compared to only 67% of women living in rural areas. Similarly, while overall use of an improved sanitation source was low, at less than 10%, in urban areas approximately 27% of women resided in households with an improved sanitation source compared to 7% of rural women. Poor access to improved water and sanitation increases the risk of diarrhea, which remains a significant contributor to under-5 mortality globally and in Ethiopia (Ethiopian Public Health Institute (EPHI), Federal Democratic Republic of Ethiopia (FMoH), Countdown to 2015, 2015; UNICEF and World Health Organization, 2015). The risk of contracting postpartum neonatal and maternal infection is also higher among women with poor access to improved sanitation (Benova, Cumming, Gordon, Magoma, & Campbell, 2014; O. M. R. Campbell et al., 2015). This risk is disproportionally high among rural populations.

Maternal Health

Receipt of any antenatal care is generally high, but only half of all women received four or more antenatal care visits, the minimum number originally recommended by the World Health Organization (WHO) and the guidance currently followed by the FMoH of Ethiopia (Ethiopian Federal Ministry of Health, 2010). In the 2016 updated guideline, WHO recommends a minimum of eight ANC contacts, but this guidance has not yet been reviewed and adopted by Ethiopia (World Health Organization (WHO), 2016). Given that half of women are already not reaching the recommended four visits, increasing coverage such that women receive eight ANC visits in Ethiopia will be challenging. Among those women who did receive ANC care, approximately half saw an ANC provider for the first time six months or more into their pregnancy. Additional outreach and communication to promote ANC visits early in pregnancy is important, particularly amongst the poor.

PMA-MNH included several questions that measured aspects of the contents of ANC visits that have not been regularly measured in other surveys. The contents of ANC visits in Ethiopia focus primarily on counseling regarding delivery care and less on the provision of diagnostic services. Diagnostic testing of syphilis, a priority indicator of the Gates Foundation and HIV, a priority of the FMoH, remain particularly low among all women regardless of background characteristics. It is possible that women under-reported receipt of testing for these diseases if they were not aware of tests that were conducted on biological samples, but this also indicates inadequate counseling during ANC. If women are unaware that they are being tested and diagnosed for sexually transmitted diseases, they will also be unaware of changes to health behavior that may be necessary to prevent transmission to their partner and baby. While it is important to increase coverage of diagnostic testing, it is also critical to

ensure that testing involves sufficient counseling about results, even when the respondent is negative. Beyond testing for STIs, there were significant urban/rural differentials in the provision of specific ANC components; urban women were much more likely to receive blood pressure testing, a blood draw, and to give a urine sample than rural women which are critical tests for screening for maternal health risks such as pre-eclampsia. Conversely, women in rural areas were more likely to receive counseling on post-partum family planning than urban women, which is likely a reflection of the reliance on HEWs for ANC in rural areas and the importance of family planning counseling and provision that the FMOH places within the HEW constellation of services.

Improving the quality and expanding the contents of ANC services may also lead to continued increases in the institutional delivery rate and skilled birth attendant rate as Chukwuma and colleagues have found (2017b). While both institutional delivery and skilled birth attendance rate have risen quickly in recent years, they remain low overall (53% for both indicators) and are particularly low for high parity women. Women who were nulliparous prior to the current pregnancy were more likely to deliver in a health facility than women who had previously given birth; similarly, younger women (15-24 years) were more likely to delivery at a health facility (58.9%) than older women (35-49 years, 46.7%). This is in keeping with evidence suggesting that coverage of key health interventions, including antenatal care and institutional delivery, are generally lower for high parity births, placing high parity women and their children at increased risk of morbidity and mortality (Sonneveldt, DeCormier Plosky, & Stover, 2013). Additional outreach may be necessary for higher parity and older women to encourage continued use of maternal and neonatal care services after the first birth.

Low desire for maternal health services is also evidenced in the responses to intended place of delivery. Higher percentages of high parity women reported that they intended to deliver at home relative to nulliparous women. This may reflect that women who have successfully delivered at least one child place less value on antenatal and delivery care services, relative to women who have never given birth. Overall, approximately one quarter of women said that they intended to deliver in a facility during the screening interview but reported that they delivered at home during the first follow-up interview. Another twenty percent of women intended to deliver at home and did. Among women who did not deliver in a facility, 78% said that it was because of a sudden delivery. The longitudinal nature of the survey allowed us to identify women who were unable to meet their stated delivery intention, and while future analyses will explore reasons behind this discordance, the small sample size is a limitation. In the future, more information could be added to the survey, and explored further through qualitative research, to better understand the timelines of delivery and specific barriers women face in achieving their delivery intentions. Of note, despite approximately 75% of women stating that they intended to deliver in a health facility, fewer than half of women reported discussing transportation plans for delivery during their antenatal care visit. Increased emphasis on helping women to plan their deliveries and establishing a transportation plan may help to reduce the percentage of women who are unable to reach a health facility after the onset of labor.

Slightly more than one-third of women reported at least one delivery complication, of which three-quarters reported seeking treatment. One in five women reported severe bleeding during pregnancy while complications such as pre-term labor and malpresentation were rare. The pattern of responses

to complications is likely due to the ability of women to identify complications. For example, women who do not know their last menstrual period will not be able to identify pre-term labor with accuracy. Similarly, women may over-report the prevalence of severe bleeding as it is difficult to determine what is a typical versus atypical amount of blood during pregnancy. Regardless of whether women met the clinical definition of each complication, what is worth noting is that one-in-four women who identified that she had a complication in pregnancy did not seek care. Women are thus experiencing events during pregnancy that they identify as complications but are not seeking care within the formal health system.

Coverage of postnatal care visits that discuss the health of the mother remains low, with fewer than one in ten women receiving a postnatal care visit from a health worker within the first week postpartum. Of those that received a visit, 30% were in the first two days postpartum, equivalent to approximately 3% of all women. By six weeks postpartum, 15% of women had received any check on their health since delivery and by six months, this number increased to 30%. This shows the region is not on track to achieve the national coverage of 95% for postnatal care by 2020. Though significant progress remains in women being seen within two days of delivery, there are multiple opportunities to increase maternal postnatal care during the postpartum period. For example, a larger proportion of women reported receiving counseling on family planning than discussing their health with a provider. Similarly, more women reported that the infant had been vaccinated and had a health check by six months postpartum than reported that they had a health check in which their health had been discussed. Ideally, integrated community care would be combining vaccine delivery with neonatal health screenings and providing an opportunity for health providers to check on women's health and provide counseling and FP service provision. As noted previously, integration of services during the postnatal period has the potential to greatly reduce maternal and neonatal morbidity and mortality but beyond incorporation of postpartum family planning services into maternal health checks, maternal and newborn health services do not appear to be broadly integrated.

While improvements in ANC and other outreach may help to explain some of the recent increases in institutional and skilled delivery, it is important to keep in mind the differences in methodology that may also affect estimates. The DHS includes retrospective questions of all live births in the past five years and reports the institutional delivery and skilled birth attendant rate across all responses. Thus changes in the uptake of delivery care services in recent years may be masked by aggregated responses. Both surveys confirm that higher percentages of urban women reported delivery in a health facility and by a skilled birth attendant than rural women, underscoring the inequity in access to clinical services between these groups.

Neonatal Health

Approximately one-third of newborn deaths in Ethiopia are estimated to be due to neonatal asphyxia (Ethiopian Public Health Institute (EPHI), Federal Democratic Republic of Ethiopia (FMoH), Countdown to 2015, 2015). In the PMA-MNH sample, most newborns (93%) cried and/or breathed normally after birth. Among those that did not (n=20), in one-quarter of cases, nothing was done to

resuscitate the newborn. Of the five neonates who died between birth and the first follow-up visit at 7 days postpartum, three were reported to have had difficulty breathing or crying. These numbers are indicative of continued challenges with prompt and effective treatment for neonatal asphyxia but must be interpreted with caution due to the small sample size.

About one-third of all live births were reported to be weighed at birth. Almost all neonates that were weighed were born in a health facility (97%). Being weighed at the health facility is not universal, however; among all neonates born in a health facility, approximately 25% of mothers reported that the infant was not weighed and another 20% reported that they did not know if the infant was weighed (not shown). As institutional delivery increases, it is likely that larger percentages of women will not be able to report if the infant was weighed, calling into question the utility of measuring this indicator in household surveys where institutional delivery rates are high. As reported at the first follow-up interview, one-half of neonates were wrapped within five minutes of delivery and approximately forty percent were placed naked on the mother's chest.

About one in eight neonatal deaths in Ethiopia is due to neonatal sepsis. Clean cord care, that is cutting the cord with a boiled or sterilized instrument and treatment of the umbilical cord with chlorhexidine have been shown to reduce the rate of neonatal sepsis and neonatal mortality (Darmstadt et al., 2008; Sinha, Sazawal, Pradhan, Ramji, & Opiyo, 2015). In the majority (88%) of live births in the home, the umbilical was cut with a boiled or new razor blade, reflecting better awareness about the importance of handling the cord with clean materials. Antiseptic substances, specifically chlorhexidine, were not widely applied to the cord after cutting. Nothing was applied to the cord for almost half (48%) of all neonates and butter or another substance such as petroleum jelly or dung was applied to one third of the neonates. Though women were not able to report what substance was applied to 17% of newborns, which raises concerns about the ability to measure chlorhexidine use with precision in household surveys, the high number of cords that continue to be treated with traditional materials is of concern. It was noted that PMA-MNH did not include a question on what was used to tie the cord after delivery. Future surveys would incorporate this question to better ascertain comprehensive cord-care.

By one-week postpartum, 15% of newborns were no longer exclusively breastfed and this number dropped by an additional 10% by the 6-week follow-up visit. By the end of the 6-month period, only 16% of newborns were exclusively breastfed. At a national level, the EDHS estimated that approximately 74% of neonates 0-1 month were exclusively breastfed, 36% of newborns age 4-5 months and 16% of newborns age 6-8 months were exclusively breastfeeding. The PMA-MNH estimates are thus in keeping with DHS estimates and demonstrate that the messages regarding exclusive breastfeeding up to age 6 months must be reinforced.

As previously discussed, receipt of postnatal care is higher for neonates than for women, however, it remains low, particularly during the first two days after birth. The low provision of postnatal care is reflected in low vaccination rates for BCG and oral polio at birth. About one in ten neonates received an oral polio vaccination within the first week of life and fewer received BCG vaccination. By the 6-month interview, fewer than half of mothers (41%) showed their vaccination card during the interview. Of those that did, vaccination coverage for BCG, oral polio, pentavalent, PCV, and rotavirus

was over 85%. Among women who self-reported vaccination coverage, coverage was much lower, with approximately half of newborns having received the oral polio, pentavalent, PCV, or rotavirus vaccination. In total, only about 70% of newborns were reported to have received each vaccine. To reach the goal of the Ministry of Health to reach 98% vaccination coverage for pentavalent 3 by the year 2020, substantial improvements need to be made.

Recall

Though longitudinal cohort studies are traditionally used to ascertain causality between interventions or exposures and later health outcomes, due to the limited sample size and small number of events such as asphyxia or death, we chose instead to capitalize on the longitudinal nature of the study to rigorously assess the ability of women to consistently recall events that occurred during delivery. Though the majority of coverage surveys rely on recall of events, few studies have assessed the reliability and validity of self-report over time, and the majority are limited to births within the facility (Stanton et al., 2013; Tunçalp et al., 2013). Rather than compare self-report to facility records, we assessed the consistency of report within individual women to identify questions which may be significantly biased when reported over longer time intervals.

We found that the majority of questions related to experience of maternal complications during pregnancy and delivery performed with high specificity, but generally lower sensitivity and that sensitivity goes down with time. This indicates that 1) complications are generally rare and that 2) women may be more likely to report complications close to birth, when the experience is recent and that over time, the perceived severity may fade, and women no longer recall or believe that they experienced a complication. Of all pregnancy and delivery related complications, edema had the highest sensitivity in both the 6-week and 6-month interview, which may be because the complication is both relatively common and swelling is easy to identify, relative to complications like high blood pressure. Interestingly, receipt of treatment for complications experienced during pregnancy was low across all measures, indicating that attempting to ascertain care seeking behavior retrospectively is not likely to lead to accurate estimates of care seeking.

Two of the newborn indicators that we measured, whether the baby was immediately placed on the chest with skin to skin contact and whether breastfeeding started within an hour, performed with high sensitivity at both the 6-week and 6-month visit, but had lower specificity, which declined over time. Of these, whether the baby was placed skin to skin on the mother's chest performed the best, with sensitivity above 90% at both visits and specificity declining from 87.9 to 82.2 at the 6-month visit. The decline in specificity is reflected in the increase of the overall prevalence estimates over time, increasing from 50.0% at the first visit to 51.7% and 57.1% at the 6-week and 6-month visit, respectively. Though there is evidence of declining specificity over time, the generally consistent validity results of this indicator are in line with work by Stanton and colleagues that recommended its inclusion into international survey programs. Similarly, the decline in specificity for initiation of breastfeeding within one hour was consistent, though we found relatively little impact on the prevalence estimates over time (increasing from 83.2% to 85.8% over the study period). These questions may thus be suitable for prevalence estimation but are less likely to be reliable for analyses

at the individual level. We differ from Stanton and colleagues, however, in our recommendation regarding whether the infant was wrapped within five minutes of birth. Stanton and colleagues recommend its inclusion into national surveys, with the caveat it should not be used for individual level analyses. In PMA-MNH, however, we see a susbtantial decrease in prevalence estimates over time, from 55.1% at the original survey to 43.7% at the 6-month follow-up. As such, based on these findings, it is likely to be underreported when measured retrospectively and may not be suitable for national surveys.

One limitation to our study, however, is that we were unable to verify the woman's self-report of these events with either health facility records or birth attendant report and thus assume that one of the interviews is more accurate than others. We assume in this analysis that the woman's first report at the7-day interview is the most reliable as the least amount of time had passed since birth. Results from the qualitative interviews suggest, however, that the 6-week interview may have been the most reliable reporting. Additional analyses will explore consistency using the 6-week interview as the standard.

Family Folder

Results not available in online version

Phone Follow-up

The phone follow-up randomization allowed us to test the feasibility of conducting interviews over the phone. In general, we found that the phone follow-up was successful and, once weighted, returned consistent results across multiple indictors. There are, however, several caveats to conducting interviews over the phone that should be considered before administering a survey over the phone.

1. Response rates to the phone follow-up were lower than for face-to-face interviews. Approximately 15% of women who were originally randomized into the phone follow-up arm completed the interview in-person. Although there were no statistically significant differences between "treated" and "cross-over" groups, a higher proportion of cross-over women were rural, reflecting weaker phone coverage in rural and remote areas. Phone follow-up may be able to reduce some costs, but the cost savings will generally be found among women who are already relatively easy to reach. Women in rural and remote areas, who are the most expensive to interview, will be the least likely to be able to complete the interview over the phone.

2. There were statistically significant differences in the background characteristics of women who had access to a phone compared to those who did not. Women who did not have access to a phone were more likely to be poor, live in a rural area, and have no education. As these characteristics are related to several maternal and neonatal health outcomes, the differences in sample characteristics must be accounted for when attempting to generate any population level estimates. Attempting to generate population level estimates by administering a phone

survey alone and not accounting for the fact that responsdents are likely to be wealthy, urban and educated would result in biased estimates.

3. Although many indicators did not demonstrate any statistically significant differences across groups once survey weights were applied, the percentage of women who reported that they had a vaccine card did vary between interviews completed in-person versus remotely. REs were instructed to verify the presence of a vaccine card in the home when conducting the interview in-person but this was not possible to do over the phone. Respondents may have introduced bias by preferentially reporting that they had a card in the home knowing it could not be verified. For surveys that rely on observation or verification of the presence or absence of something in the home, remote surveys are not appropriate as social desirability bias is likely to impact respondent reporting.

4. Although we did not observe many statistically significant differences in indicators across arms, qualitative interviews with REs indicated that phone interviews were more difficult to conduct when the questions were sensitive or complex. For example, REs who asked questions about the death of a child over the phone reported that they did not feel it was an appropriate modality to administer these kinds of emotionally charged questions. They felt that they could not appropriately respond if the woman was upset such as offering comfort or pausing the interview. Additinally, they reported concerns about privacy, as they could not confirm that the respondent was in a private location. Therefore, surveys that incorporate questions on highly sensitive issues, such as a neonatal deaths, or illicit behaviors, such as contraceptive use or abortion (not measured in this study) may not be appropriate to administer over the phone. Finally, REs reported that phone surveys should be short. REs struggled to keep the attention of respondents for long periods of time and felt that the modality is not suited to long or complex surveys, a finding in keeping with previous studies of phone survey methodology (Greenleaf et al., 2017).

Strengths and Limitations

PMA-MNH monitored a range of maternal and newborn health indicators that had not been previously included in population-based surveys. As this was a feasibility study and implementation was limited to one region in Ethiopia, however, the sample size was small. This limited our ability to identify statistically significant differences across background characteristics, such as wealth or parity, although the patterns are generally in keeping with previous research. While we included several questions in the female survey to measure the prevalence of interventions such as chlorhexidine or oxytocin, due to a lack of other population-based surveys measuring these values, it is difficult to validate our values. The family folder could perhaps provide some information to validate individual report in the future, however, the current low coverage and incompleteness of the family folder curtailed our ability to validate individual report with health system records. Future work would be strengthened by including a simultaneously fielded service delivery point survey to estimate the availability of key interventions in the health system.

Despite these limitations, the PMA-MNH study has several strengths. First, the study completed a census of all randomly selected EAs to identify all women six or more months pregnant, reducing the selection bias often inherent in maternal and newborn health studies that are conducted amongst women who deliver in health facilities. Additionally, the study utilized enumerators who had conducted multiple rounds of PMA2020 surveys and who were familiar with survey work and with the communities in which they were collecting data. The familiarity with respondents and relationship with the community that REs have built over time, discussed in more detail below, likely contributed to low non-response and loss to follow-up. Finally, the longitudinal nature of the survey allowed several advantages; first, prospective follow-up eliminated the bias associated with including births from five years ago and reduced the likelihood of recall bias in the first follow-up interviews. By including the same questions in multiple rounds of the survey, we were able to evaluate the consistency of responses over time and assess the extent to which recall bias may affect certain indicators.

Recommendations

The current validation study identified several gaps in the provision of MNH services in SNNPR, particularly for some of the indicators that are not routinely measured in standard household surveys such as the DHS. Specifically, it is worth mentioning the following unique features that helped provide unique insights into the performance of the health system in maternal and newborn care;

1. Measured the prevalence of risk factors during pregnancy, birth and postpartum including bleeding, preterm labor and malpresentation;
2. Measured important indicators of newborn health including difficulty breathing at birth (as a proxy for asphyxia), use of chlorhexidine for cord care and clean handling of the umbilical cord (as prevention practices for neonatal sepsis) and immunization over the 6-month period after birth;
3. Attempted to verify availability and completeness of family folders kept at health posts by health extension workers.

The findings have implications for MNH programs in SNNPR and the whole country in the following areas:

Implications for Programs and Research

Maternal Services

- Adherence of the recommended four ANC visits remains low. This is also reflected in lower attendance by skilled attendance at delivery for rural women. It is important to note that having four or more visits is similar to the percentage of women obtaining skilled attendance at birth. Increasing high quality ANC outreach may thus result in overall delivery service utilization.

- Another important challenge in ANC is initiation of care late in the pregnancy. This should be addressed by encouraging HEWs to refer for early ANC initiation for all pregnancies, regardless of parity, and improving awareness of the community through various media outlets.
- Improve content of ANC:
    - Improve testing for important risk factors including preeclampsia, anemia, and STIs including syphilis and HIV
    - Improve the counseling service at ANC – The study showed counseling by providers is low for many of the routine ANC services including counseling for postpartum family planning and discussion on danger signs, or birth preparedness and complication readiness. Additionally, improvements in diagnostic testing must be accompanied by improvements in counseling to ensure that women understand what they are being tested for, the results of the tests, and any modifications to health behavior that may improve health outcomes.

It is encouraging to note that a high percentage of women intend to deliver in facilities. However, a much lower percentage do deliver in a health facility. This indicate the need to thoroughly discuss preparatory activities needed to ensure facility delivery, particularly for those who are convinced about its importance. The fact that many women gave the reason of 'sudden delivery' as a reason for home delivery suggests inadequate preparation for transportation and communication with health facilities.

Newborn Services

- Focus on reducing unhealthy practices that could affect newborn health including applying unclean foreign materials on the cord.
- More awareness creation on the importance of chlorhexidine and improving the supply is needed to reduce the risk of infection and sepsis.
- Improve immunization services – in view of the low health service utilization, especially for services that need continuous follow-up, it is imperative to strengthen the outreach program to reach more children with vaccines at the right age.

Family Folders

Institute a verification mechanism for availability and completeness of family folders by conducting random evaluations aimed at measuring key indicators and providing supportive supervision. It is also essential to have a reward system for HEWs who keep complete family folders as there is significant variation between health posts.

Further Research

The study tested several new questions that are not traditionally included in nationally representative surveys. Some of these questions could be instrumental for inclusion in future surveys to allow regular monitoring but would benefit from validation of self-report to health facility records. Further research and refinement for some of the questions is necessary to identify whether the questions are appropriate only for some sub-populations (e.g institutional versus home delivery). Additionally, due to the small sample size, we were limited in our ability to link the experience of complications during pregnancy and delivery to later health outcomes for either the mother or child. Additional qualitative research could be undertaken to better understand the events surrounding delivery and how quickly childbirth occurred, particularly among women who reported "sudden delivery".

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Appendix I - Bill & Melinda Gates Foundation MNCH Dashboard Indicator Definitions

Short name	Indicator	Denominator
Access across the continuum of care ("Proxies")		
Antenatal care (4 visits)	% of women attended at least four times during pregnancy by any provider for reasons related to the pregnancy	# of mothers age 15-49 with a live birth in the survey reference period
Institutional delivery	% of live births delivered in a health facility (public & private)	# of mothers age 15-49 with a live birth in the survey reference period
Skilled attendant present at birth	% of live births assisted by a skilled provider (doctor, nurse, midwife, auxiliary nurse/midwife)	# of mothers age 15-49 with a live birth in the survey reference period
Postpartum care visit	% of women with post-partum check-up within 2 days for last live birth	# of mothers age 15-49 with a live birth in the survey reference period
Postnatal care visit	% of babies with post-natal check-up within 2 days for last live birth	# of mothers age 15-49 with a live birth in the survey reference period
INTERVENTIONS - Facility readiness ("Proxies")		
Newborn asphyxia bag and mask%	% of facilities with a functional bag and mask for resuscitation	# of facilities reporting/visited
Chlorhexidine for cord	% of facilities with chlorhexidine available	# of facilities reporting/visited
Kangaroo Mother Care	% of facilities with a designated space for KMC initiation and at least one staff member has received training in KMC	# of facilities reporting/visited
PPH uterotonics	% of facilities with uterotonics available	# of facilities reporting/visited
Handwashing	% of facilities with running water and soap or alcohol-based hand rub in the delivery ward/room	# of facilities reporting/visited
PRoM antibiotics	% of facilities with oral/injectable antibiotic	# of facilities reporting/visited
Pre-eclampsia MgSO4	% of facilities with MgS04 available	# of facilities reporting/visited
INTERVENTIONS - Core coverage ("Ideal")		
Newborn sepsis antibiotics	% of newborns with suspected sepsis (possible serious bacterial infection) treated with antibiotics	# of babies born in SRP, who had suspected sepsis (PSBI symptoms) during 0-2 months of age
Newborn asphyxia bag and mask	% of newborns with asphyxia (not breathing, or gasping, at birth) who are resuscitated with bag and mask and established spontaneous breathing	# of live births in SRP in a facility with asphyxia (not breathing or gasping at birth)
Chlorhexidine for cord	% of newborns having CHX 7.1% w/v (or appropriate formulation) applied to the cord stump within the first 24 hours of life	# of live births in SRP
Clean cord care	% of newborns receiving clean cord care	# of live births in SRP
Exclusive breastfeeding <6 months	% of newborns receiving exclusive breastfeeding through first 6 months	# of babies 0-5 months old at the time of the survey
Immediate breastfeeding	% of newborns breastfeeding within 1 hour	# of live births in SRP
Kangaroo Mother Care	% of low birth weight infants initiated on KMC (facility)	# of live births in SRP in a facility who were low birth weight
Thermal care- skin-to-skin	% of newborns receiving skin-to-skin contact within 5 minutes of birth	# of live births in SRP
Thermal care- drying	% of newborns receiving immediate drying within 1 minute of birth	# of live births in SRP
PPH uterotonics	% of mothers who received prophylactic uterotonics	# of mothers age 15-49 with a live birth in SRP (excluding c-sections)
Handwashing	% of deliveries where delivery attendant washed hands with soap	# of mothers age 15-49 with a live birth in SRP
pPRoM antibiotics	% of pregnant women with pPRoM who are not in labor and are given oral erythromycin	# of pregnant women admitted to a health facility with pPRoM in SRP
Pre-eclampsia MgSO4	% of women with pre-eclampsia who are treated with IV/IM MgS04	# of pregnant women admitted to a health facility with pre-eclampsia or eclampsia in SRP

Syphilis test	% of pregnant women who were tested for syphilis while receiving ANC services	# of mothers age 15-49 with a delivery in SRP
Note: Some definitions vary by country –further alignment is under way. Definitions as of January 2017		

Appendix II – Questionnaires

IIA – Household questionnaire

Household Screening Questionnaire

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	Relevant
IDENTIFICATION **Please record the following identifying information prior to beginning the interview.**			
A	**Your name: Is this your name?** [ODK will display the name associated with the phone's serial number.] *Check the button next to the name if that is your name and select 'yes' here. Do not check the button if that is not your name and select 'no' here (long press to remove response next to the name if needed).*	Yes ..... 1 No 0	Always
	Enter your name below. *Please record your name*	Interviewer's Name	If A=0
B	**Is this date and time correct?** [THE CURRENT DATE AND TIME WILL BE DISPLAYED ON SCREEN]	Yes ..... 1 No 0	Always
C	**Record the correct date and time**	Date / Month / Day / Year Time / Hour / Minutes / AM/PM	If B=0
D1	**Region**	Tigray ..... 1 Afar ..... 2 Amhara ..... 3 Oromia ..... 4 Ethiopia Somali ..... 5 Benishangul Gumuz ..... 6 SNNPR ..... 7 Gambella ..... 8 Harari ..... 9 Addis Ababa ..... 10 Dire Dawa 11	Always
D2	**Zone**	*ODK will populate a list of appropriate zones based on the selected region.*	Always

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	Relevant
D3	**District**	*ODK will populate a list of appropriate districts based on the selected zone.*	Always
D4	**Locality Name**	*ODK will populate a list of appropriate localities based on the selected district. There may be only one choice.*	Always
D5	**Enumeration area**	*ODK should populate the appropriate EA*	Always
E	**Structure number** *Please record the structure number from the household listing form.*		Always
F	**Household number** *Please record the household number from the household listing form.*		Always
G	**Check: Have you already sent a form for this structure and household?** *Do not duplicate any form unless you are correcting a mistake in an earlier form.*	Yes ..... 1 No 0	Always
	WARNING: Contact your supervisor before sending this form again.		
H	**CHECK: Why are you resending this form?** *Choose all that apply.*	There are new household members on this form ..... 1 I am correcting a mistake made on a previous form ..... 2 The previous form disappeared from my phone without being sent ..... 3 I submitted the previous form and my supervisor told me that is was not received ..... 4 Other reason(s) 5	If G=1
I	**Is a member of the household and competent respondent present and available to be interviewed today?**	Yes ..... 1 No 0	Always
J	**Did this household participate in a previous PMA2020 survey?**	Yes ..... 1 No ..... 0 Do not know ..... -88 No response ..... -99	If I=1
INFORMED CONSENT **Find a competent member of the household. Read the greeting on the following screen.**			
K	Explain the consent form to the respondent. Then, ask: **May I begin the interview now?**	Yes ..... 1 No 0	If I=1

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	Relevant
L	**Interviewer's name** *Please record your name as a witness to the consent process. You previously entered "[NAME FROM HSQ A]."*		If K=1
M	**Respondent's first name.** *Please record the first name of the respondent.*		If K=1

SECTION 1 – Household Screening

I am now going to ask you a series of questions about each usual member of the household or anyone who slept in the house last night.

	HSQ1	HSQ2	HSQ3	HSQ4	HSQ5	HSQ6	HSQ7	HSQ8
	First name	**Sex**	**Age (years)** If less than one year old, record 0.	**Marital Status**	**Relationship to head of household**	**Does [NAME] usually live here?**	**Did [NAME] stay here last night?**	**Eligible female respondent**
Rel	K=1	K=1	K=1	K=1	K=1 Restrict only one HH head/household	K=1	K=1	K=1 & Q2=2 & Q3>=15 & Q3<=49 & Q6=1
		Male ..... 1 Female 2		Married ..... 1 Living with a partner .. 2 Divorced / separated . 3 Widow / widower ..... 4 Never Married ..... 5 No response .....-99	Head ..... 1 Wife/Husband ..... 2 Son/Daughter ..... 3 Son/Daughter-in-law .. 4 Grandchild ..... 5 Parent ..... 6 Parent in law ..... 7 Brother/Sister ..... 8 Other ..... 9 Step child/adopted----10 Don't know .....-88 No response .....-99	Yes ..... 1 No .....0 No response -99	Yes ..... 1 No .....0 No response -99	Yes ..... 1 No ..... 0 No response .....-99 *ODK will determine and display eligibility*
1								
2								

3							

After recording information for one household member, the following prompt is asked to activate a looping script to record information for another member			
HSQ9	**Are there any other usual members of your household or persons who slept in the house last night?**	Yes ..... 1 No ..... 0 No response ..... -99	K=1
Check question: ODK will display the following constraint message if more than one household heads were selected Multiple heads are registered. Please register only one head in the household. Please go back and make corrections.			
	READ THIS CHECK OUT LOUD: There are [NUMBER OF HOUSEHOLD MEMBERS ENTERED] household members who are named [NAMES OF ENTERED HOUSEHOLD MEMBERS]. Is this a complete list of the household members? *Remember to include all children in the household.*	Yes ..... 1 No ..... 0 No response ..... -99	K=1
HSQ10	**Now I would like to ask some questions that are sensitive and that they may be difficult to answer.** **Are there any households members who have died in the last three years, that is since July 2013? This includes any infants that may have died shortly after birth.** *Remember to ask about babies who may have died.*	Yes ..... 1 No ..... 0 No response -99	K=1

This section of the household screening will gather information on any persons in the household who died in the last three years (since July 2005).							
	HSQ11	**HSQ12**	**HSQ13**	**HSQ14**	**HSQ15**	**HSQ16**	**HSQ17**
	First name	**Sex**	**Age when [NAME] died (years)**	**Month and Year [NAME] died**	**Was [NAME] pregnant when she died?**	**Did [NAME] die during childbirth/miscarriage/ abortion?**	**Did [NAME] die within 6 weeks after the end of a pregnancy of childbirth?**

Rel	**HSQ10=1**	**HSQ10=1**	**HSQ10=1**	**HSQ10=1**	**${HSQ10}='1' and ${HSQ12}='2' and ${HSQ13}>=15 and ${HSQ13}<=49**	**${HSQ10}='1' and ${HSQ12}='2' and ${HSQ13}>=15 and ${HSQ13}<=49 and ${HSQ15}='0' or {HSQ15}='-88' or {HSQ15}='-99'**	**${HSQ10}='1' and ${HSQ12}='2' and ${HSQ13}>=15 and ${HSQ13}<=49 and ${HSQ15}='0' or {HSQ15}='-88' or {HSQ15}='-99' and {HSQ16}='0' or {HSQ16}='-88' or {HSQ16}='-99'**
		Male .....1 Female 2			Yes .....1 No .....0 No response .....-99	Yes .....1 No .....0 No response .....-99	Yes .....1 No .....0 No response .....-99
1							
2							
3							

HS Q18	**Please tell me about the items your household owns. Does your household have:** *Read out all types and select all that apply. Scroll to bottom to see all choices.* *If an item is reported broken but said to be out of use only temporarily, select the item. Otherwise do not select the item.* **READ OUT ALL TYPES AND SELECT ALL THAT APPLY.**		Yes	No	K=1
		Electricity?	1	0	
		A watch/clock?	1	0	
		A radio?	1	0	
		A television?	1	0	
		A mobile phone?	1	0	
		A non-mobile telephone?	1	0	
		A refrigerator?	1	0	
		A table	1	0	
		A chair	1	0	
		A bed with cotton/sponge/spring mattress	1	0	
		An electric mitad	1	0	
		A kerosene lamp/pressure lamp	1	0	
		A bicycle?	1	0	
		A motorcycle or motor scooter?	1	0	
		An animal-drawn cart	1	0	
		A car or truck?	1	0	
		None of the above	-77		
		No response	-99		
HS Q19	**Main material of the floor** *Observe.*	Earth/Sand	11		K=1
		Dung	12		
		Wood Planks	21		
		Palm/Bamboo	22		
		Parquet or polished wood	31		
		Vinyl/Asphalt strips	32		
		Ceramic Tiles	33		
		Cement	34		
		Carpet	35		
		Other	96		
		No response	-99		
HS Q20	**Main material of the roof** *Observe.*	No Roof	11		K=1
		Thatch/Leaf/ Mud	12		
		Rustic Mat/Plastic Sheets	21		
		Reed/Bamboo	22		
		Wood Planks	23		
		Cardboard	24		
		Corrugated Iron/Metal	31		
		Wood	32		
		Asbestos/Cement Fiber	33		
		Cement/Concrete	34		
		Roof Shingles	35		
		Other	96		
		No response	-99		

HS Q21	**Main material of the exterior walls** *Observe.*	No Walls ..... 11 Cane/Palm/Trunks/Bamboo/Reed ..... 12 Dirt ..... 13 Bamboo/ Wood with Mud ..... 21 Stone with Mud ..... 22 Uncovered Adobe ..... 23 Plywood ..... 24 Cardboard ..... 25 Reused Wood ..... 26 Corrugated sheets ..... 27 Cement ..... 31 Stone with Lime/Cement ..... 32 Bricks ..... 33 Cement Blocks ..... 34 Covered Adobe ..... 35 Wood Planks/Shingles ..... 36 Other ..... 96 No response ..... -99	K=1
HQ S22	**Do you have a place to wash your hands, or do you have a movable container that is not kept in a fixed location, such as a bowl or kettle, that is commonly used for hand washing?** *If the container is always in the same location, then count it as a fixed place*	Yes, fixed place ..... 1 Yes, movable container ..... 2 No ..... 0 Don't know ..... -88 No response ..... -99	K=1
HS Q23	**What are all of the sources of drinking water for members of your household?** *Select all that apply*	Piped Water Piped into dwelling/indoor ..... 11 Pipe to yard/plot ..... 12 Public tap/standpipe ..... 13 Tube well or borehole ..... 21 Dug Well Protected Well ..... 31 Unprotected Well ..... 32 Water from Spring Protected Spring ..... 41 Unprotected Spring ..... 42 Rainwater ..... 51 Tanker Truck ..... 61 Cart with Small Tank ..... 71 Surface water (River / Dam / Lake / Pond / Stream / Canal / Irrigation Channel) ..... 81 Bottled Water ..... 91 Sachet Water ..... 92 No Response ..... -99	K=1

HS Q24	**What is the main toilet facility used by members of your household?** Read out the options on the screen	Flush/pour flush toilets connected to: Piped sewer system ..... 1 Septic tank ..... 2 Elsewhere ..... 3 Unknown / Not sure / Don't know ..... 4 Ventilated improved pit latrine ..... 5 Pit latrine with slab ..... 6 Pit latrine without slab ..... 7 Composting toilet ..... 8 Bucket toilet ..... 9 Hanging toilet /Hanging latrine ..... 10 Other ..... 11 No facility / bush / field ..... 12 No response ..... -99	K=1
HS Q25	**Are you currently a model family?**	Yes ..... 1 No ..... 0 Not applicable ..... -77 No response ..... -99	K=1

LOCATION AND QUESTIONNAIRE RESULT			
N	**Location** **Take a GPS point near the entrance to the household. Record location when the accuracy is smaller than 6m.**	RECORD LOCATION	Always
O	**How many times have you visited this household?**	1st time ..... 1 2nd time ..... 2 3rd time 3	Always
P	**Questionnaire result** *Record the result of the Household Questionnaire*	Completed ..... 1 No household member at home or no competent respondent at home at time of visit ..... 2 Postponed ..... 3 Refused ..... 4 Partly completed ..... 5 Dwelling vacant or address not a dwelling ..... 6 Dwelling destroyed ..... 7 Dwelling not found ..... 8 Entire household absent for extended period . 9	Always

IIB – Female screening questionnaire

Female Screening Questionnaire

NO	QUESTIONS AND FILTERS	CODING CATEGORIES				Relevant
IDENTIFICATION **Please record the following identifying information prior to beginning the interview.**						
A	**Is this your name?** [Interviewer name from Household Screening Questionnaire] *Check the button next to the name if that is your name and select 'yes' here. Do not check the button if that is not your name and select 'no' here (long press to remove response next to the name if needed).*	Yes ..... 1 No 0				Always
A2	**Enter your name below.** *Please record your name*	Interviewer's Name				A=0
B	**Is this date and time correct?** [THE CURRENT DATE AND TIME WILL BE DISPLAYED ON SCREEN]	Yes ..... 1 No 0				Always
C	**Record the correct date and time**	Date	Month	Day	Year	B=0
		Time	Hour	Minutes	AM/PM	
D	**The following information is from the Household Screening Questionnaire. Please review to make sure you are interviewing the correct respondent.** [ODK will display the geographic location information, Structure Number, and Household Number from the linked Household Questionnaire.] **Is the above information correct?** *Go to the right household or update the Household Screening Questionnaire if needed.*	Yes ..... 1 No 0				Always

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	Relevant
	CHECK: You should be attempting to interview [Respondent's Name]. Is that correct? *If misspelled, select "Yes" here and update the name in question "K."* *If this is the wrong person, you have two options:* *(1) exit and ignore changes to this form. Open the correct form.* *Or* *(2) find and interview the person whose name appears above*	Yes ..... 1 No 0	Always
E	**How well acquainted are you with the respondent?**	Very well acquainted ..... 1 Well acquainted ..... 2 Not well acquainted ..... 3 Not acquainted 4	Always
F	**Is the respondent present and available to be interviewed today?**	Yes ..... 1 No 0	Always
INFORMED CONSENT *Find the woman between the ages of 15-49 associated with this Screening Questionnaire. The interview must have auditory privacy. Read the following greeting:*			
G	Explain the consent form to the respondent. Then, ask: **May I begin the interview now?**	Yes ..... 1 No 0	F=1
H	**Interviewer's name** [ODK will display the Interviewer's name from linked Household Screening Questionnaire] *Mark your name as a witness to the consent process.*		G=1
I	**Respondent's Name** [ODK will display respondent's name from the Household Screening Questionnaire. If it is incorrect, correct it here.]		
SCREENING QUESTIONNAIRE			

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	Relevant
FSQ 0	**In what month and year were you born? The age in the household screening questionnaire is [AGE].**	Month Year	G=1
FSQ 00	**How old were you at your last birthday?** *Must be more than 14. Must agree with FSQ0.*	Age	G=1
FSQ 1	**Are you pregnant now?**	Yes ..... 1 No ..... 0 No response ..... -99	G=1
FSQ 2	**How many months pregnant are you?**	Months: No response ..... -99	FSQ1=1
FSQ 3	**When did your last menstrual period start?** *If you select days, weeks, months or years, you will enter a number for x on the next screen.* *Enter 0 days for today, not 0 weeks/months/years.*	Weeks ago: Months ago: Years ago: Before last birth ..... 4 Never menstruated ..... 5 In menopause/has had hysterectomy ... 6 No response ..... -99	G=1
	If time since LMP > 3 months but response to pregnancy status is 'No' ODK will display:] **CHECK: Based on the response you entered in FSQ1, the respondent has not had her menstrual period in the last three months. Please verify pregnancy status**		(FSQ3>3 & FSQ1=0) OR (FSQ3>3 & FSQ1=-99)
Now I would like to ask a question about your current pregnancy. If FSQ1=1			

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	Relevant
FSQ 4	**Where would you like to deliver your baby?**	Her Home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Oher private medical sector ..... 22 NGO/Faith-based health facility ..... 31 Traditional healer/medicine ..... 32 Other ..... 96 Have not decided yet ..... -88 No response ..... -99	FSQ1=1
FSQ 5	**At the time you became pregnant, did you want to become pregnant then, did you want to wait until later, or did you not want to have any / any more children at all?**	Then ..... 1 Later ..... 2 Not at all ..... 3 No response ..... -99	FSQ=1
FSQ 6	**At the time you became pregnant, were you using any method(s) of contraception to avoid becoming pregnant?**	Yes ..... 1 No ..... 0 No response ..... -99	FSQ=1
FSQ 7	**If yes, which method or methods were you using?** **Probe: Anything else?** *Select all methods mentioned. Be sure to scroll to bottom to see all choices.*	Female Sterilization ..... 1 Male Sterilization ..... 2 Implant ..... 3 IUD ..... 4 Injectables ..... 5 Pill ..... 7 Emergency Contraception ..... 8 Male Condom ..... 9 Female Condom ..... 10 Std. Days/Cycle beads ..... 13 LAM ..... 14 Other modern ..... 19 Rhythm method ..... 30 Withdrawal ..... 31 Other traditional methods ..... 39 No response ..... -99	FSQ6=1

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	Relevant
FSQ 8	**Do you have an insecticide treated net in your household?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response .....-99	G=1
FSQ 9	**Do you have regular access to a mobile phone or landline?**	Yes, own ..... 1 Yes, within household ..... 2 Yes, neighbor ..... 3 No access 0	**(FSQ1=1 & FSQ2>6)**
FSQ 10	**Do you also have network coverage where you regularly access the phone?**	Yes, coverage is reliable ..... 1 Yes, but network coverage is not reliable at times..... 2 No network coverage 3	FSQ9=1,2, 3
LONGITUDINAL STUDY INFORMED CONSENT **[FOR ANDUALEM: SCREEN SHOULD ONLY APPEAR IF (FSQ1=1 & FSQ2>=6)]** *Read Longitudinal Informed Consent script here:*			
FSQ 11	**Do you consent to be enrolled in the study?**	Yes ..... 1 No 0	(FSQ1=1 & FSQ2>=6)
	If the respondent is randomly selected to the phone interview to be conducted 6 months after birth, ODK will display: **You have been selected to have the third interview conducted over the phone, rather than in person. Do you agree to conducting the third interview over the phone rather than in person?**	Yes ..... 1 No 0	If random_num < 0.5 and SQ11 = '1' and SQ9='1' or '2'
FSQ 12	**Can you please give me your phone number and an alternate phone number if we are unable to reach you?**	Phone number: Alternate phone number:	FSQ11=1 and FSQ 9= 1 or 2 or 3
	SCAN QR CODE	QR CODE	FSQ11=1
FSQ 13	**Do you intend to move to your parent's or relative's home right before or after delivery of this pregnancy?**	Yes ..... 1 No ..... 0 Do not know .....-88	FSQ11=1

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	Relevant
FSQ 14	**Do they live in the same or adjacent kebele?**	Yes ..... 1 No ..... 0 Don't know ..... -88	FSQ13=1
FSQ 15	**Do they live in the same or adjacent district?**	Yes ..... 1 No ..... 0 Don't know ..... -88	FSQ13=1
LOCATION AND QUESTIONNAIRE RESULT			
J	**Location** *Take a GPS point near the entrance to the household. Record location when the accuracy is smaller than 6m.* *GPS coordinates can only be collected when outside.*	RECORD LOCATION	Always
K	**How many times have you visited this household to interview this female respondent?**	1st time ..... 1 2nd time ..... 2 3rd time 3	Always
L	**Questionnaire result** *Record the result of the Female Screening Questionnaire*	Completed ..... 1 Not at home ..... 2 Postponed ..... 3 Refused ..... 4 Partly completed ..... 5 Incapacitated 6	Always

IIC – Seven-day follow-up questionnaire

Maternal and Neonatal Health Survey – First Interview

NO	QUESTIONS AND FILTERS	CODING CATEGORIES				Relevant
IDENTIFICATION						
A	**Your name:** [Interviewer name] **Is this your name?**	Yes ..... 1 No 0				Always
	Enter your name below. *Please record your name*	Interviewer's Name				If A=0
B	**Current date and time.** [ODK will display on screen] **Is this date and time correct?**	Yes ..... 1 No 0				Always
C	**Record the correct date and time.**	Date	Month	Day	Year	If B=0
		Time	Hours	Minutes	AM/PM	
D	**QR Code** *Scan the QR code that appears on the ID card given at enrollment.* **If you are unable to scan the QR code enter the number on the next screen**	QR code				Always
D1	**Record the correct number on the ID card**					If D=0
E1	**Region**					If D=0
E2	**Zone**	*ODK will populate a list of appropriate zones based on the selected region.*				If D=0
E3	**District**	*ODK will populate a list of appropriate districts based on the selected zone.*				If D=0
E4	**Locality Name**	*ODK will populate a list of appropriate localities based on the selected district. There may be only one choice.*				If D=0
E5	**Enumeration area**	*ODK should populate the appropriate EA*				
E6	**Structure number**					If D=0

	Please record the structure number from the household listing form.		
E7	**Household number**		
F	**Respondent's name** *Enter the respondent's name exactly as it appears on the ID card given at enrollment.*	Respondent's name	Always
H	**Is the respondent present and available to be interviewed today?**	Yes ..... 1 No, unavailable..... 2 No, died 3	Always
I	**When did the woman die; before delivery, during delivery or after delivery?**	Before delivery ..... 1 During delivery ..... 2 After delivery ..... 3 Don't Know……-88 No response .....-99	If H=3
J	**Date of death**	Day: Month:	If H=3

INFORMED CONSENT
Confirm that this woman is still willing to participate in the study.

K	Do you still consent to participate in the study?	Yes ..... 1 No..... 0	If H=1
L	**Interviewer's name:** *Mark your name as a witness to the consent process.*		If H=1

Section 1 – Respondent's Background

Now I would like to ask about your background.

1	**What is your religion?**	Protestant ..... 1 ..... 1 Orthodox ..... 2 Muslim ..... 3 Catholic ..... 4 Traditional ..... 5 Wakefeta ..... 6 Non-believers ..... 7 Other ..... 96 No response .....-99	K=1

2	**What is the highest level of school you attended?**	Never attended .....0 Primary .....1 Secondary .....2 Technical & vocational .....3 Higher……4 No response .....-99	K=1
3	**How many sons and daughters have you given birth to who were born alive, including the child just born?**	Number: No response .....-99	K=1
4	**Have you ever given birth to a boy or girl who was born alive but later died?**	Yes .....1 No .....0 No response .....-99	K=1
5	**How many have died?**	Number: No response .....-99	MFQ4=1
6	**Have you ever given birth to a boy or girl who was born dead?**	Yes .....1 No .....0 No response .....-99	K=1
7	**How many times have you given birth to a boy or girl who was born dead?**	Number: No response .....-99	MFQ6=1
THE FOLLOWING QUESTIONS ARE ABOUT THE CHILD THAT WAS JUST BORN FROM YOUR RECENT PREGNANCY			
8	**On what day and month did you give birth?**	Day: Month: Year: Don't know .....-88 No response .....-99	K=1
9	**How many children were in this pregnancy? (eg twin or triplet?)**	Single .....1 Twin .....2 Triplet .....3 No response .....-99	K=1
	I will now ask you some questions about the baby that was just born. If there was more than one child, we will start with the first child born. ***ODK will repeat questions 11-16 for each child born in this pregnancy***		Repeat MFQ10-MFQ15 each child in MFQ9
10	**What was the outcome of this pregnancy for the [first/second/third] baby born?**	Live birth .....1 Still birth .....2 No response .....-99	K=1
11	**Did the baby cry or show any signs of life?**	Yes .....1 No 0	MFQ10=2

		No response .....-99	
	If response to MFQ10=2 and MFQ11=1 then ODK will display:] **CHECK: The outcome of this pregnancy is live birth. Go back and correct Question number 10.**		
12	**What was the name given to the baby that was just born?** *Write 'Baby' if no name given*	Name: No response .....-99	MFQ10=1
13	**Is [NAME] a boy or a girl?**	Boy .....1 Girl .....2 No response .....-99	MFQ10=1
14	**Is [NAME] still alive?**	Yes .....1 No .....0 No response .....-99	MFQ10=1
15	**IF DEAD: Exactly how many days old was [NAME] when (he/she) died?**	Days: Don't know .....-88 No response .....-99	MFQ14=0
Section 2 – Antenatal Care *Now I would like to ask about the care that you received during pregnancy.*			
16	**Did any health extension worker visit you at your home or did you see an HEW at a health post during this pregnancy?**	No.....0 Yes, at home .....1 Yes, at health post..... 2	K=1
17	**How many times did you receive antenatal care during this pregnancy from a health extension worker, either at a health post or at home?**	Number of Times: Don't know .....-88 No response…….-99	MFQ16=1 or 2
18	**How many months pregnant were you when you first talked to a health extension worker about your pregnancy?**	Months: Don't know .....-88	MFQ16=1 or 2
19	**Did you see a professional health care provider, other than a HEW, for antenatal care during this pregnancy?**	Yes .....1 No .....0 No response .....-99	K=1
20	**What are the reasons that you did not see a professional health care provider for care during your pregnancy? Any other reason?** *(Select all that apply)*	Too far .....1 Inconvenient service hour .....2 Unpleasant staff .....3 Lack of experienced staff .....4 Lack of privacy .....5 Inadequate drug supply .....6 Long waiting time .....7 Service too expensive .....8 Religious reason .....9 Not needed .....10 Did not know of need for care 11	MFQ19=0

		Unable to go/Not permitted to leave house ..... 12 Did not know of a place/Did not know where to go ..... 13 Female provider not available……14 Other ..... 96 No response ..... -99				
21	**Whom did you see, not including an HEW? Anyone else?** <u>*(Select all that apply)*</u> *Probe to identify each type of person and record all mentioned.*	Doctor ..... 1 Health officer ..... 2 Nurse/midwife ..... 3 Skilled worker, can't distinguish ..... 4 Other ..... 96 No response ..... -99				MFQ19= 1
22	**How many months pregnant were you when you first received antenatal care from a professional health care provider for this pregnancy?**	Months: Don't know ..... -88 No response ..... -99				MFQ19= 1
23	**Where did you receive antenatal care for this pregnancy, including from the HEW? Anywhere else?** <u>*(Select all that apply)*</u> *Probe to identify the type of source and record all mentioned*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99				MFQ19= 1 or MFQ16= 1 or 2
24	**How many times did you receive antenatal care during this pregnancy at a health center or hospital?**	Number of Times: Don't know ..... -88 No response……-99				MFQ23= 11, 12, 21, 22, 31
25	**As part of your antenatal care during this pregnancy were any of the following measured at least once:** *Hint: This includes any ANC from any provider* **A) Was your blood pressure measured?**	Yes 1	No 0	DK -88	NR -99	MFQ19= 1 or MFQ16= 1 or 2

	B) Did you give a urine sample that was not for a pregnancy test?	1	0	-88	-99	
	C) Did you give a blood sample?	1	0	-88	-99	
	D) Did you give a stool sample?	1	0	-88	-99	
26	**I don't want to know the results, but as part of your antenatal care were you:** *Hint: This includes any ANC from any provider*	Yes	No	DK	NR	MFQ19=1 or MFQ16=1 or 2
	A) Tested for syphilis?	1	0	-88	-99	
	B) Did you receive the results of your test?	1	0	-88	-99	MFQ26A=1
	C) Did you receive counseling after you were tested?	1	0	-88	-99	MFQ26A=1
27	**I don't want to know the results, but as part of your antenatal care were you:** *Hint: This includes any ANC from any provider*	Yes	No	DK	NR	MFQ19=1 or MFQ16=1 or 2
	A) Tested for HIV?	1	0	-88	-99	
	B) Did you receive the results of your test?	1	0	-88	-99	MFQ27A=1
	C) Did you receive counseling after you were tested?	1	0	-88	-99	MFQ27A=1
28	**During your antenatal care visit, did anyone counsel you on postpartum family planning?** *Hint: This includes any ANC from any provider*	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				MFQ19=1 or MFQ16=1 or 2

29	**During this pregnancy, were you given an injection in the arm to prevent the baby from getting tetanus, that is convulsions (locked jaw) after birth?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				MFQ16= 1 or 2 MFQ19= 1
30	**During this pregnancy, how many times did you get a tetanus injection?**	Times: Don't know ..... -88 No response…….-99				MFQ29= 1
	If number entered for MFQ30 >3, then ODK will display: **CHECK: You entered that the respondent received ${MFQ30} tetanus injections in question MFQ30. Confirm that these were received only during this pregnancy.**					
31	**At any time before this pregnancy, did you receive any tetanus injections?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				K=1
32	**Before this pregnancy, how many times did you receive a tetanus injection?**	Times: Don't know ..... -88				MFQ31= 1
	If number entered for MFQ32 >9, then ODK will display: **CHECK: You entered that the respondent received ${MFQ32} tetanus injections. Is that correct?**					
33	**During this pregnancy did you take any iron tablets or iron syrup?** *A photo of iron tablets will appear on the screen*	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				K=1
34	**During this pregnancy, did you take any drug for intestinal worms?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				K=1
35	**Did you experience any of the following problems during this pregnancy:**	Yes	No	DK	NR	K=1

	A) Severe headache with blurred vision?	1	0	-88	-99	
	B) High blood pressure?	1	0	-88	-99	
	C) Edema face/feet/body?	1	0	-88	-99	
	D) Convulsion/fits?	1	0	-88	-99	
	E) Vaginal bleeding before delivery?	1	0	-88	-99	
	F) High fever?	1	0	-88	-99	
	G) Abnormal vaginal discharge (foul smelling/dark)?	1	0	-88	-99	
	H) Lower abdominal pain?	1	0	-88	-99	
36	**Where did you seek treatment for [EACH PROBLEM LISTED IN 36]?** **This question will be repeated for every health problem you said you experienced during pregnancy** *Interviewer: Select all that apply.*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99				Any of MFQ35 A-MFQ35 H=1
37	**During (any of) your antenatal care visit(s) was there any discussion about the following:** **A) Place of delivery?**	Yes 1	No 0	DK -88	NR -99	MFQ19=1 or MFQ16=1

	B) Delivery by a skilled person?	1	0	-88	-99	
		1	0	-88	-99	
	C) Where to go in case of emergency?	1	0	-88	-99	
		1	0	-88	-99	
	D) Arrangement for transport in case of emergency?					
	E) Danger signs of pregnancy (severe headaches with blurred vision, high blood pressure, edema face/feet/body, convulsions/fits, bleeding before delivery)?	1	0	-88	-99	
38	**Did you receive any tablets that should be taken to prevent bleeding after delivery?** *A picture of misoprostol package will appear on the screen*	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				MFQ19=1 or MFQ16=1
39	**During your most recent pregnancy, did you participate in a 1 to 5 meeting to discuss pregnancy-related issues with your team or team leader?**	Yes ..... 1 No, member but did not participate 2 No, not member..... 3 No response ..... -99				K=1
Section 3 – Delivery *Now I would like to talk more about the delivery of your last baby.*						
40	**Did you go to a maternity waiting home before going into labor?** Hint: This is a room or home where women go to live before they deliver. It is not the waiting room in the health center	Yes ..... 1 No ..... 0 No response ..... -99				K=1
41	**Where did you give birth?**	Her home 1				K=1

	Probe to identify the type of facility.	Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99	
42	**What are the reasons you did not go to a health facility for delivery?** **Any other reason?** *Select all that apply*	Not necessary ..... 1 Not understand that service is needed ..... 2 Not customary ..... 3 Cost too much ..... 4 Lack of money ..... 5 Too far ..... 6 Transport problem ..... 7 No one to accompany ..... 8 No provider available ..... 9 Providers mistreat women ..... 10 Provider not competent ..... 11 Sent home ..... 12 Concern about privacy ..... 13 Family did not allow ..... 14 Better care at home ..... 15 Not know how to go ..... 16 No time to go for services ..... 17 Not know where to go ..... 18 For fear ..... 19 Had sudden delivery ..... 20 Other ..... 96 Don't know ..... -88 No response ..... -99	MFQ41= 1 or MFQ41= 2 or 32
43	**Who assisted with the delivery?** *If Respondent says 'No one assisted,' probe to determine whether any adults were present at the delivery. If Respondent says more than one person, ask who was the primary attendant.*	No one assisted ..... 0 Doctor ..... 1 Health officer ..... 2 Nurse/Midwife ..... 3 Skilled attendant, can't distinguish.... 4 Health extension worker ..... 5 Health development army ..... 6 Traditional birth attendant ..... 7 Family member 8	K=1

		Other ..... 96 No response ..... -99				
44	**Was the baby weighed at birth?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				MFQ10= 1 & MFQ43> 1
45	**Did you experience any of the following problems during the delivery:** **A) Severe bleeding?** **B) Leaking/rupture of membrane and no labor pain for >24 hours?** **C) Leaking/rupture of membrane before 9 months?** **D) Malpresentation (the feet/hand came out first) or malposition (baby lied transversely during pregnancy)** **E) Prolonged labor (>12 hours)?**	Yes 1 1 1 1 1	No 0 0 0 0	DK -88 -88 -88 -88	NR -99 -99 -99 -99	K=1
46	**Where did you seek treatment for the complications you experienced during delivery?** *Select all that apply.*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector 22				Any of MFQ45 A-E=1 Cannot Select -77 or -99 and other option

		NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99				
47	**Did you experience any of the following problems after the delivery:** **A) Retained placenta? (more than 30 minutes)** **B) High fever with foul/smelly discharge or lower abdominal pain?** **C) Severe/heavy bleeding?**	Yes 1 1 1	No 0 0 0	DK -88 -88 -88	NR -99 -99 -99	K=1
48	**Where did you seek treatment for [EACH PROBLEM LISTED IN 47]?** **This question will be repeated for every health problem you said you experienced after delivery**	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99				Any of MFQ47 A-MFQ47 C=1 Cannot Select -77 or -99 and other option
49	**Did you receive any injection after you delivered to prevent excess bleeding?** *A picture of oxytocin/potosin will appear on the screen*	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				K=1

50	**How long were you in labor before you left your home to seek care?** *You will enter a number for x on the next screen.*	Minutes: Hours:Before labor started .....-77 Don't know..... -88 No response .....-99	MFQ41= 11-14 or 21 to 31
51	**Was your delivery by caesarean, that is, did they cut your belly open to take the baby out?**	Yes ..... 1 No ..... 0 No response .....-99	MFQ41= 11-14 or 21 to 31
52	**Did you receive blood transfusion for this delivery?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response .....-99	K=1
53	**How much money did you spend for health care related costs during this pregnancy, not including delivery costs?**	Amount: Don't know..... -88 No response .....-99	K=1
54	**How much money did you spend for care during delivery?**	Amount: Don't know..... -88 No response .....-99	K=1
55	**How much money did you spend on transport costs for delivery? This includes round-trip cost.**	Amount: Don't know..... -88 No response .....-99	MFQ41> 1
Section 4-Post-Partum *Now I would like to ask you about what happened after delivery.*			
56	**What was used to cut the cord?**	Surgical blade ..... 1 Razor blade ..... 2 Bamboo strips ..... 3 Scissor ..... 4 Others ..... 5 Don't know .....-88 No response .....-99	K=1 & 41==1 or 2
57	**Was the instrument boiled before cutting the cord?**	Yes ..... 1 No ..... 0 New blade/ no need to boil ..... 2 Don't know..... -88 No response .....-99	K=1 & 41=1 or 2
58	**Was anything applied to the cord after cutting and tying it?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response .....-99	K=1
59	**What was applied to the cord after cutting and tying the cord?** *Select all that apply.*	Chlorhexidine ..... 1 Other antiseptic/Savlon ..... 2 Antibiotics (Powder/Ointment) ..... 3 Spirit/Alcohol 4	MFQ58 =1

		Gentian violet (GV) ..... 5 Butter……6 Mustard oil with garlic ..... 7 Chewed rice ..... 8 Turmeric juice/powder ..... 9 Ginger juice ..... 10 Petroleum jelly ..... 11 Body/Hair lotion ..... 12 Cattle dung ..... 13 Other ..... 96 Don't know ..... -88 No response ..... -99				
Questions 60-74 will be repeated based on answers to question 10. If the respondent had twins or triplets, this series of question will appear for each child born in this pregnancy						
60	**Did [NAME] cry/breathe normally immediately after birth?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				MFQ10=1
61	**Was anything done to help [NAME] cry or breathe immediately after birth?** *Do not suggest any answers. Ask:* **Anything else?** *Select all that apply.* .	Dried the baby ..... 1 Wrapped the baby ..... 2 Rubbed the back from stimulation .. 3 Rubbed the feet for stimulation ..... 4 Use of ambu-bag ..... 5 Heated the cord ..... 6 Slapped the baby ..... 7 Hold the baby upside down ..... 8 Nothing done ..... -77 Other ..... 96 Don't know ..... -88 No response ..... -99				MFQ60=0
62	**Who took initiative to resuscitate or to help the baby cry?**	Doctor ..... 1 Health officer ..... 2 Nurse/Midwife ..... 3 Skilled attendant,can't distinguish….4 Health extension worker ..... 5 Health development army ..... 6 Traditional birth attendant ..... 7 Other ..... 96 Don't know ..... -88 No response ..... -99				MFQ61=1-8
63	**Did the baby receive any of the following after delivery:** **Eye ointment?** **Any injection?**	Yes 1 1	No 0 0	DK -88 -88	NR -99 -99	MFQ10=1

64	**Did someone place the baby naked on your chest against your skin, immediately after delivery of the baby?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				MFQ10= 1
65	**After delivery, was [NAME] wrapped with a cloth?**	Yes ..... 1 No ..... 0 Don't know ..... -88 No response ..... -99				MFQ10= 1
66	**How many minutes after delivery of [NAME] was he/she wrapped?**	Minutes: Don't know ..... -88 No response ..... -99				MFQ65= 1
67	**When was [NAME] given a bath for the first time?**	Immediately after birth ..... 1 Within 24 hours ..... 2 Second day ..... 3 Third day ..... 4 Days 4-6 ..... 5 Day 7 and later ..... 6 Not given ..... -77 Don't know ..... -88 No response ..... -99				MFQ10= 1
68	**How long after birth did you first put [NAME] to the breast?** *Enter a number for Minutes, Hours, or Days on the next screen.* *If less than 1 hour, record minutes. If less than 24 hours, record hours; otherwise, record days.*	Minutes: ..... 1 Hours:……2 Days: ..... 3 Not yet……..... 0 Don't know..... -88 No response……-99				MFQ10= 1
68b	**Number of minutes, hours or days baby first put to breast** *If Immediately, record "0" minutes.*	Minutes ☐ Hours ☐ Days ☐				MFQ68= 2 or 3

		Yes	No	DK	NR	
69	**Since this time yesterday, did [NAME] receive any of the following?**					MFQ10=1 & MFQ14=1
	Breast milk?	1	0	-88	-99	
	Vitamin, mineral supplements or medicine?	1	0	-88	-99	
	Plain water?	1	0	-88	-99	
	Sweetened, flavored water or fruit juice or tea or infusion?	1	0	-88	-99	
	Oral rehydration solution (ORS)?	1	0	-88	-99	
	Infant formula?	1	0	-88	-99	
	Tinned, powered or fresh milk?	1	0	-88	-99	
	Herbal tonic/drinks	1	0	-88	-99	
	Any other liquids?	1	0	-88	-99	
	Anything else?	1	0	-88	-99	
70	**Has [NAME] ever received a BCG vaccination against tuberculosis, that is, an injection in the arm or shoulder that usually causes a scar?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				MFQ10=1
71	**Has [NAME] ever received oral polio vaccine, that is, about two drops in the mouth, or an injection in the arm to prevent polio?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				MFQ10=1

72	**What illness, if any, has [NAME] suffered from since birth?** *Select all that apply.* *Do not read aloud.*	Poor feeding or unable to suck ..... 1 Diarrhea ..... 2 Pus in the umbilicus ..... 3 Redness of the umbilicus ..... 4 Red eye/passage of pus from eyes 5 Hypothermia (temp 95.5-97.5 F) .... 6 Jaundice ..... 7 Convulsion ..... 8 Skin rash/skin lesion ..... 9 Baby doesn't cry/breathe ..... 10 Fever (temp more than 101 F) ..... 11 Unconscious ..... 12 Fast breathing ..... 13 Sore throat/Tonsillitis ..... 14 Difficulty in breathing ..... 15 Chest in drawing ..... 16 Doesn't pass urine ..... 17 Doesn't pass stool ..... 18 Cold/cough ..... 19 Vomiting ..... 20 Reduced alertness (lethargy) ..... 21 No illness……-77 Other ..... 96 No response ..... -99	K=1

73	**Where did you seek treatment for [EACH PROBLEM LISTED IN 72]?** **This question will be repeated for every illness you said that [NAME] experienced since birth** *Select all that apply.*	Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99	Any of MFQ72 except -77, -99 Cannot Select -77 or -99 and other option
74	**Has any health extension worker visited you since delivery?**	Yes ..... 1 No ..... 0 No response ..... -99	K=1
75	**How many days after birth did the health extension worker visit you?** *If less than 24 hours, write 0 days*	Days: Don't know ..... -88 No response ..... -99	MFQ74=1

76	**At that visit did you receive counseling for:**	Yes	No	DK	NR	MFQ74=1
	A) Family planning?	1	0	-88	-99	
	B) Exclusive Breastfeeding?	1	0	-88	-99	
	C) Immunization?	1	0	-88	-99	
	D) Childcare, including infant feeding, growth, and development?	1	0	-88	-99	

77	**Do you think you will use a contraceptive method to delay or avoid getting pregnant at any time in the future?**	Yes ..... 1 No ..... 0 No response..... -99	K=1

Thank the respondent for her time and update the ID card

Before you leave, update the ID card with the respondent's name, baby's name (if given), the outcome of the birth (live birth, still birth, miscarriage), whether there were multiple births, and whether the baby is still alive.

FOLLOW UP INTERVIEW DATES						
FU6W	**Date of six-week interview** ***Enter Jan 1, 2020 if woman refuses to schedule upcoming interview***	Date	Month	Day	Year	K=1
FU6M	**Date of six-month interview** ***Enter Jan 1, 2020 if woman refuses to schedule upcoming interview***	Date	Month	Day	Year	K=1

LOCATION			
	Did the interview take place at the respondent's home, her family home, or somewhere else?	Respondents home……1 Her Family home……2 Somewhere else……3	Always
M	**Location** *Take a GPS point near the entrance to the household. Record location when the accuracy is smaller than 6m.* *GPS coordinates can only be collected when outside.*	RECORD LOCATION	Always

QUESTIONNAIRE RESULT			
N	**How many times have you visited this household to interview this female respondent?**	1st time ..... 1 2nd time ..... 2 3rd time 3	Always
O	**Questionnaire result** *Record the result of the Female Questionnaire*	Completed ..... 1 Not at home ..... 2 Postponed ..... 3 Refused ..... 4 Partly completed ..... 5 Incapacitated ..... 6 Respondent death ..... 7 Respondent moved ..... 8 Household moved……9	Always

IID – Six-week follow-up questionnaire

Maternal and Neonatal Health Survey – Second Interview

NO	QUESTIONS AND FILTERS	CODING CATEGORIES				Relevant
IDENTIFICATION						
A	**Your name:** [Interviewer name] **Is this your name?**	Yes ..... 1 No 0				Always
	Enter your name below. *Please record your name*	Interviewer's Name				If A=0
B	**Current date and time.** [ODK will display on screen] **Is this date and time correct?**	Yes ..... 1 No 0				Always
C	**Record the correct date and time.**	Date	If B=0	Day	Year	If B=0
		Time	Hours	Minutes	AM/PM	
D	**QR Code** *Scan the QR code that appears on the ID card given at enrollment.* **If you are unable to scan the QR code enter the number on the next screen**	QR code				Always
D1	**Record the correct number on the ID card**					If D=0
E1	**Region**	*ODK will populate a list of appropriate zones based on the selected region. This will be SNNPR for all respondents.*				If D=0
E2	**Zone**	*ODK will populate a list of appropriate zones based on the selected region.*				If D=0
E3	**District**	*ODK will populate a list of appropriate districts based on the selected zone.*				If D=0
E4	**Locality Name**	*ODK will populate a list of appropriate localities based on the selected district. There may be only one choice.*				If D=0
E5	**Enumeration area**	*ODK should populate the appropriate EA*				If D=0

E6	*Please record the following from the household listing form:* **Structure number**		Always
E7	*Please record the following from the household listing form:* **Household number**		Always
F	**Respondent's name** *Enter the respondent's name exactly as it appears on the ID card given at enrollment.*	Respondent's name	Always
G	*Fill in the following from the ID card given at enrollment:* **How many children were in this pregnancy? (eg twin or triplet?)**	Single ..... 1 Twin ..... 2 Triplet + ... 3 No response ..... -99	Always
H	*Fill in the following from the ID card given at enrollment:* **What was the outcome of this pregnancy for the [first/second/third] baby born?** ODK Will repeat H for each child identified in G.	Live birth ..... 1 Still birth ..... 2 No response ..... -99	Always
I	*Fill in the following from the ID card given at enrollment:* **Was the baby still alive at first visit?** ODK Will repeat I for each child identified in G.	Yes ..... 1 No 0	H=1
J	*Fill in the following from the ID card given at enrollment:* **Type name given to baby if name given by first interview. Otherwise, type BABY** ODK Will repeat J for each child identified in G.	Yes ..... 1 No 0	H=1
K	**Is the respondent present and available to be interviewed today?**	Yes ..... 1 No, unavailable ..... 2 No, died ..... 3 No response ..... -99	Always

L	**Date of death**	Day: Month:				K=3
INFORMED CONSENT ***Confirm that this woman has previously completed the Informed Consent.***						
M	**Do you still consent to participate in this study?**	Yes ..... 1 No 0				Always
N	**Interviewer's name:** *Mark your name as a witness to the consent process.*					M=1
Antenatal						
1	**Did you experience any of the following problems during this *pregnancy*?**	Yes	No	DK	NR	M=1
	I) **Severe headache with blurred vision?**	1	0	-88	-99	
	J) High blood pressure?	1	0	-88	-99	
	K) Edema face/feet/body?	1	0	-88	-99	
	L) Convulsion/fits?	1	0	-88	-99	
	M) Vaginal bleeding before delivery?	1	0	-88	-99	
	N) High fever?	1	0	-88	-99	
	O) Abnormal vaginal discharge (foul smelling/dark)?	1	0	-88	-99	
	P) Lower abdominal pain?	1	0	-88	-99	
2	**Where did you seek treatment for [EACH PROBLEM LISTED IN 1]?** **This question will be repeated for every health problem you said you experienced during pregnancy** *Select all that apply.*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77				Any of MSQ1A-MSQ1H=1 If MSQ2=-77 or =-99 cannot select other options

		No response ..... -99				
3	**Did you experience any of the following problems during the delivery:** **F) Severe bleeding?** **G) Leaking/rupture of membrane and no labor pain for >24 hours?** **H) Leaking/rupture of membrane before 9 months?** **I) Malposition (baby lied transversely during pregnancy)/Malpresentation (the feet/hand came out first)?** **J) Prolonged labor (>12 hours)?**	Yes 1 1 1 1 1	No 0 0 0 0 0	DK -88 -88 -88 -88 -88	NR -99 -99 -99 -99 -99	M=1
4	**Where did you seek treatment for the complications you experienced during delivery?** *Select all that apply.*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99				Any of MSQ3A-MSQ3E=1 Cannot Select -77 or -99 and other option

5	**Did you experience any of the following problems *after the delivery*?** **D) Retained placenta? (more than 30 minutes)** **E) High fever with foul/smelly discharge or lower abdominal pain?** **F) Severe/heavy bleeding?**	Yes 1 1 1	No 0 0 0	DK -88 -88 -88	NR -99 -99 -99	M=1
6	**Where did you seek treatment for [EACH PROBLEM LISTED IN 5]?** **This question will be repeated for every health problem you said you experienced after delivery** *Select all that apply.*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99				Any of MSQ5A-MSQ5C=1 Cannot Select -77 or -99 and other option
	<u>Neonatal</u> ***Starting with the first child born, I would like to ask you some questions.*** ***ODK will repeat questions 7-21 for each child born.***					
7	**What was the name given to the baby that was just born?** *Write 'Baby' if no name given*	Name: No response ..... -99				If M=1 AND J=0
8	**Is [NAME] still alive?**	Yes ..... 1 No ..... 0 No response ..... -99				If M=1 AND H=1 AND I=1

9	**IF DEAD: What date did the baby die?**	Day: Month: Year: Don't know .....-88 No response .....-99	If MSQ8=0 AND I=1
10	**IF DEAD: Exactly how old was [NAME] when (he/she) died?** *Don't restrict days, but has to be one or more weeks*	Days: Don't know .....-88 No response .....-99	If MSQ8=0 AND I=1
11	**Did someone place the baby naked on your chest, against your skin, immediately after delivery of the baby?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response .....-99	If M=1 AND H=1
12	**After delivery, was [NAME] wrapped with a cloth?**	Yes ..... 1 No ..... 0 Don't know .....-88 No response .....-99	If M=1 AND H=1
13	**How many minutes after delivery of [NAME] was he/she wrapped?**	Minutes: Don't know .....-88 No response .....-99	If MSQ12=1
14	**How long after birth did you first put [NAME] to the breast?** *Enter a number for Minutes, Hours, or Days on the next screen.* *If less than 1 hour, record minutes. If less than 24 hours, record hours; otherwise, record days.*	Minutes..... 1 Hours: ..... 2 Days: ..... 3 Not yet: ..... 4 Don't know..... -88 No response .....-99	If M=1 AND H=1
14b	**Number of hours or days baby first put to breast**	Minutes ☐ Hours Ago ☐ Days Ago ☐	If MSQ14=1, 2,3

15	**Since this time yesterday, did [NAME] receive any of the following?**	Yes	No	DK	NR	MSQ8=1
	Breastmilk?	1	0	-88	-99	
	Vitamin, mineral supplements or medicine?	1	0	-88	-99	
	Plain water?	1	0	-88	-99	
	Sweetened, flavored water or fruit juice or tea or infusion?	1	0	-88	-99	

	Oral rehydration solution (ORS)?	1	0	-88	-99	
	Infant formula?	1	0	-88	-99	
	Tinned, powered or fresh milk?	1	0	-88	-99	
	Herbal tonic/drinks	1	0	-88	-99	
	Any other liquids?	1	0	-88	-99	
	Anything else?	1	0	-88	-99	
16	**Did [NAME] ever receive a BCG vaccination against tuberculosis, that is, an injection in the arm or shoulder that usually causes a scar?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				If M=1 AND I=1
17	**Did [NAME] ever receive oral polio vaccine, that is, about two drops in the mouth to prevent polio?**	Yes ..... 1 No ..... 0 Don't know..... -88 No response ..... -99				If M=1 AND I=1
18	**What illness, if any, did [NAME] suffer from before our first visit?** *Select all that apply* *Do not read aloud.*	Poor feeding or unable to suck ..... 1 Diarrhea ..... 2 Pus in the umbilicus ..... 3 Redness of the umbilicus ..... 4 Red eye/passage of pus from eyes 5 Hypothermia (temp 35.3-36.4 C) .... 6 Jaundice ..... 7 Convulsion ..... 8 Skin rash/skin lesion ..... 9 Baby doesn't cry/breathe ..... 10 Fever (temp more than 38.3 C) .... 11 Unconscious ..... 12 Fast breathing ..... 13 Sore throat/Tonsillitis..... 14 Difficulty in breathing ..... 15 Chest in drawing ..... 16 Doesn't pass urine ..... 17 Doesn't pass stool ..... 18 Cold/cough ..... 19 Vomiting ..... 20 Reduced alertness (lethargy) ..... 21 Other ..... 96 None, no illness……-77 No response ..... -99				If M=1 AND H=1

19	**Where did you seek treatment for [EACH PROBLEM LISTED IN 18]?** **This question will be repeated for every illness you said that [NAME] experienced after our first visit** *Select all that apply.*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99	Any of MSQ18 except -77, -99 Cannot Select -77 or -99 and other option
20	**What illness, if any, did [NAME] suffer from after our first visit?** *Select all that apply* *Do not read aloud.*	Poor feeding or unable to suck ..... 1 Diarrhea ..... 2 Pus in the umbilicus ..... 3 Redness of the umbilicus ..... 4 Red eye/passage of pus from eyes 5 Hypothermia (temp 35.3-36.4 C) .... 6 Jaundice ..... 7 Convulsion ..... 8 Skin rash/skin lesion ..... 9 Baby doesn't cry/breathe ..... 10 Fever (temp more than 38.3 C) .... 11 Unconscious ..... 12 Fast breathing ..... 13 Sore throat/Tonsillitis ..... 14 Difficulty in breathing ..... 15 Chest in drawing ..... 16 Doesn't pass urine ..... 17 Doesn't pass stool ..... 18 Cold/cough ..... 19 Vomiting ..... 20 Reduced alertness (lethargy) ..... 21 Other ..... 96 None, no illness..... -77 No response ..... -99	If M=1 AND H=1 AND I=1 Cannot Select -77 or -99 and other option
21	**Where did you seek treatment for [EACH PROBLEM LISTED IN 20]?** **This question will be repeated for every illness you said that [NAME] experienced since our first visit**	He Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector 14	Any of MSQ20 except -77, -99 Cannot Select -77 or -99 and

	Select all that apply.	Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99	other option
22	**Did anyone refer you to treatment for any illness that the baby has had since birth?**	Yes ..... 1 No ..... 0 No response ..... -99	MSQ18>0 OR MSQ20>0
23	**Who referred you?**	Doctor ..... 1 Health officer ..... 2 Nurse/midwife ..... 3 Skilled worker, can't distinguish ..... 4 Health extension worker ..... 5 Health development army ..... 6 Traditional birth attendant ..... 7 Husband/partner ..... 8 Family/friend ..... 9 Other ..... 96 No response ..... -99	MSQ22=1
	Section – Post-Natal ***I would like to follow up on how you and your baby are doing.***		
24	**I would like to talk to you about checks on your health after delivery, for example, someone asking you questions about your health or examining you.** **Has any health extension worker visited you since delivery or did you go anywhere for care for yourself?**	Yes ..... 1 No ..... 0 Don't know ..... -88 No response ..... -99	If M=1
25	**Who checked on your health since delivery?** *(Select all that apply)*	Doctor ..... 1 Health officer ..... 2 Nurse/midwife ..... 3 Skilled worker, can't distinguish ..... 4 Health extension worker ..... 5 Health development army ..... 6 Traditional birth attendant ..... 7 Other ..... 96 No response ..... -99	If MSQ24=1
26	**Where did the checks take place since delivery?** *(Select all that apply)*	Her home ..... 1 Other home ..... 2 Government hospital 11	If MSQ24=1

		Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99	
27	**How long after delivery did that first check take place?** *Record only first visit.*	Days: ..... 1 Weeks: ..... 2 Don't know ..... -88 No response ..... -99	If MSQ24=1
27b	**Record length of time in days or weeks**	Days After Delivery ☐ Weeks After Delivery ☐	MSQ27=1 or 2
28	**I would like to talk to you about checks on your baby's health after delivery—for example, someone examining the baby, checking the cord, or seeing if he/she is OK.** **Did any health worker visit you since delivery to check the baby's health or did you go anywhere for care for the baby?**	Yes ..... 1 No ..... 0 Don't know ..... -88 No response ..... -99	M=1 AND H=1
29	**Who checked on the baby's health since delivery?** *(Select all that apply)*	Doctor ..... 1 Health officer ..... 2 Nurse/midwife ..... 3 Skilled worker, can't distinguish ..... 4 Health extension worker ..... 5 Health development army ..... 6 Traditional birth attendant ..... 7 Other ..... 96 No response ..... -99	If MSQ28=1
30	**Where did the checks take place since delivery?** *(Select all that apply)*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector 14	If MSQ28=1

		Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99	
31	**How long after delivery did that first check take place?** *Record only first visit.*	Days: ..... 1 Weeks:..... 2 Don't know ..... -88 No response ..... -99	If MSQ28=1
31b	**Record length of time in days or weeks**	Days After Birth ☐ Weeks After Birth ☐	MSQ31=1 or 2
	Section – Family Planning ***I would like to ask you a few questions about family planning.***		
32	**Have you received any counseling on family planning since delivery?**	Yes ..... 1 No ..... 0 No response ..... -99	If M=1
33	**Have you resumed sexual activity since the birth of [NAME]?**	Yes ..... 1 No ..... 0 No response ..... -99	If M=1
34	**Are you or your partner currently doing something or using any family planning method to delay or avoid getting pregnant?**	Yes ..... 1 No ..... 0 No response ..... -99	If MSQ33=1
35	**Which method are you using?** *Circle all method mentioned. If more than one code is circled, circle the highest code in the list*	Female Sterilization ..... 1 Male Sterilization ..... 2 Implant ..... 3 IUD ..... 4 Injectables ..... 5 Pill ..... 7 Emergency Contraception ..... 8 Male Condom ..... 9 Female Condom ..... 10 Std. Days/Cycle beads ..... 13 LAM ..... 14 Rhythm method ..... 30 Withdrawal ..... 31 Other traditional methods ..... 39 No response ..... -99	If MSQ34=1
36	**Before you started using [CURRENT METHOD], had you discussed the decision to delay or avoid pregnancy with your husband/partner?**	Yes ..... 1 No ..... 0 Don't know ..... -88	If MSQ34=1

		No response ..... -99	
37	**Would you say that using contraception is mainly your decision, mainly your husband/partner's decision or did you both decide together?**	Mainly respondent ..... 1 Mainly husband /partner ..... 2 Joint decision ..... 3 Other ..... 96 No response ..... -99	If MSQ34=1
38	**Did any of the health service providers force you to accept or insist that you should accept [CURRENT METHOD]?**	Yes ..... 1 No ..... 0 Don't know ..... -88 No response ..... -99	If MSQ34=1
39	**Would you say that not using contraception is mainly your decision, mainly your husband/partner's decision or did you both decide together?**	Mainly respondent ..... 1 Mainly husband /partner ..... 2 Joint decision ..... 3 Other ..... 96 No response ..... -99	If MSQ34=0 AND MSQ33=1
Thank the respondent for her time and update the ID card. ***Before you leave update the ID card with the respondent's name, baby's name (if given), the outcome of the birth (live birth, still birth, miscarriage), whether there were multiple births, and whether the baby is still alive.***			
LOCATION			
O	**Location** *Take a GPS point near the entrance to the household. Record location when the accuracy is smaller than 6m.* *GPS coordinates can only be collected when outside.*	RECORD LOCATION	Always
QUESTIONNAIRE RESULT			
P	**How many times have you visited this household to interview this female respondent?**	1st time ..... 1 2nd time ..... 2 3rd time 3	Always
Q	**Questionnaire result** *Record the result of the Female Questionnaire*	Completed ..... 1 Not at home ..... 2 Postponed ..... 3 Refused ..... 4 Partly completed ..... 5 Incapacitated ..... 6 Respondent death ..... 7 Respondent moved ..... 8 Household moved 9	Always

IIE – Six-month follow-up questionnaire

Maternal and Neonatal Health Survey – Interview Three

NO	QUESTIONS AND FILTERS	CODING CATEGORIES	Relevant
IDENTIFICATION			
A	**Is this interview conducted face to face or over the phone?**	Face to face……..1 Phone…….2	Always
B	**Your name:** [Interviewer name from Female Screening Questionnaire] **Is this your name?**	Yes ..... 1 No 0	Always
	Enter your name below. *Please record your name*	Interviewer's Name	If B=0
C	**Current date and time.** [ODK will display on screen] **Is this date and time correct?**	Yes ..... 1 No 0	Always
D	**Record the correct date and time.**	Date / Month / Day / Year Time / Hours / Minutes / AM/PM	If C=0
E	**QR Code** *Scan the QR code that appears on the ID card given at enrollment.* **If you are unable to scan the QR code enter the number on the next screen**	QR code	Always
E1	**Record the correct number on the ID card**		If E=0
F1	**Region**	*ODK will populate a list of appropriate zones based on the selected region. This will be SNNPR for all respondents.*	If E=0
F2	**Zone**	*ODK will populate a list of appropriate zones based on the selected region.*	If E=0
F3	**District**	*ODK will populate a list of appropriate districts based on the selected zone.*	If E=0
F4	**Locality Name**	*ODK will populate a list of appropriate localities based on the selected district. There may be only one choice.*	If E=0
F5	**Enumeration area**	*ODK should populate the appropriate EA*	If E=0

F6	*Please record the following from the household listing form:* **Structure number**		Always
F7	*Please record the following from the household listing form:* **Household number**		Always
G	**Respondent's name** *Enter the respondent's name exactly as it appears on the ID card given at enrollment.*	Respondent's name	Always
H	*Fill in the following from the ID card given at enrollment:* **How many children were in this pregnancy? (eg twin or triplet?)**	Single ..... 1 Twin ..... 2 Triplet + ... 3 No response ..... -99	Always
I	*Fill in the following from the ID card given at enrollment:* **What was the outcome of this pregnancy for the [first/second/third] baby born?** ODK Will repeat H for each child identified in G.	Live birth ..... 1 Still birth ..... 2 No response ..... -99	Always
J	*Fill in the following from the ID card given at enrollment:* **Was [NAME] still alive at the second visit?**	Yes ..... 1 No 0	I=1
K	*Fill in the following from the ID card given at enrollment:* **Type name given to baby if name given by second interview. Otherwise, type BABY** ODK Will repeat J for each child identified in I.	Name:	I=1
L	**Is the respondent present and available to be interviewed today?**	Yes ..... 1 No, unavailable ..... 2 No, died 3	Always
M	**Date of death**	Day: Month:	If L=3

INFORMED CONSENT
Confirm that this woman has previously completed the Informed Consent for Interview 1.

N	**Do you still consent to participate in this study?**	Yes ..... 1 No 0				Always
O	**Interviewer's name:** [ODK will display the Interviewer's name from linkedIMEI number] *Mark your name as a witness to the consent process.*					If N=1
Antenatal						
1	**Did you experience any of the following problems during this *pregnancy*?**	Yes	No	DK	NR	If N=1
	Q) **Severe headache with blurred vision?**	1	0	-88	-99	
	R) High blood pressure?	1	0	-88	-99	
	S) Edema face/feet/body?	1	0	-88	-99	
	T) Convulsion/fits?	1	0	-88	-99	
	U) Vaginal bleeding before delivery?	1	0	-88	-99	
	V) High fever?	1	0	-88	-99	
	W) Abnormal vaginal discharge (foul smelling/dark)?	1	0	-88	-99	
	X) Lower abdominal pain?	1	0	-88	-99	
2	**Where did you seek treatment for [EACH PROBLEM LISTED IN 1]?** **This question will be repeated for every health problem you said you experienced during pregnancy** *Select all that apply.*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99				Any of MTQ1A-MTQ1H=1 If MSQ2=-77 or =-99 cannot select other options
3	**Did you experience any of the following problems during the delivery:** **K) Severe bleeding?**	Yes	No	DK	NR	If N=1

	L) Leaking/rupture of membrane and no labor pain for >24 hours?	1	0	-88	-99	
	M) Leaking/rupture of membrane before 9 months?	1	0	-88	-99	
	N) Malposition (baby lied transversely during pregnancy)/Malpresentation (the feet/hand came out first)?	1	0	-88	-99	
	O) Prolonged labor (>12 hours)?	1	0	-88	-99	
4	**Where did you seek treatment for problems reported *during delivery*?** *Select all that apply.*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99				Any of MTQ3A-MTQ3E=1 Cannot Select -77 or -99 and other option
5	**Did you experience any of the following problems *after the delivery*?**	Yes 1	No 0	DK -88	NR -99	If N=1

	G) Retained placenta? (more than 30 minutes) **H) High fever with foul/smelly discharge or lower abdominal pain** **I) Severe/heavy bleeding** *Select all that apply.*	1 1	0 0	-88 -88	-99 -99	
6	**Where did you seek treatment for [EACH PROBLEM LISTED IN 5]?** **This question will be repeated for every health problem you said you experienced after delivery** *Select all that apply.*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99				Any of MTQ5A-MTQ5C=1 Cannot Select -77 or -99 and other option
<u>Neonatal</u> *Starting with the first child born, I would like to ask you some questions.* ***ODK will repeat questions 7-26 for each child born.***						
7	**What was the name given to the baby that was just born?** *Write 'Baby' if no name given*	Name: No response ..... -99				N=1 AND K=0
8	**Is [NAME] still alive?**	Yes ..... 1 No ..... 0 No response ..... -99				If N=1 AND I=1 AND J=1
9	**IF DEAD: What date did the baby die?**	Day: Month: Year: Don't know ..... -88 No response ..... -99				If MTQ8=0 AND J=1
10	**IF DEAD: Exactly how old was [NAME] when (he/she) died?**	Days: Don't know ..... -88				If MTQ8=0 OR J=0

	Don't restrict days, but has to be one or more weeks	No response .....-99	
11	**Did someone place the baby naked on your chest, against your skin, immediately after delivery of the baby?**	Yes .....1 No .....0 Don't know..... -88 No response .....-99	If I=1 AND N=1
12	**After delivery, was [NAME] wrapped with a cloth?**	Yes ..... 1 No .....0 Don't know .....-88 No response .....-99	If I=1 AND N=1
13	**How many minutes after delivery of [NAME] was he/she wrapped?**	Minutes: Don't know .....-88 No response .....-99	If MTQ12=1
14	**How long after birth did you first put [NAME] to the breast?** *Enter a number for Hours, or Days on the next screen.* *If less than 1 hour, record minutes. If less than 24 hours, record hours; otherwise, record days.*	Minutes: .....1 Hours: .....2 Days: .....2 Don't know..... -88 No response .....-99	If I=1 AND N=1
14b	**Number of hours or days baby first put to breast**	Minutes Hours Ago Days Ago	If MSQ14=1 OR 2

15	**Since this time yesterday, did [NAME] receive any of the following?**	Yes	No	DK	NR	MTQ8=1
	Breastmilk?	1	0	-88	-99	
	Vitamin, mineral supplements or medicine?	1	0	-88	-99	
	Plain water?	1	0	-88	-99	
	Sweetened, flavored water or fruit juice or tea or infusion?	1	0	-88	-99	
	Oral rehydration solution (ORS)?	1	0	-88	-99	
	Infant formula?	1	0	-88	-99	
	Tinned, powered or fresh milk?	1	0	-88	-99	

	Any other liquids **Herbal tonic/drinks** **Solid or semi-solid (mushy) foods?** **Anything else?**	1 1 1 1	0 0 0 0	-88 -88 -88 -88	-99 -99 -99 -99	
16	**Do you have a card where [NAME'S] vaccinations are written down?** *If yes: May I see it please?*	Yes, seen ..... 1 Yes, not seen ..... 2 No card ..... 3 Don't know..... -88 No response ..... -99				MTI=1 OR MT8=0
17	**Did you ever have a vaccination card for [NAME]?**	Yes ..... 1 No ..... 0 Don't know ..... -88 No response ..... -99				MTI=1 OR MT8=0 AND MT16=3,-88,-99
18	**Vaccine Card** *(1) Copy date from the card for each vaccine* *(2) If any of the date record/s is/are missing or not legible, record the default date (01-January-2020) for specific missing or illegible records and mentions the missing or illegible record in the check box prepared below each vaccine.* *One vaccine per screen*					A=1 AND MTQ16=1
19	**Please tell me if [NAME] received any of the following vaccinations:** **A) A BCG vaccination against tuberculosis, that is, an injection in the arm or shoulder that usually causes a scar**	Yes 1	No 0	DK -88	NR -99	A=2 OR MTQ16=2, 3, or -88

	Last Birth		
Vaccine	**Day**	**Month**	**Year**
BCG			
Polio-0			
Polio-1			
Pentavalent-1			
PCV-1			
Rota-1			
Polio-2			
Pentavalent-2			
PCV-2			
Rota-2			
Polio-3			
Pentavalent-3			
PCV-3			
Vitamin A			

	B) Polio vaccine, that is, about two drops in the mouth, or an injection in the arm to prevent polio?	1	0	-88	-99	
	C) **A PENTA vaccination, that is, an injection given in the thigh or buttocks, sometimes at the same time as polio drops?**	1	0	-88	-99	
	D) **A Rota vaccination, that is, drops in the mouth to prevent diarrheal disease?**	1	0	-88	-99	
	E) A PCV vaccination, that is, an injection given in the thigh or buttocks	1	0	-88	-99	
20	**Was the first polio vaccine received in the first two weeks after birth or later?**	First two weeks ..... 1 Later ..... 0 Don't know ..... -88 No response ..... -99				MTQ19b==1
21	**How many times was the polio vaccine received?**	Number of times: Don't know ..... -88 No response ..... -99				MTQ19b=1
22	**How many times was the PENTA vaccine received?**	Number of times: Don't know ..... -88 No response ..... -99				MTQ19c=1
23	**What illness, if any, did [NAME] suffer from before our first visit?** *Select all that apply*	Poor feeding or unable to suck ..... 1 Diarrhea ..... 2 Pus in the umbilicus ..... 3 Redness of the umbilicus ..... 4 Red eye/passage of pus from eyes 5 Hypothermia (temp 95.5-97.5 F) .... 6 Jaundice ..... 7 Convulsion ..... 8 Skin rash/skin lesion ..... 9 Baby doesn't cry/breathe ..... 10 Fever (temp more than 101 F) ..... 11 Unconscious ..... 12 Fast breathing ..... 13 Sore throat/Tonsillitis ..... 14 Difficulty in breathing ..... 15 Chest in drawing ..... 16 Doesn't pass urine ..... 17 Doesn't pass stool ..... 18 Cold/cough 19				If N=1 AND I=1 Cannot Select -77, -88 or -99 and other option

		Vomiting ..... 20 Reduced alertness (lethargy) ..... 21 Constipation ..... 22 No illness……-77 Other ..... -96 No response ..... -99	
24	**Where did you seek treatment for [EACH PROBLEM LISTED IN 23]?** **This question will be repeated for every health problem you said [NAME] experienced before our first visit** *Select all that apply.*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99	MTQ23>0 Cannot Select -77 or -99 and other option
25	**What illness, if any, did [NAME] suffer from since our last visit?** *Select all that apply*	Poor feeding or unable to suck ..... 1 Diarrhea ..... 2 Pus in the umbilicus ..... 3 Redness of the umbilicus ..... 4 Red eye/passage of pus from eyes 5 Hypothermia (temp 95.5-97.5 F) .... 6 Jaundice ..... 7 Convulsion ..... 8 Skin rash/skin lesion ..... 9 Baby doesn't cry/breathe ..... 10 Fever (temp more than 101 F) ..... 11 Unconscious ..... 12 Fast breathing ..... 13 Sore throat/Tonsillitis ..... 14 Difficulty in breathing ..... 15 Chest in drawing ..... 16 Doesn't pass urine ..... 17 Doesn't pass stool ..... 18 Cold/cough ..... 19 Vomiting ..... 20 Reduced alertness (lethargy) ..... 21 Constipation ..... 22 No illness……-77 Other ..... -96 No response ..... -99	If N=1 AND I=1 AND J=1 Cannot Select -77 or -99 and other option

26	**Where did you seek treatment for [EACH PROBLEM LISTED IN 25]?** **This question will be repeated for every health problem you said [NAME] suffered since our last visit** *Select all that apply.*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other ..... 96 Nowhere, no treatment sought ..... -77 No response ..... -99	If MTQ25>0 Cannot Select -77 or -99 and other option
Section – Post-Natal *I would like to follow up on how you and your baby are doing.*			
27	**I would like to talk to you about checks on your health after delivery, for example, someone asking you questions about your health or examining you.** **Has any health worker visited you since delivery or did you go anywhere for care for yourself?**	Yes ..... 1 No ..... 0 Don't know ..... -88 No response ..... -99	If N=1
28	**Who checked on your health since delivery?** *Select all that apply.*	Doctor ..... 1 Health officer ..... 2 Nurse/midwife ..... 3 Skilled worker, can't distinguish ..... 4 Health extension worker ..... 5 Health development army ..... 6 Traditional birth attendant ..... 7 Other ..... 96 No response ..... -99	If MTQ27=1
29	**Where did the checks take place since delivery?** *Select all that apply.*	Her home ..... 1 Other home ..... 2 Government hospital ..... 11 Government health center ..... 12 Government health post ..... 13 Other public sector ..... 14 Private hospital/clinic ..... 21 Other private medical sector ..... 22 NGO/Faith-based health facility ... 31 Traditional healer/medicine ..... 32 Other 96	If MTQ27=1

		Nowhere, no treatment sought .....-77 No response .....-99	
30	**How long after delivery did that first check take place?** *Record only first visit.*	Days: Weeks: Months: Don't know .....-88 No response .....-99	If MTQ27=1
30b	**Record length of time in days or weeks**	Days ☐ Weeks ☐ Months ☐	MSQ31=1 or 2
31	**I would like to talk to you about checks on your baby's health after delivery—for example, someone examining the baby, checking the cord, or seeing if he/she is OK.** **Did any health worker visit you since delivery to check the baby's health or did you go anywhere for care for the baby?**	Yes .....1 No .....0 Don't know .....-88 No response .....-99	If I=1
32	**Who checked on the baby's health since delivery?** *Select all that apply.*	Doctor .....1 Health officer .....2 Nurse/midwife .....3 Skilled worker, can't distinguish .....4 Health extension worker .....5 Health development army .....6 Traditional birth attendant .....7 Other .....96 No response .....-99	If MTQ31=1
33	**Where did the checks take place since delivery?** *Select all that apply.*	Her home .....1 Other home .....2 Government hospital .....11 Government health center .....12 Government health post .....13 Other public sector .....14 Private hospital/clinic .....21 Other private medical sector .....22 NGO/Faith-based health facility ...31 Traditional healer/medicine .....32 Other .....96 Nowhere, no treatment sought .....-77 No response .....-99	If MTQ31=1

34	**How long after delivery did that first check take place?** *Record only first visit.*	Days: ..... 1 Weeks:..... 2 Months..... 2 Don't know ..... -88 No response ..... -99	If MTQ31=1
34b	**Record length of time in days or weeks**	Days After Birth [ ] Weeks After Birth [ ] Months After Birth [ ]	MSQ34=1 or 2
	Section – Family Planning *I would like to ask you a few questions about family planning.*		
35	**Have you received any counseling on family planning since delivery?**	Yes ..... 1 No ..... 0 No response ..... -99	If N=1
36	**How many months after the birth of the baby did you wait before resuming sexual activity?** *If less than a month record 0 for number of months*	Months: Within a month ..... 0 Not yet started ..... -77 No response ..... -99	If N=1
37	**Are you or your partner currently doing something or using any family planning method to delay or avoid getting pregnant?**	Yes ..... 1 No ..... 0 No response ..... -99	If N=1
38	**Which method are you using?** *Circle all method mentioned. If more than one code is circled, circle the highest code in the list*	Female Sterilization ..... 1 Male Sterilization ..... 2 Implant ..... 3 IUD ..... 4 Injectables ..... 5 Pill ..... 7 Emergency Contraception ..... 8 Male Condom ..... 9 Female Condom ..... 10 Std. Days/Cycle beads ..... 13 LAM ..... 14 Rhythm method ..... 30 Withdrawal ..... 31 Other traditional methods ..... 39 No response ..... -99	If MTQ37=1
39	**Where did you obtain [CURRENT METHOD] when you started using it after the birth of the baby?** *Probe to identify the type of source and circle the appropriate code. If unable to determine if hospital,*	**Public Sector:** Govt. Hospital ..... 11 Govt. Health Center..... 12 Govt. Health Station/Clinic ..... 13 Govt. Health Post/HEW ..... 14 Other Public ..... 15 **NGO:**	If MTQ37=1

	health center or clinic is public or private medical, write the name of the place.	NGO Health Facility ..... 16 Voluntary Community Health Workers ..... 17 Other NGO ..... 18 **Private Medical Sector:** Private Hospital ..... 21 Private Clinic ..... 22 Pharmacy ..... 23 Other Private Medical ..... 24 **Other Source:** Drug Vendor/Store ..... 31 Shop ..... 32 Friend/Relative ..... 33 Other ..... 96 Don't know ..... -88 No response ..... -99	
40	**When did you begin using your [CURRENT METHOD]?**	Month: Year: Don't know ..... -88 No response ..... -99	If MTQ37=1
41	**Before you started using [CURRENT METHOD], had you discussed the decision to delay or avoid pregnancy with your husband/partner?**	Yes ..... 1 No ..... 0 Don't know ..... -88 No response ..... -99	If MTQ37=1
42	**Would you say that using contraception is mainly your decision, mainly your husband/partner's decision or did you both decide together?**	Mainly respondent ..... 1 Mainly husband /partner ..... 2 Joint decision ..... 3 Other ..... 96 No response ..... -99	If MTQ37=1
43	**Did any of the health service providers force you to accept or insist that you should accept [CURRENT METHOD]?**	Yes ..... 1 No ..... 0 Don't know ..... -88 No response ..... -99	If MTQ37=1
44	**Would you say that not using contraception is mainly your decision, mainly your husband/partner's decision or did you both decide together?**	Mainly respondent ..... 1 Mainly husband /partner ..... 2 Joint decision ..... 3 Other ..... 96 No response ..... -99	If MTQ37=0
44	**Has your menstrual cycle returned since the birth of [NAME]?**	Yes ..... 1 No ..... 0 No response ..... -99	If N=1
45	**When did your last menstrual period start?**	Days Ago: Weeks Ago:	If MTQ45=1

		Months Ago: Don't know .....-88 No response .....-99	
LOCATION			
P	**Location** *Take a GPS point near the entrance to the household. Record location when the accuracy is smaller than 6m.* *GPS coordinates can only be collected when outside.*	RECORD LOCATION	A=1
QUESTIONNAIRE RESULT			
Q	**How many times have you visited/called this household to interview this female respondent?**	1st time.....1 2nd time.....2 3rd time.....3	Always
R	**Questionnaire result** *Record the result of the Female Questionnaire*	Completed.....1 Not at home.....2 Postponed.....3 Refused.....4 Partly completed.....5 Incapacitated.....6 Respondent death .....7 Respondent moved .....8 Household moved .....9 Unable to reach by phone 10	Always

IIF – Family folder validation questionnaire

Maternal and Neonatal Health Survey – Family Folder Validation						
NO	**QUESTIONS AND FILTERS**	**CODING CATEGORIES**				**Relevant**
IDENTIFICATION						
A0	**A0. Your name:** [Interviewer name]	Yes ..... 1 No 0				Always
A	**A. Is this your name?**					
A2	**A. Enter your name below.** *Please record your name*	Interviewer's Name				${A} = '0'
B0	**Date and time.** [ODK will display on screen]					
B	**B. Is this date and time correct?**	Yes ..... 1 No 0				Always
C	**Record the correct date and time.**	Date	If B=0	Day	Year	${B} = '0'
		Time	Hours	Minutes	AM/PM	
D0	**Scan the QR code that appears on the ID card given at enrollment and updated subsequently. The number embedded in the QR code should show up when you swipe right.** *If you successfully scan the QR code ODK will link the area identifications and will bring the preloaded respondent name, baby name/s, Structure and HH numbers.*	QR code				Always
D	**D. Is the number below the same as the number on the ID card?**	Yes ..... 1 No 0				
D	**Record the correct number on the ID card** *If you manually record the QR code, you will need to record the area identification codes and respondent name, baby name/s, Structure and HH numbers manually from the QR code.*					(${D_confirm}='0')
D1	**D1. Region**	*ODK will populate a list of appropriate zones based on the selected region.*				(${D0_confirm}='0')

		This will be SNNPR for all respondents.	
D2	**Zone**	*ODK will populate a list of appropriate zones based on the selected region.*	(${D0_confirm}='0')
D3	**District**	*ODK will populate a list of appropriate districts based on the selected zone.*	(${D0_confirm}='0')
D4	**Locality Name**	*ODK will populate a list of appropriate localities based on the selected district. There may be only one choice.*	(${D0_confirm}='0')
D5	**Enumeration area**	*ODK should populate the appropriate EA*	(${D0_confirm}='0')
D6	*Please record the following from the Id card or excel summary list of identifiers given at departure :* **Structure number** [ODK will display on screen]	**Structure number:-------**	(${D0_confirm}='0')
D7	**Household number** *Please record the following from the Id card :* **Household number** [ODK will display on screen]	**Household number:-------**	(${D0_confirm}='0')
E	**E. Respondent's name** [ODK will display on screen]	Respondent's name	Always or
E	**E. Respondent's name** *Enter the respondent's name exactly as it appears on the family folder/women card.*		${E_firstname} = 'other' or ${E_firstname} = '' Or (${D0_confirm}='0')
E1	**How many children were in this pregnancy? (eg twin or triplet?)** *Fill in the following from the updated ID card that was given at enrollment*	Single ..... 1 Twin 2	Always
F	**F. Baby name** [ODK will display the baby name on screen]	Baby Name (preloaded) Other (up to date if name has been changed)	Always
F	**F. Baby name (2nd Baby)**	Baby Name (preloaded) Other (up to date if name has been changed)	indexed-repeat(${F_child_name},

	Enter the name of the child born to the woman enrolled in the study as it appears on the updated ID card.		${F_repeat}, ${count_F}) = 'other') or (indexed-repeat(${F_child_name}, ${F_repeat}, ${count_F}) = '')
H	**H. Name of the facility:** *Please record the name of the facility.*	Facility name	Always
G	**G. Family head name** *Enter the family head name exactly as it appears in the family folder* .	*House head Name*	Always

Questions from the family folder			
1	Is there a family folder for the selected family?	Yes ..... 1 No 0	Always
2	Is there a card for the woman enrolled in the study? *Select NO if the woman doesn't have information about FP, Delivery/Labour and PNC in the Family Folder.*	Yes ..... 1 No 0	Always
Section 1 – Questions about household Check the household member description page of the card			
3	Record the marital status of the respondent as listed in the family folder	Single ..... 1 Married ..... 2 Divorced ..... 3 Widow..... 4 Not legible ..... -88 Not recorded ..... -99	If FFQ1=1
4	Does this family have a latrine?	Yes ..... 1 No ..... 0 Not legible ..... -88 Not recorded..... -99	If FFQ1=1
4.1.	4.1. Type (s) of toilet facility/facilities used by members of the household	Flush/pour flush toilets connected to: Piped sewer system ……..1 Septic tank……..2	Always

		Elsewhere……..3 Unknown / Not sure / Don't know…….4 Ventilated improved pit latrine……..5 Pit latrine with slab……6 Pit latrine without slab……...7 Composting toilet……...8 Bucket toilet……9 Hanging toilet /Hanging latrine……...10 Other……...11 No facility / bush / field……12 Pit latrine - unknown type……...13 Not Ligible ……-88 No Information..... …. -99	
5	What water sources are regularly used by this family? *Select all that apply*	Piped Water Piped into dwelling/indoor 11 Pipe to yard/plot ..... 12 Public tap/standpipe .... 13 Tube well or borehole ..... 21 Dug Well Protected Well ..... 31 Unprotected Well ..... 32 Water from Spring Protected Spring ..... 41 Unprotected Spring ..... 42 Rainwater ..... 51 Tanker Truck ..... 61 Cart with Small Tank ..... 71 Surface water (River / Dam / Lake / Pond / Stream / Canal / Irrigation Channel) . 81 Bottled Water ..... 91 Sachet Water ..... 92 Not legible .....-88 Not recorded..... -99	If FFQ1=1
6	Any birth recorded in the last six months? *6 months is meant to indicate the date of MNH-3 interview.*	Yes ..... 1 No ..... 0 Not legible .....-88	If FFQ1=1
7	Any date of death listed for birth in the last six months?	Yes ..... 1 No ..... 0 Not legible .....-88	If FFQ1=1
8	Record date of death *Record Jan 1, 2020 if the date of death is Not legible*	Date: Not legible ..... Jan 1, 2020	If FFQ6=1

9	Any other death in the household during last three years?	Yes ..... 1 No ..... 0 Not legible ..... -88	If FFQ1=1
10	How many deaths during last three years? *Number of deaths:* *Not legible: -88* *No information: -99*	Number of deaths Not legible ..... -88	If FFQ9 =1
11	Does this family have an insecticide treated net (ITN)?	Yes ..... 1 No ..... 0 Not legible ..... -88	If FFQ1=1
Find the card for the woman enrolled in the study			
12	Any family planning method(s) used in last six months? *This information is located in the top left of Health card-Page-4*	Yes ..... 1 No ..... 0 Not legible ..... -88	If FF2=1
13	Record the date of the most recent visit for family planning services *Record Jan 1, 2020 if the date of visit is Not legible*	Date: Not legible ..... Jan 1, 2020	If FF12=1
14	Select the type of method given at most recent visit	Female Sterilization ..... 1 Male Sterilization ..... 2 Implant ..... 3 IUD ..... 4 Injectables ..... 5 Pill ..... 7 Emergency Contraception ..... 8 Male Condom ..... 9 Female Condom ..... 10 Std. Days/Cycle beads ..... 13 LAM ..... 14 Rhythm method ..... 30 Withdrawal ..... 31 Other traditional methods ..... 39 Not legible ..... -88 Not recorded ..... -99	If FF12=1
Check the Delivery/Labor card for the woman enrolled in the study			
15	Is there a Delivery/Labor card for [RESPONDENT NAME]?	Yes ..... 1 No 0	If FF2=1

16	Is there a delivery date in the last six months?	Yes ..... 1 No ..... 0 Not legible ..... -88 No information ..... -99	If FF15=1
17	What is the date of delivery? *Record Jan 1, 2020 if the date of birth is Not legible*	Date:___/____/____ Not legible ..... Jan 1 2020	If FF16=1
18	Is there a BP recorded?	Yes ..... 1 No ..... 0 Not legible ..... -88	If FF15=1
Check the *Delivery Outcome* section to answer the below questions on the delivery outcome of the most recent birth.			
19	Normal delivery	Yes ..... 1 No ..... 0 Not legible ..... -88 No information ..... -99	If FF15=1
20	Complicated and referred delivery	Yes ..... 1 No ..... 0 Not legible ..... -88 No information 99	If FF15=1
21	Maternal death	Yes ..... 1 No ..... 0 Not legible ..... -88 No information ..... -99	If FF15=1
22	Birth attendant present at delivery	Health Worker ..... 1 HEW ..... 2 TBA ..... 3 Not legible ..... -88 No information ..... -99	If FF15=1
23	Live birth	Yes ..... 1 No ..... 0 Not legible ..... -88 No information ..... -99	If FF15=1
24	Still birth	Yes ..... 1 No ..... 0 Not legible ..... -88 No information ..... -99	If FF15=1
25	Sex of the baby	Male ..... 1 Female ..... 0 Not legible ..... -88 No information ..... -99	If FF15=1
26	Neonatal death	Yes ..... 1 No 0	If FF15=1

		Not legible ..... -88 No information .....-99	
27	Age at death	Age in days: Not legible ..... -88 No information .....-99	If FF26=1
Check the *Postnatal Section* to answer the below questions on the postnatal follow-ups after the most recent birth			
28a	Is there a recorded information on the postnatal section of the family folder for [RESPONDENT NAME]? *Post natal follow-ups after the most recent birth.*	Yes ..... 1 No 0	
28	How many postnatal visits recorded	Number of visits: Not legible ..... -88 No information .....-99	If FF15=1
29	Any counseling for family planning at any visit?	Yes ..... 1 No ..... 0 Not legible ..... -88 No information .....-99	If FF15=1
30	Any counseling on breast feeding?	Yes ..... 1 No ..... 0 Not legible ..... -88 No information .....-99	If FF15=1
Check the immunization section to answer the below questions:			
31	Is there recorded or filled -in immunization card for [BABY NAME]?	Yes ..... 1 No 0	Always
32	Protected at birth against tetanus	Yes ..... 1 No ..... 0 Not legible ..... -88	If FF31=1
	Instruction on how to fill immunization records (FFQ 32-40) from the family folder. One vaccine will appear per screen and there are two questions for each vaccine to assure the completeness of the records. a. [vaccine name] Is there an incomplete record/illegible record in either day, month or year? YES: 1 NO: 2 If 'Yes' to question 'a' you should specify the date which is not recorded/illegible in question 'b' by checking the check box. b. Which one is/are not recorded? Month Day Year Insert the date recorded in the family folder for each vaccine. If there is no record or the cell is empty Jan 01, 2020. If either of the day, month or year is missing/illegible record the default		

	date (Jan or 01 or 2020) for the specific date missing/illegible and specify the missing/illegible date in question 'b'.		
33	BCG recorded	Month/Day/Year	If FF31=1
34	OPV-0 recorded	Month/Day/Year	If FF31=1
35	OPV-1 recorded	Month/Day/Year	If FF31=1
36	Pentavalent-1 recorded	Month/Day/Year	If FF31=1
37	OPV-2 recorded	Month/Day/Year	If FF31=1
38	Pentavalent-2 recorded	Month/Day/Year	If FF31=1
39	OPV-3 recorded	Month/Day/Year	If FF31=1
40	Pentavalent-3 recorded	Month/Day/Year	If FF31=1
Check the *Integrated Maternal and Child Care Card* to answer the questions below:			
41	Is there an integrated maternal and child care card for [RESPONDENT NAME] and [BABY NAME]? *Please check all the papers/cards within the folder before selecting "NO"*	Yes ..... 1 No 0	Always
Check the *General Conditions* section to answer the questions below:			
42	Parity?	Number of children: Not legible ..... -88 No information ..... -99	If FF2 and FFQ41=1
43	Last menstrual period (LMP)	Date: Not legible/No informationJan 1, 2020	If FF2=1
44	Referred for STI testing	Yes ..... 1 No ..... 0 Not legible ..... -88 No information ..... -99	If FF2=1
45	Referred for HIV testing	Yes ..... 1 No ..... 0 Not legible ..... -88 No information ..... -99	If FF2=1
Check the *current pregnancy section* to answer the below questions:			
46	Age less than 16 years?	Yes ..... 1 No ..... 0 Not legible ..... -88 No information ..... -99	FFQ,1,2 and 41=1
47	Age more than 40?	Yes ..... 1 No ..... 0 Not legible ..... -88 No information ..... -99	If FFQ,1,2 and 41=1

48	Vaginal bleeding	Yes ..... 1 No ..... 0 Not legible ..... -88 No information ..... -99	If FFQ,1,2 and 41=1
49	Number of pregnancy follow-ups recorded	Number of visits: Not legible ..... -88 No information ..... -99	If FFQ,1,2 and 41=1
50	BP recorded at any visit	Yes ..... 1 No ..... 0 Not legible ..... -88 No information ..... -99	If FFQ,1,2 and 41=1
Thank the Health Extension Worker for allowing use of the Family Folder			
H. LOCATION *Record the location*			
QUESTIONNAIRE RESULT			
I.	**Questionnaire result** *Record the result of the Family Folder Questionnaire*	Completed ..... 1 Partly completed ..... 2 Missing at least one section ..... 3 No family folder 4	Always

Appendix III – Focus Group Discussion Guide

FOCUS-GROUP QUESTIONS FOR SNNP/MNH REs

The first section of this discussion will focus more on what you learned and on what we learned about maternal and neonatal health in SNNP from doing this survey. We want to hear about what you thought was interesting, what you enjoyed learning about from the respondents, or what you heard that you thought was important.

1. This is the first time we did a survey on a topic other than family planning. What was the most interesting thing you learned?
    - One thing that we see in the data is that it seems like more boys were born than girls, specifically in rural areas. Do you have any ideas on why this might be?
    - Another thing that we see is that most women who did not deliver in a health facility said they "experienced a sudden delivery". What were some of the stories that women told you that you decided to code as "sudden delivery." {NOTE TO SELAM AND ROBEL: The REs were not necessarily wrong in choosing this answer, we just want to know why it was so commonly chosen.}

The MNH survey was the first study where PMA follows up with the same study participants over the course of the study. With the MNH module we have implemented a number of innovative approaches to data collection using phones – large-scale screening, the use of QR codes, phone follow-up, etc.

As we, and our funders consider the prospect of scaling up this survey to other parts of Ethiopia, or other countries we want to hear from you about your experiences working on this survey – the positive aspects and the challenges.

2. In the MNH survey we changed data collection protocol in two ways. The first was asking you to identify every household in the community and the second was following up women over time. We would like to know more about the process and the experiences you had identifying and following up women.
    - First, please tell me about your experiences with the household screening and specifically, your thoughts on what it was like to identify every household.
    - We also collected data on all deaths in the household in the last three years. What were the challenges of collecting data on deaths, especially to identify the deaths during pregnancy, delivery and within 2 months after delivery?
    - How did you determine if a woman was eligible for the longitudinal study if she did not know her LMP or how many months she is pregnant?
    - Next, can you tell us about your experience with following up women over a six to nine month period.
        - What challenges did you face?

- What did you do to overcome them?
    i. What worked well?
    ii. What strategies did you use to keep track of women?

3. In the survey, we also ask similar questions, or repeat the same questions. How do you feel that the respondents received these repeated questions? Can you tell us more about how asking these repeat questions went?
    - Did participants remember that they had already been asked these questions? How did they respond?
    - How did you explain why you were asking the same questions?
    - What was the experience of conducting the first vs. second interview?
        - Were there any questions that seemed particularly hard for women to recall?
        - Were there any challenges in administering the questions that asked about before the first interview, after the first interview but before the second interview, etc? For example: What illness, if any, did [NAME] suffer from before our first visit? versus What illness, if any, did [NAME] suffer from after our first visit?
            - How did you explain this question?
            - Do you have suggestions on how to improve it?
    - [IF TIME PERMITS] For anyone that had multiple/twin births how did the mother respond to the repeated questions for each child?
        - Did her mood change after a certain amount of questions? If it did change, at what point/after how long did it change?

4. How were your experiences using the QR code cards?
    - Did the respondents have any problems with the cards?
        - If not brought up, were these issues with losing or damaged cards?
    - Did you have trouble scanning these into your phone?

5. Have any of you conducted a phone-based follow-up for interview three? If so, could you talk about that experience?
    - Have any of you had challenges with the phone interview? If so, what were they?

6. In general, do you think that there were questions that women did not understand?
    - Are there questions that can be rephrased so that women better understand them? What are they?
    - Are there questions that no matter how they are phrased, women simply won't know the answer or are unfamiliar with the choices or terms? What are they? Is there something that could be asked instead?

7. Did you experience any other challenges during this survey?

8. Do you have any other suggestions on how to improve the survey questionnaire specifically?
   Do you have any suggestions to improve the data collection process, or implementation of the survey?