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The association between antenatal care utilization adequacy and urban versus rural locality in North and South Kivu, Democratic Republic of the Congo

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The association between antenatal care utilization adequacy and urban versus rural locality in North and South Kivu, Democratic Republic of the Congo

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An abstract of
a thesis submitted to the Faculty of the
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ABSTRACT

The association between antenatal care utilization adequacy and urban versus rural locality in North and South Kivu, Democratic Republic of the Congo

Background: Maternal and newborn mortality rates in the Democratic Republic of the Congo (DRC) are among the highest in the world. Antenatal care (ANC) is a proven and cost-effective strategy for reducing maternal and newborn mortality. Although 88% of women in the DRC received at least one antenatal care visit, only 48% of women received the World Health Organization's recommendation of four or more antenatal care visits. The purpose of this analysis is to assess how urban versus rural place of residence impacts antenatal care utilization adequacy (4-visit model) in two provinces of eastern Congo.

Methods: Using data from the 2010 Multiple Indicator Cluster Survey for the Democratic Republic of the Congo, we examined the association between adequate antenatal care utilization and urban versus rural locality among women of reproductive age (15-49 years old) living in the North and South Kivu provinces of eastern Congo and who reported attending at least 1 antenatal care visit during their last pregnancy (n=850). We estimated crude and adjusted odds ratios as well as 95% confidence intervals using logistic regression procedures while accounting for the survey design.

Results: Overall, 63.9% of women surveyed attended 1 to 3 visits while only 36.1% of women reported attending 4 or more visits. During unadjusted analysis, we found a statistically significant association between locality and adequate ANC utilization (OR=2.64, 95%CI=1.62-4.29). After adjusting for education and province in the final model, the association remained significant (aOR=2.34, 95% CI=1.43-3.82). The odds of a woman living in an urban area attending 4 or more visits is 2.34 times larger than the odds for a women living in a rural area. In the final model, province was also found to be a statistically significant predictor. Women in North Kivu province were more likely than women in South Kivu province to attend 4 or more visits (aOR=2.47, 95% CI=1.62-3.78).

Conclusion: Although a majority of women attend at least one prenatal care visit in the Kivus, many of these women do not attend the recommended number of visits. The disparity in adequate antenatal care utilization between women living in urban areas versus rural areas is suggestive of the need to improve accessibility in rural areas of eastern Congo. Additional findings suggest the need to improve accessibility in the South Kivu province. Although adequate antenatal care utilization is used as a proxy for understanding ANC accessibility, it is possible that other individual and societal factors, such as distance or difficulty in reaching the nearest health facility, may be responsible for ANC underutilization and thus should be examined in future studies.

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BACKGROUND

OVERVIEW: THE IMPORTANCE OF ANTENATAL CARE IN PREVENTING MATERNAL AND NEWBORN MORTALITY

An estimated 800 women worldwide die everyday of preventable causes related to pregnancy and childbirth [1]. Nearly all (99%) of maternal deaths occur in developing countries and more than half of maternal deaths occur in Sub-Saharan Africa [1]. A systematic review of the global causes of maternal mortality found that 73% of maternal deaths were due to direct obstetric causes [2]. Some of the direct causes of maternal mortality include abortion related complications and obstetric complications such as sepsis or eclampsia. [3]. The top three direct causes of maternal death are hemorrhage, hypertensive disorders, and sepsis [2]. The review also found that 27.5% of deaths were due to indirect causes which are primarily pre-existing conditions that can be exacerbated by pregnancy such as HIV or nutritional deficiencies such as anemia [2].

Many of these conditions can be prevented, detected, and treated by trained health care providers even before childbirth through utilization of antenatal care (ANC) services, commonly referred to as prenatal care. Interventions provided during antenatal care include malaria prevention, tetanus immunization, screening and treatment for infections, and identification of adverse pregnancy outcomes. These interventions, when delivered by trained health care professionals, have been proven to reduce maternal deaths significantly [4]. Preliminary estimates have shown that raising current coverage levels of all maternal health interventions, which includes interventions given during prenatal care, to 99% would reduce maternal deaths by three-fourths [5]. Additionally, utilization of antenatal care services increases the likelihood that a woman will seek care from a skilled attendant during childbirth [6], which has been shown to reduce maternal morbidity and mortality [7].

In addition to reducing maternal deaths, prenatal care can also help reduce newborn deaths. Worldwide, 2.9 million infants die every year within the neonatal period, defined as the first 4 weeks of life [8]. Recent estimates found that neonatal mortality comprises at least 44% of deaths in children under 5 [9]. The main causes of death in the neonatal period are preterm birth (28%), severe infections (26%) and asphyxia (23%) [10]. Many of these deaths are preventable using proven, cost-effective interventions (e.g. treatment of maternal infections) and are administered during prenatal care. Inadequate antenatal care has also been linked to increased risk of mortality in

the perinatal period, defined as the period of time from 22 weeks of gestation to 7 days after birth [11]. An estimated six million perinatal deaths occur worldwide every year [11]. Almost all (98%) of these deaths occur in developing countries. In children under the age of 5, deaths in the perinatal period of life cause twice as many deaths as malaria and HIV/AIDS combined [11].

It is evident that prenatal care plays an important role in reducing poor health outcomes among women and newborns, particularly in developing countries which are afflicted with high rates of maternal and newborn deaths. Research has shown that poor health in developing countries is largely attributable to underutilization of and relatedly, lack of access to, health care services [12]. Utilization of antenatal health care services is vital to preventing unnecessary maternal and neonatal deaths. However, in order for prenatal care to be most effective at preventing poor adverse health outcomes, prenatal care must be considered adequate.

ADEQUACY IN ANTENATAL CARE

There are currently three commonly used indices which measure the adequacy of prenatal care: the Kessner index of care, the Kotelchuk index, and the GINDEX [13]. These indices measure adequacy differently but all take into account when prenatal care began (initiation), the number of prenatal care visits completed, and the gestational age of the infant at delivery in determining adequacy [14]. The use of these indices helps to create a threshold for defining adequate care, which although they vary among indices, share a common theme. Prenatal care visits must be initiated early on in pregnancy and completed on a routine schedule, with more visits as needed determined by using a risk-based approach. It is important to note that none of these indices measure the quality and the content of the prenatal care provided, both which should be considered when defining adequate prenatal care.

Evidence shows that adequate prenatal care is important in reducing adverse health outcomes. The relationship between adequate prenatal care and health outcomes was recognized as early as 1915 when J Whitridge Williams shared his findings with the Journal of the American Medical Association which demonstrated that early detection and treatment of pregnancy complications reduced perinatal mortality significantly [15]. In a US study that looked at the impact of adequate antenatal care on health outcomes in both high and low risk pregnancies, researchers found that inadequate prenatal care was associated with increased risk of neonatal death in high risk pregnancies complicated by anemia, cardiac disease, lung disease, chronic hypertension, diabetes, renal disease, eclampsia, and previous preterm/small-for-gestational age birth [16]. Though this association

disappeared when adjusting for gestational age at delivery and birth weight, even among pregnancies that were not considered high-risk researchers still found higher neonatal mortality among women reporting inadequate prenatal care.

Other studies point to similar findings between adequate prenatal care and preterm birth, intrauterine growth, and birth weight:

- A 10 year retrospective study of adolescents from 2010, researchers found that women without prenatal care had a 7-fold higher risk of preterm birth compared with those attending 75-100% of recommended visits [17]. As prenatal care increased, the risk decreased linearly.
- A study by Coria-Soto et al showed that inadequate number of visits led to a 63% higher risk of intrauterine growth restriction [18].
- Ahmed and Das found that birth weight was positively correlated with the number of antenatal care visits [19].

ADEQUATE ANTENATAL CARE IN RESOURCE-LIMITED SETTINGS

The three indices mentioned previously are used primarily in developed countries where there are fewer barriers to accessing and utilizing care. In resource-limited settings however, measuring adequacy of antenatal care is challenging due to the multitude of barriers that interfere with the delivery and receipt of adequate antenatal care. Historically, the Western model of antenatal care, which typically involves 12 or more antenatal care visits, was adopted by many countries with few attempts to adapt the care model to fit within the context of a low-resource setting [20]. Shortages in health care facilities and health care workers, which is endemic in low-resource settings, often leads to ineffective care as visits become irregularly spaced and waiting times to see providers are long [20].

As such, the World Health Organization (WHO) undertook a randomized trial to simplify the model for routine antenatal care [20]. The results of the 2001 trial showed that a reduced visit model of focused antenatal care package of interventions among low-risk pregnancies did not impact maternal and newborn health outcomes [20]. A Cochrane review of the literature confirmed that health outcomes using this reduced visit model were comparable to those in the standard Western model which involved more visits [21]. Based on this evidence, the WHO currently recommends a minimum of four antenatal care visits for low-risk pregnancies. These four visits focus on delivering

an essential package of interventions that include the prevention, identification, and management of any conditions which may complicate pregnancy and birth such as pre-eclampsia, tetanus, malaria, and sexually transmitted diseases as well as providing advice and support to the woman and her family.

Despite the evidence pointing toward the benefits of antenatal care in reducing adverse health outcomes for mothers and neonates, antenatal care coverage (4-visit model) is relatively low. Worldwide, only 56% of pregnant women attended the recommended minimum of four ANC visits [22]. In developed countries, the proportion of women attending the recommended amount of ANC visits has increased from 37% in 1990 to 52% in 2012 [22]. Among developing countries however, only 38% of pregnant women met the recommended minimum of four ANC visits [22]. Data available from the World Health Organization indicate that there have been little improvement in antenatal care coverage worldwide in the past decade [22].

Encouragingly, antenatal care coverage (4-visit model) has increased among urban households of Asia, Africa, and the Americas [23]. Disparities between rich and poor households in urban areas are still problematic. Among the richest 20% of urban households in Africa and Asia, antenatal coverage is 1.6 and 1.8 times higher than among women in the poorest 20% of urban households [23]. Although the disparity between the richest 20% of women in urban areas and the poorest 20% of women in urban areas is decreasing in Asia and America, this inequality is increasing in Africa [23].

WHY STUDY HEALTH CARE UTILIZATION

The research is clear that increased antenatal care utilization is associated with better health outcomes among mothers and neonates. However, the research also shows that in developing countries utilization of prenatal care is low and health outcomes among mothers and neonates is especially poor. The high number of maternal and newborn deaths in developing countries is suggestive of disparities in access and utilization of health services. Thus, examining prenatal care utilization can be helpful to policy makers and health care system decision makers in creating policies which promote more equitable distribution of health care services [24]. For health care services to be equitable does not suggest that all individuals receive the same amount of care, but rather that the effects of certain predisposing or enabling individual and health care system characteristics such as income or number of health care personnel would pose less of a constraint to the accessibility of care.

INDIVIDUAL AND SOCIETAL FACTORS IMPACTING HEALTH CARE SERVICES UTILIZATION

Utilization patterns are greatly impacted by a multitude of factors associated with the health care system as well as the patient. Such utilization patterns include entry into services (e.g. whether a person uses health care) and timing (e.g. when a person goes for care and how often the person uses care). A commonly used framework by Andersen and Aday provides an understanding of health services utilization which takes into account both societal and individual determinants that may encourage or inhibit utilization [24, 25].

- Societal determinants include: A health care system's resources (e.g. the number of health care personnel relative to the population size and the geographical distribution of services); organization of a health care system (e.g. entry and structure).
- Individual determinants include: demographics, social structure, beliefs, and family and community characteristics.

Together, these societal and individual determinants may provide insight into any patterns and trends in health care utilization.

INDIVIDUAL DETERMINANTS OF HEALTH CARE UTILIZATION

The individual behavioral model of understanding health care utilization assumes that utilization depends on an individual's predisposition to utilize services (predisposing factors), to obtain health care services (enabling factors), and lastly his or her person's illness level (illness factors) [25].

- Predisposing factors include: demographic characteristics such as age or marital status; social structure characteristics such as education or religion; and knowledge or beliefs toward health and disease.
- Enabling factors include: family characteristics such as income or health insurance; community characteristics such as region or urban-rural character.
- Illness factors include: perceived characteristics such as disability and symptoms; evaluated characteristics such as symptoms and diagnoses.

PREDICTORS OF ANTENATAL CARE UTILIZATION

Existing studies have examined various individual factors that may contribute specifically to underutilization of antenatal care visits. A systematic review conducted by Simkhada et al found that the following sociodemographic factors were significantly associated with utilization of antenatal care: women's education, husband's education, parity, birth order or interval, pregnancy

intendedness, age of woman at marriage or pregnancy, ethnicity/caste/religion, and family size and structure [12]. In addition, they found that certain individual characteristics associated with accessibility and affordability were also significant in predicting utilization of antenatal care. These factors included place of residence, distance or travel time to health facilities, women's or husband's occupation, socioeconomic status, and cost of services [12]. These determinants are all essential in understanding patterns of utilization of antenatal care.

Place of Residence and Utilization of Health Care Services

Place of residence is a critical factor in understanding health care utilization as the proximity to health care services varies from region to region and from urban to rural areas. In developing countries, geography is often a limiting factor to accessing health care due to the lack of good roads to reach health care facilities, availability of transportation, and the large distances many individuals travel to reach facilities. Studies have demonstrated that distance or travel time to a health facility can be a major barrier to utilization of health care services [26]. The lack of good roads not only impacts an individual's ability to reach health care facilities, but may also impact the quality of the clinic. For example, poor road conditions make it difficult to distribute supplies, to supervise health care workers, and to communicate during adverse weather conditions [26].

About The Democratic Republic of the Congo

The Democratic Republic of Congo (DRC), formerly known as Zaire, is as large as two-thirds of the entire European Union but ranks second to last on the Human Development Index [27]. The DRC is rich in natural resources such as diamonds, crude oil, cobalt, copper and timber. However, a series of inter-ethnic conflicts in the 1990s decimated its political, economic, and social infrastructure which critically slowed development [27]. This was further exacerbated by the influx of Rwandan refugees fleeing the genocide in 1994. Although a peace agreement was eventually signed and a transnational government was established to formally end seven years of inter-ethnic conflict within the DRC, political, social, and economic infrastructure remains fragile [28]. Encouragingly, the government recently developed a strategy to improve basic infrastructure in the DRC which includes the construction and modernization of roads, railways, water systems, ports and airports, schools, and hospitals [29].

In 2013 a major rebel group in eastern Congo, the M23, was defeated by the Congolese army and in the same year regional cooperation increased [30]. Although the security situation has vastly

improved, armed conflict and insecurity in the eastern provinces of the DRC continues to be chronic and presents a significant obstacle to achieving long-lasting social and economic stability in the DRC. These armed forces control much of the region and are responsible for mass violence in this area including sexual violence toward women and girls. Much of the armed conflict is centered in two of the DRC's eastern provinces, North Kivu and South Kivu. The Kivus are abundant in mineral resources; however armed groups have been competing for control of mining areas resulting in chronic violence.

Maternal and Neonatal Mortality in The DRC

Utilization of antenatal cares services is critical in reducing maternal and neonatal mortality and is especially critical in a country where maternal and neonatal mortality are among the highest worldwide. In the DRC, the lifetime risk of maternal death is 1 in 30 compared to 1 in 3800 in developed countries [31]. In the most recent 2013-2014 Demographic and Health Survey of the DRC, the neonatal mortality rate was reported to be 28 deaths per 1000 births which is a marked reduction from the 2007 results of 42 per 1000 births [29]. An estimated 29% of all under-5 deaths were due to neonatal deaths in the DRC [32]. In the eastern DRC, neonatal deaths are the second leading cause of death in children under 5 following fever/malaria [33].

Not only do neonatal deaths contribute considerably to under-5 mortality within the DRC, neonatal deaths in the DRC also contribute considerably to the amount of neonatal deaths around the world. In 2009, a study on neonatal mortality determined that the DRC was one of five countries which accounted for more than half of all neonatal deaths worldwide [34]. Antenatal care can make a big impact on reducing preventable neonatal and maternal deaths, however coverage (4-visit model) is low. In the 2013-2014 DHS report, 88% of women interviewed reported having received antenatal care at least once from a skilled health care provider during their last completed pregnancy [29]. However, only 48% reported attending four or more ANC visits [29].

Locality and Utilization of Antenatal Care

In the Democratic Republic of the Congo, locality of residence (urban versus rural residence) is of particular interest in understanding utilization patterns of antenatal care. Throughout the DRC, access to health care, health services infrastructure and development remains deficient particularly in rural areas [35] where 75% of the population resides [36]. Development of health services

infrastructure in urban and rural areas has been uneven, creating disparities in health care accessibility between urban and rural areas [35].

Urban and rural disparities in the percentage of women accessing health care facilities during childbirth are suggestive of disparities in accessibility between urban and rural areas. Only 74% of women living in rural areas in the DRC gave birth in a health care facility compared to 93% of women living in urban areas [29]. In rural DRC, 86% of women received prenatal care by a doctor, nurse or midwife, compared to 94% of women living in urban areas [29]. Similar trends have been found in other countries. A systematic review of urban versus rural differences in accessing maternal health care in developing countries found seven studies which demonstrated that women living in urban areas were more likely to have a skilled health care worker present at delivery than women in rural areas [37].

Studies conducted in Haiti [38] and Vietnam [39] point to marked differences in utilization patterns between urban and rural women. In Vietnam, it was found that 77.2% of women living in rural areas attended three or more ANC visits compared to 97.2% of women living in urban areas [39]. While in Haiti, it was found that the expected probability of women living in rural Haiti to utilize health care services was 77.2% compared to 85.8% of women residing in urban Haiti [38]. Furthermore, the study found that of women who accessed prenatal care, women in rural Haiti had an average of 3.78 prenatal care visits compared to those living in urban Haiti with an average of 5.06 visits [38]. This data suggests that women living in rural areas (compared to urban areas) are less likely to receive prenatal care, and among those receiving prenatal care, have fewer prenatal care visits on average.

LOCALITY AND HEALTH CARE OUTCOMES

Uneven access of healthcare services between women living in urban versus rural areas may also account for disparities in health outcomes. As an example, a review of studies performed in developing countries have shown that urban children are better nourished, are less likely to suffer chronic malnourishment, and less likely to be severely underweight than rural children [40]. Furthermore, urban children are shown to be at a lower risk of dying before their first or fifth birthday than rural children [40].

A study on perinatal mortality in Equateur, a rural province in the DRC, highlighted some of the characteristics present in rural areas that may contribute to poor health outcomes. Such characteristics include lack of basic infrastructure such as electricity and plumbing in clinics,

inadequacy of lab services and drugs in stock in clinics, difficulties getting to health clinics due to lack of public transportation, extreme poverty, illiteracy, and teen pregnancy. [11]. These characteristics are common in other rural areas in the DRC and may be associated with adverse health outcomes. Differences in health outcomes between children living in rural areas versus those living in urban areas are evident when looking at the under-5 mortality rate in the DRC. The under-5 mortality in rural areas is much higher at 118 deaths per 1000 live births compared to 96 deaths per 1000 live births in urban areas [29].

It is evident that urban and rural differentials exist in overall health care utilization but also in health outcomes. These patterns are evident not just in the DRC but also worldwide. As such, urban and rural differentials in antenatal care utilization are examined in this study.

THE IMPACT OF CONFLICT ON HEALTH CARE SERVICES IN EASTERN CONGO

The eastern DRC provinces of North and South Kivu have been heavily afflicted by chronic conflict which has destabilized the public health system in these regions and had an adverse effect on public health services [35]. A survey conducted in 2010 found that 67% of the population living in secure and accessible villages in the North and South Kivu provinces and Ituri District of the Orientale Province lacked adequate access to general health care [41]. Although many humanitarian agencies have been deployed to assist in providing much needed services such as health care in eastern Congo, many are centered in the urban centers of North and South Kivu where refugees fleeing conflict from rural areas and neighboring Rwanda have settled [42]. Consequentially, Goma, which is the provincial capital of North Kivu and has been at the center of the violent conflict, has a very large NGO (non-governmental organization) presence.

THE IMPACT OF CONFLICT ON MATERNAL AND INFANT HEALTH OUTCOMES

Because of the impact conflict has on the public health infrastructure, conflict has also been shown to impact health outcomes. A report on the reproductive health of war-affected populations points to several studies which suggest a relationship exists between poor maternal and infant pregnancy outcomes and war-affected populations [43]. One of the studies referenced in the report found that women who lived in neighborhoods afflicted by violence in Santiago, Chile were five times as likely to experience pregnancy complications than those who lived in neighborhoods with low levels of violence [43]. Another study which examined perinatal mortality before and during the war in Sarajevo found that the rate increased from 15 deaths per 1000 live births before the war to 39

deaths per 1000 live births during the war [43]. The western regions of the DRC have been less impacted by ongoing conflict than the eastern regions, thus North and South Kivu have been chosen as the population of interest for this study.

STUDY OBJECTIVE

In this study, accessibility will be indirectly examined to identify if any differences in utilization exist between women in urban areas versus rural areas in North and South Kivu. With that being said, a major limitation of the study is that it cannot directly measure accessibility as no survey questions were included to assess accessibility to antenatal care (e.g. how close a woman lived to an ANC clinic).

The primary objective of this study is to determine whether there are differences in adequate antenatal care utilization in women who received antenatal care between women living in urban versus rural areas in the provinces of North and South Kivu. Although the security situation has fluctuated since the time the survey data was obtained, this research may be useful in providing some insight into the impact of chronic conflict on the utilization of antenatal care services. As with accessibility, there is no direct way to assess conflict in this study.

While examining the impact of urban or rural locality on antenatal care utilization adequacy is the primary focus of this study, there are additional factors that may influence utilization such as age, education, wealth index, parity, intendedness of last pregnancy, age at first marriage, region, religion, and marital status. Many of these factors have been known to be interlinked with urban and rural locality and thus must be examined as covariates.

The evidence presented in the Simkhada et al review will serve as the basis for the covariates that were chosen for this study. It is important to note that not all variables examined in the Simkhada et al review were available in the MICS survey and thus only select variables were chosen for this analysis.

Age (covariate): In the Simkhada review, they found that the majority of women in their thirties attended ANC early and more frequently than teenagers and older women.

Education (covariate): Simkhada et al found sixteen studies which showed that women's education was the best predictor of ANC visits. Women who were better educated were more likely to receive the recommended number of ANC visits and were more likely to initiate ANC early in the pregnancy.

Wealth (covariate): Their review cited three studies that found that women who had high household economic status were more likely to receive adequate ANC and initiate ANC early than women with lower economic status.

Parity (covariate): The Simkhada review found eleven studies which found strong associations between parity and ANC utilization. In general, higher parity was found to be a barrier to accessing the recommended amount of care.

Pregnancy Intention (covariate): Simkhada et al found that intendedness of pregnancy was a statistically significant factor in determining ANC use in four studies. Women whose pregnancies were unwanted tended to initiate visits late and go to less visits.

Age at first marriage (covariate): The researchers cited eight studies which found that age was positively associated with ANC attendance. For example, two studies found that later age of marriage was positively associated with access or attendance for ANC.

Marital Status (covariate): Simkhada et al found two studies that showed married women were more likely to receive ANC and initiate ANC earlier than single or unmarried women.

Religion (covariate): Researchers found nine studies which showed that ethnicity, caste, and religion played a significant role in utilization. For example, women who followed Muslim, Orthodox and Protestant religions were more likely to use ANC in Ethiopia.

Region (covariate): To understand if there are regional differences in utilization between North and South Kivu, the covariate of region has been added.

Methodology

DATA SOURCE

The Multiple Indicator Cluster Survey (MICS) is a standardized household demographic and health survey developed by the United Nations Children Fund (UNICEF) to collect information on the status of women and children. UNICEF assists countries worldwide in implementing the survey. Topics covered in the survey include demography, health, nutrition, education, drinking water, hygiene and sanitation, social protection, development indicators, and socioeconomic status indicators. The fourth round of MICS (MICS-4) surveys was conducted between 2009 and 2011 and helps countries monitor progress toward national health priorities as well as twenty of the Millennium Development Goals [44].

UNICEF collaborated with the National Statistical Institute (INS) in the DRC to design the MICS-4 survey. Three of the standardized MICS-4 questionnaires were utilized in this survey: Household Questionnaire, Questionnaire for Individual Women (Age 15-49), Questionnaire for Children Under Age 5. An additional questionnaire on Household Expenditures was also developed. The surveys were field tested and adapted to the DRC prior to data collection. The INS was also charged with implementing the survey under the direction of the Ministry of Planning of the Government of the DRC. Funding assistance was provided by UNICEF, UNFPA, WFP, and USAID's 20/20 Programme.

A multi-stage stratified sampling approach was conducted to enable representativeness and to allow for comparisons between the DRC's 11 provinces and between urban and rural populations. The total sample size had 11,490 households which consisted of 147 urban clusters and 246 rural clusters for a total of 383 clusters. The sampling frame used consisted of a complete list of city-neighborhoods, township-neighborhoods, and rural villages along with their population numbers. There were 198 teams of trained interviewers that collected data between February 8 and April 24, 2010. Questionnaires were translated to the main languages spoken in the DRC. Data entry was performed between March 15 and June 4, 2010. Double-data entry was conducted to minimize data entry errors. Two additional rounds of data quality checking were also conducted.

The questionnaire used in this analysis is the Questionnaire for Individual Women (Age 15-49). Of the 11,490 households sampled, 13,235 women between the ages of 15-49 were identified. Of the 13,235 women, 12,853 women between the ages of 15-49 completed the Questionnaire for

Individual Women responded resulting in a 97.1% response rate. The dataset is de-identified and contains no names or addresses. The only possible HIPAA identifier included in the dataset is month and year of birth, although it should be noted that the actual date is not captured in the data. Access to the MICS-4 dataset was requested by UNICEF via email. A short form was completed asking for name, address, country of residence, email, affiliation, country dataset requested, and a short description of the research objectives. A username and password was emailed by a UNICEF staff member providing access to the MICS-4 dataset. UNICEF has requested that copies of any reports and publications based on the downloaded MICS data be forwarded to the UNICEF national office and government partner. This project was submitted to the Emory University Institutional Review Board (IRB) and although it is human subjects research, was determined to be exempt from further IRB review and approval (IRB00075291) as it is secondary analysis on de-identified data.

MEASURES

The main objective of this study is to examine the association between adequate antenatal care utilization and urban versus rural locality while examining additional correlates.

Urban-rural locality (main exposure variable): The primary independent variable being studied is urban-rural locality which is a binary variable that indicates whether the respondent lives in a rural area (reference level) or an urban area.

Adequate antenatal care utilization (dependent variable): Adequate antenatal care utilization is defined by whether or not the woman reported attending 4 or more ANC visits during her last completed pregnancy. This number is self-reported and was not verified by any official health records. Antenatal care utilization is assessed using the question "How many times did you receive antenatal care during this pregnancy?" from the Maternal and Newborn Health Module of the Questionnaire for Individual Women. This module is only administered to women who answered that they attended one or more antenatal care visit and had a live birth in the 2 years preceding the interview. For this study, the antenatal care utilization variable has been recoded from a continuous to a binary variable: (1) 1-3 visits and (2) 4 or more visits.

The covariates to be examined are age, education, wealth index, parity, intendedness of last pregnancy, age at first marriage, region, religion, and marital status as these variables have all been shown in other studies to be associated with antenatal care utilization in a systematic review completed by Simkhada et al [12].

Age (covariate): Age has been recoded from a continuous variable to a categorical variable and is separated into two categories: 15-20 years old, 21-26 years old, and 27 years and older (reference level).

Education (covariate): In the MICS survey, education is assessed by asking the participant "What is the highest level of school you attended?" The response choices are: preschool, primary, secondary, and higher. In data processing, these responses are recoded into a new education variable with the following responses: none, primary, and secondary and above. These categories will remain the same in this analysis with "none" serving as the reference level. Primary education is the equivalent to the first 6 years of education or elementary school in the US whereas secondary education is equivalent to the next 6 years of education (junior high and high school) in the US.

Wealth (covariate): Although income was not captured in this survey, a proxy for wealth was used instead. The wealth index variable is calculated by taking into account dichotomous variables related to household and individual assets such as car ownership [45]. The wealth index is divided into quintiles which range from the poorest 20% to the richest 20% and has been re-coded to combine quintiles into a categorical variable with three levels as follows: Poorest and second quintile (reference), middle quintile, and fourth/richest quintile.

Parity (covariate): Parity is formally defined as the number of times a woman has given birth to a fetus with a gestational age of approximately 24 weeks regardless of whether or not the baby was stillborn. As it is difficult to assess parity in household surveys due to poor recall and lack of understanding of definitions, parity will be determined by asking how many live births a woman had in her lifetime. Parity has been recoded from a continuous variable to a categorical variable with the following categories: 0 births, 1-3 births (reference level), 4 or more births.

Pregnancy Intention (covariate): Pregnancy intendedness is determined by a simple yes or no question that asks women who have given birth in the past 2 years prior to the interview, "When you got pregnant with (*NAME OF CHILD*), did you want to get pregnant at that time?" A response of no will serve as the reference level.

Age at first marriage (covariate): Age at first marriage has been recoded into a binary variable: less than 15-17 years old and 18 years old or greater (reference level). This variable was dropped after conducting stratified analysis due to insufficient sample size (see Appendix A).

Marital Status (covariate): The MICS survey asks several questions on marital status: (1) Are you currently married or living together with a man as if married? (Response options: Yes, currently married; Yes, living with a man; No, not in a union) (2) Have you ever been married or living together with a man as if married? (Response options: Yes, formerly married; Yes, formerly lived with a man; No). During data processing, a new variable was created to indicate current marital status with the response options: Currently married/in union; Formerly married/in union; and Never married/in union. In union refers to a consensual union that is not formally recognized as a marriage. These categories will remain the same for analysis. The currently married/in union category will serve as the reference level.

Religion (covariate): Religion has been recoded from nine categories to four categories in order to maintain sufficient sample size (see Appendix A). The four categories are: (1) Catholic and (2) Protestant (3) Other Christian (which includes Kimbanguism, Pentecostal, and Jehovah's Witnesses) and (4) Other Religion (Muslim and Animist) or No Religion. Protestant religion will serve as the reference level category.

Region (covariate): The original sample contained data from all 11 provinces. Only observations from North and South Kivu have been included. Observations from other provinces have been excluded from the analysis. South Kivu will serve as the reference level category.

STATISTICAL ANALYSIS

Survey Procedures: Survey procedures will be used in all the analyses as the data was collected using a multi-stage stratified sampling approach. MICS stratifies both on province and between urban and rural to enable a representative sampling of the population. There are two strata that will be accounted for in the analysis: region (North Kivu or South Kivu) and locality (urban versus rural). Cluster and sampling weight variables will be included in the survey analysis procedures. Only North and South Kivu households were included in this analysis. Data from all other provinces were excluded from the dataset. The final dataset, which only includes households from North and South Kivu provinces, consists of 4 strata, 70 clusters, and 2170 households. All women of reproductive age (15-49 years) in each household were invited to participate.

Descriptive analysis: Basic descriptive analysis using SAS Version 9.4 will be conducted to examine the sample population, to identify any outliers, and to help in the creation of categorical variables. Stratified analysis will be conducted to determine whether a covariate's categories may need to be collapsed. Appendix A provides a detailed methodology of how variable categories were developed.

Bivariate analysis: Bivariate analysis will be conducted to examine the distribution of the independent variable and antenatal care utilization adequacy and then by each of the covariates. A design-adjusted Rao-Scott chi-square test will be used to determine if there are any significant differences in the distribution of such variables between women who attended 4 or more antenatal care visits and those who only attended 1-3 visits. Significance will be assessed using a 0.05 level of significance.

Logistic regression to determine crude and adjusted odds ratios: Logistic regression will then be used to determine the crude odds ratio and 95% confidence interval between urban and rural locality and antenatal care utilization adequacy. These results will identify whether there is a significant, independent association between the two variables. Logistic regression will then be conducted again between the main independent variable and the dependent variable adjusted for each of the additional covariates. Adjusted odds ratios and 95% confidence intervals will be examined to identify any significant associations accounting for the survey design.

Model Selection: Backward elimination will be conducted to determine the final model. The first step in building this model is to create the Fully Adjusted Model. This model will include the dependent variable, the main exposure variable, the covariates, and cross-product terms. Cross-product terms will be created for each of the covariates in order to determine whether there is effect modification for locality. Effect modification will be assessed in logistic regression. Any significant cross-product terms and its matching variable will be kept in the model while non-significant terms will be removed. Significance for cross-product terms will be assessed at the 0.05 level. After non-significant cross-product terms are dropped, non-significant covariates will be removed from the model one by one starting with the term that has the highest p-value. After each non-significant covariate is dropped, confounding will be assessed. All confounding variables will be kept in the model. To determine whether confounding occurred, each of the remaining covariates that are not part of a matching variable will be dropped from the model. As each covariate is dropped, confounding is assessed using this standard criteria: if a change of 10% of more from the

crude model is present, the variable will be kept in the model. Any independent variables that do not confound the relationship between antenatal care utilization adequacy and locality will be removed from the model. The process of assessing each variable for interaction and then again assessing for confounding will continue for each covariate until all terms remaining are significant and show no confounding. Note that variables that are part of significant cross product terms will remain in the model. Significance for covariates will be assessed at the 0.05 level.
The final model selected will be determined using the results from backward elimination as well as the literature.

Collinearity: To determine whether two or more predictor variables are highly correlated, an assessment of collinearity will be conducted on the final model. It is important to identify highly correlated predictor variables as it may result in the unreliability of regression coefficients. Any variables expressing collinearity will be removed.

Goodness of Fit: Survey design will be ignored in order to assess goodness of fit using the Hosmer-Lemeshow test. This test is indicative of whether the observed distribution between women who went to 4 or more antenatal care visits versus those who only went to 1-3 visits is similar to the expected distribution based on the model. A higher p-value indicates a better fit of each model while a lower number shows a poor model fit.

All analyses will be conducted using SAS version 9.4.

RESULTS

DESCRIPTIVE ANALYSIS

Table 1: Characteristics of Study Population
Reproductive Age Women (15-49 years old) Receiving At Least One Prenatal Care Visit
North and South Kivu (MICS 2010)

	n = 850	Weighted Percent
Locality		
Rural	618	83.8%
Urban	232	16.2%
Age		
15-20 years old	114	13.8%
21-26 years old	288	34.5%
27+ years old	448	51.7%
Parity		
1-3 live births	416	48.6%
4+ live births	434	51.4%
Pregnancy Intendedness		
No	294	33.9%
Yes	556	66.1%
Wealth		
Poorest and 2nd quintiles	227	29.2%
Middle quintile	235	30.4%
4th and richest quintiles	388	40.4%
Education		
None	290	35.6%
Primary	334	41.4%
Secondary and above	226	23.0%
Marital Status		
Currently married	731	85.8%
Formerly married	72	8.7%
Never married	47	5.6%
Religion		
Catholic	410	40.5%
Protestant	310	41.4%
Other Christian	74	9.2%
Other or No Religion	56	8.8%
Region		
North Kivu	417	52.5%
South Kivu	433	47.5%

A total of 2368 women participated in the survey from North and South Kivu provinces (Appendix B). Of these women, 938 (58.0%) women reported a live birth in the past two years while 750 women

did not have a live birth in the past two years (42.0%). There were 680 women who did not report having any live births in their lifetime. Of the 938 women who reported a live birth in the past two years, 874 (92.9%) received prenatal care and 64 (7.1%) did not receive prenatal care. Women who did not receive any prenatal care (n=64) were not included in this analysis as most women received prenatal care and it is possible that women who went to no prenatal care may be different from those who went but did not meet the minimum 4 visits. Of the 874 women who received prenatal care, 850 women gave a response as to how many prenatal care visits they attended during their last pregnancy and 24 women did not respond. Of these 850 women, 508 (60.1%) reported 1-3 visits and 342 (39.9%) reported 4 or more visits.

Table 1 provides basic descriptive analysis of these 850 women who reported a live birth in the past two years and who attended at least 1 prenatal care visit. A greater percentage of women included in this analysis reside in rural areas (83.8%) than in urban areas (16.2%). Most women report that they intended their last pregnancy (66.1%). Only a small percentage of women report having an education of secondary and above (23.0%) compared to women with no education (35.6%) or primary education (41.4%). A majority of women report being currently married (85.8%). A large percentage of women report being either Protestant (41.4%) or Catholic (40.5%).

BIVARIATE ANALYSIS

Table 2. Characteristics of women by antenatal care adequacy
Reproductive Age Women (15-49 years old) Receiving At Least One Prenatal Care Visit
North and South Kivu (MICS 2010)

Characteristic		1-3 Visits		4+ Visits			
		n=508	*%*	n=342	*%*	X^2 (d.f.)*	*p-value*
Locality							
	Rural	409	*63.9%*	209	*36.1%*		
	Urban	99	*40.2%*	133	*59.8%*	16.7399 (1)	*< 0.0001*
Age							
	15-20 years old	63	*52.8%*	51	*47.2%*		
	21-26 years old	184	*64.8%*	104	*35.2%*		
	27+ years old	261	*58.9%*	187	*41.1%*	2.5992 (2)	0.2726
Parity							
	1-3 live births	250	*61.2%*	166	*38.8%*		
	4+ live births	258	*59.0%*	176	*41.0%*	0.2514 (1)	0.6161
Intendedness of Pregnancy							
	No	161	*55.7%*	133	*44.3%*		
	Yes	347	*62.3%*	209	*37.7%*	3.7465 (1)	0.0529
Marital Status							
	Currently Married	444	*62.0%*	287	*38.0%*		
	Formerly Married	40	*47.2%*	32	*52.8%*		

	Never Married	24	*50.6%*	23	*49.4%*	3.6345 (2)	0.1625
Education							
	None	205	*68.1%*	85	*31.9%*		
	Primary	200	*59.7%*	134	*40.3%*		
	Secondary and above	103	*48.4%*	123	*51.6%*	8.9760 (2)	*0.0112*
Wealth							
	Poorest and second	159	*64.1%*	68	*35.9%*		
	Middle	151	*62.4%*	84	*37.6%*		
	Fourth and Richest	198	*55.4%*	190	*44.6%*	2.1197 (2)	0.3465
Religion							
	Catholic	228	*52.5%*	182	*47.5%*		
	Protestant	199	*65.4%*	111	*34.6%*		
	Other Christian	46	*64.7%*	28	*35.3%*		
	No Religion or Other	35	*65.3%*	21	*34.7%*	10.5274 (3)	*0.0146*
Region							
	North Kivu	206	*50.3%*	211	*49.7%*		
	South Kivu	302	*70.9%*	131	*29.1%*	31.0844 (1)	*< 0.0001*

*Rao-Scott chi-square test, d.f. = degrees of freedom

Looking at women living in rural areas, a greater percentage of women attended 1-3 visits (63.9%) than 4 or more visits (36.1%). Among women residing in urban areas, a greater proportion of women attended 4 or more visits (59.8%) than 1 to 3 visits (40.2%). These differences are statistically significant ($p < 0.0001$). Among women with no education, a greater percentage (68.1%) attended only 1 to 3 visits than 4 or more visits (31.9%). Among women with an education level of primary, a greater percentage (59.7%) went to 1 to 3 visits than 4 or more visits (40.3%). Among women with an education level of secondary and above, a greater percentage attended 4 or more visits (51.6%) than 1 to 3 visits (48.4%). The distribution at each education level is significantly different between women who attended 1 to 3 visits and women who attended 4 or more visits ($p=0.0112$).

Among women who report being Catholic, 52.5% attended 1-3 visits compared to 47.5% who attended 4 or more visits. Among women who report Protestant religion, 65.4% attended 1-3 visits compared to 34.6% who attended 4 or more visits. Among women categorized as Other Christian, 64.7% report attending 1-3 visits compared to 35.3% who attended 4 or more visits. Among women who are classified as having none or other religion, 65.3% attended 1-3 visits compared to 34.7% who attended 4 or more visits. The differences in distributions between women who attended 1-3 visits versus those who attended 4 or more visits are statistically significant ($p=0.0146$). Among women residing in North Kivu, the percentages between women attending 1 to 3 visits (50.3%) and 4

or more visits (49.7%) is similar. Among women residing in South Kivu, a much higher proportion of women report having only 1 to 3 visits (70.9%) than 4 or more visits (29.1%). The distribution in each region is significantly different between women who attended 1 to 3 visits and women who attended 4 or more visits ($p < 0.0001$).

LOGISTIC REGRESSION TO DETERMINE CRUDE AND ADJUSTED ODDS RATIOS

Table 3. Association of antenatal care adequacy with urban-rural locality, adjusted for other characteristics, Reproductive Age Women (15-49 years old) Receiving At Least One Prenatal Care Visit North and South Kivu (MICS 2010)

Adjusted For *	Urban-rural locality	Odds Ratio	*95% C.I.*[†]	*Wald chi-square*
Unadjusted (crude)	Urban	2.64	(1.62-4.29)	<0.0001
	Rural (Reference)	1.00	--	
Age	Urban	2.63	(1.61-4.32)	0.0001
	Rural (Reference)	1.00	--	
Parity	Urban	2.64	(1.62-4.29)	<0.0001
	Rural (Reference)	1.00	--	
Marital Status	Urban	2.62	(1.61-4.26)	0.0001
	Rural (Reference)	1.00	--	
Wealth	Urban	2.57	(1.50-4.42)	0.0006
	Rural (Reference)	1.00	--	
Intendedness of Pregnancy	Urban	2.58	(1.58-4.20)	0.0001
	Rural (Reference)	1.00	--	
Education	Urban	2.26	(1.35-3.79)	0.0020
	Rural (Reference)	1.00	--	
Religion	Urban	2.45	(1.52-3.96)	0.0002
	Rural (Reference)	1.00	--	
Region	Urban	2.74	(1.72-4.37)	<0.0001
	Rural (Reference)	1.00	--	

[†] C.I. Confidence interval

The crude association between urban-rural locality and antenatal care adequacy was examined (Table 3). The odds of a woman living in an urban area attending 4 or more visits is 2.64 times larger than the odds for a women living in a rural area. This association is significant ($p < 0.0001$).

This association was then adjusted for each of the covariates individually (Table 3). The Wald chi-square test was used to look for significant associations. The Wald chi-square test is significant ($p < 0.05$) for all of the associations examined. Interaction was assessed for each of the adjusted odds ratios at the 0.05 significance level (Appendix D). Interaction was found for the association between locality and wealth (p=0.0454). Stratum specific odds ratios are reported for this association (Appendix D). If no interaction was found after assessing for effect modification, confounding was assessed (Table 3). Confounding was found for the association between education and locality (aOR=2.26, 95% CI=1.35-3.79).

MODEL SELECTION

Table 4. Unadjusted and adjusted odds ratios of various characteristics with antenatal care adequacy Reproductive Age Women (15-49 years old) Receiving At Least One Prenatal Care Visit North and South Kivu (MICS 2010)

		Logistic regression analysis					
		Crude			Adjusted*		
	Characteristic	Odds Ratio	95% C.I.†	p-value‡	Odds Ratio	95% C.I.†	p-value‡
Locality				<0.0001			0.0018
	Urban	2.64	(1.62-4.29)		2.26	(1.36-3.77)	
	Rural (reference)	1	--		1	--	

CRUDE MODEL: logit (P(D=1 | LOCALITY)) = b0 + b1*LOCALITY

ADJUSTED MODEL: logit (P(D=1 | LOCALITY, AGE, PARITY, INTENTION, EDUCATION, RELIGION, REGION, WEALTH, MARITAL STATUS)) = $b_0 + b_1$*LOCALITY + b_2*AGE + b_3*PARITY + b_4*INTENTION + b_5*EDUCATION + b_6*RELIGION + b_7*REGION + b_8*WEALTH + b_9*MARITAL

Age			0.226			0.4845
	15-20 years old	1.28	(0.64 - 2.57)	1.6	(0.71-3.62)	
	21-26 years old	0.78	(0.55 - 1.11)	1.01	(0.64-1.59)	
	27+ years old (reference)	1	--	1	--	

CRUDE MODEL: logit (P(D=1 | AGE)) = $b_0 + b_1$*AGE

ADJUSTED MODEL: logit (P(D=1 | LOCALITY, AGE, PARITY, INTENTION, EDUCATION, RELIGION, REGION, WEALTH, MARITAL STATUS)) = $b_0 + b_1$*LOCALITY + b_2*AGE + b_3*PARITY + b_4*INTENTION + b_5*EDUCATION + b_6*RELIGION + b_7*REGION + b_8*WEALTH + b_9*MARITAL

Marital Status			0.213			0.4577
	Never married	1.59	(0.74 - 3.44)	1.07	(0.50-2.30)	
	Formerly married	1.83	(0.81 - 4.12)	1.71	(0.68-4.30)	
	Currently married (reference)	1	--	1	--	

CRUDE MODEL: logit (P(D=1 | MARITAL)) = $b_0 + b_1$*MARITAL

ADJUSTED MODEL: logit (P(D=1 | LOCALITY, AGE, PARITY, INTENTION, EDUCATION, RELIGION, REGION, WEALTH, MARITAL STATUS)) = $b_0 + b_1$*LOCALITY + b_2*AGE + b_3*PARITY + b_4*INTENTION + b_5*EDUCATION + b_6*RELIGION + b_7*REGION + b_8*WEALTH + b_9*MARITAL

Parity			0.622			0.311
	1-3 live births (reference)	1	--	1	--	
	4+ births	1.10	(0.77-1.57)	1.29	(0.79-2.11)	

CRUDE MODEL: logit (P(D=1 | PARITY)) = $b_0 + b_1$*PARITY

ADJUSTED MODEL: logit (P(D=1 | LOCALITY, AGE, PARITY, INTENTION, EDUCATION, RELIGION, REGION, WEALTH, MARITAL STATUS)) = $b_0 + b_1$*LOCALITY + b_2*AGE + b_3*PARITY + b_4*INTENTION + b_5*EDUCATION + b_6*RELIGION + b_7*REGION + b_8*WEALTH + b_9*MARITAL

Intendedness of Pregnancy			0.059			0.8851
	No (reference)	1	--	1	--	
	Yes	0.76	(0.57-1.01)	1.02	(0.76-1.37)	

CRUDE MODEL: logit (P(D=1 | INTENTION)) = $b_0 + b_1$*INTENTION

ADJUSTED MODEL: logit (P(D=1 | LOCALITY, AGE, PARITY, INTENTION, EDUCATION, RELIGION, REGION, WEALTH, MARITAL STATUS)) = $b_0 + b_1$*LOCALITY + b_2*AGE + b_3*PARITY + b_4*INTENTION + b_5*EDUCATION + b_6*RELIGION + b_7*REGION + b_8*WEALTH + b_9*MARITAL

Education			0.008			0.0655
	None (reference)	1	--	1	--	
	Primary	1.44	(0.92-2.24)	1.4	(0.89-2.22)	
	Secondary and above	2.28	(1.35-3.83)	1.87	(1.09-3.2)	

CRUDE MODEL: logit (P(D=1 | EDUCATION)) = $b_0 + b_1$*EDUCATION

ADJUSTED MODEL: logit (P(D=1 | LOCALITY, AGE, PARITY, INTENTION, EDUCATION, RELIGION, REGION + WEALTH + MARITAL STATUS)) = $b_0 + b_1$*LOCALITY + b_2*AGE + b_3*PARITY + b_4*INTENTION + b_5*EDUCATION + b_6*RELIGION + b_7*REGION + b_8*WEALTH + b_9*MARITAL

Religion			0.0136			0.3775
	Protestant (reference)	1	--	--	1	
	Other Christian	1.03	(0.54-1.97)	0.96	(0.49-1.89)	
	Other or No Religion	1.006	(0.52-1.96)	1.34	(0.66-2.75)	
	Catholic	1.71	(1.19-2.47)	1.36	(0.92-2.01)	

CRUDE MODEL: logit (P(D=1 | RELIGION)) = $b_0 + b_1$*RELIGION

ADJUSTED MODEL: logit (P(D=1 | LOCALITY, AGE, PARITY, INTENTION, EDUCATION, RELIGION, REGION), WEALTH, MARITAL STATUS)) = $b_0 + b_1$*LOCALITY + b_2*AGE + b_3*PARITY + b_4*INTENTION + b_5*EDUCATION + b_6*RELIGION + b_7*REGION + b_8*WEALTH + b_9*MARITAL

Wealth			0.008			0.9333
	Poorest and Second (reference)	1	--	--	1	
	Middle	1.07	(0.67-1.73)	0.91	(0.55-1.51)	
	Fourth and Richest	1.44	(0.78-2.65)	0.93	(0.50-1.71)	

CRUDE MODEL: logit (P(D=1 | WEALTH)) = $b_0 + b_1$*WEALTH

ADJUSTED MODEL: logit (P(D=1 | LOCALITY, AGE, PARITY, INTENTION, EDUCATION, RELIGION, REGION + WEALTH + MARITAL STATUS)) = $b_0 + b_1$*LOCALITY + b_2*AGE + b_3*PARITY + b_4*INTENTION + b_5*EDUCATION + b_6*RELIGION + b_7*REGION + b_8*WEALTH + b_9*MARITAL

Region			< 0.0001			0.0003
	North Kivu	2.41	(1.59-3.64)	2.36	(1.49-3.75)	
	South Kivu (Reference)	1	--	1	--	

CRUDE MODEL: logit (P(D=1 | REGION)) = $b_0 + b_1$*REGION

ADJUSTED MODEL: logit (P(D=1 | LOCALITY, AGE, PARITY, INTENTION, EDUCATION, RELIGION, REGION, WEALTH, MARITAL STATUS)) = $b_0 + b_1$*LOCALITY + b_2*AGE + b_3*PARITY + b_4*INTENTION + b_5*EDUCATION + b_6*RELIGION + b_7*REGION + b_8*WEALTH + b_9*MARITAL

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* Adjusted simultaneously for all other factors

† C.I. Confidence interval

‡ Wald Chi-square Test

Crude Odds Ratios: Logistic regression was then conducted to examine crude odds ratios between the outcome variable and each of the covariates (Table 4, Crude). Significant associations were found between urban-rural locality and antenatal care adequacy ($p<0.0001$), education and antenatal care adequacy ($p=0.008$), religion and antenatal care adequacy ($p=0.0136$), wealth and antenatal care adequacy ($p=0.008$) and region and antenatal care adequacy ($p<0.0001$).

Adjusted Model: Logistic regression was conducted again to examine the adjusted model (Table 4, Adjusted). The adjusted model includes the dependent variable, the main exposure variable, and all covariates. Significant predictors in the model are urban-rural locality (p=0.0018) and region (p=0.0003).

Assessing Cross-Product Terms: The following cross-product terms were created to test for interaction: locality*age, locality*parity, locality*intention, locality*education, locality*religion, locality*marital, locality*wealth, and locality*region (Appendix E). The cross-product terms were added to the adjusted model and logistic regression was run again. No significant interactions were found at the 0.05 level and thus all interaction terms were removed.

Backward Selection: Logistic regression on the adjusted model was run again in order to begin the process of backward selection, which will help determine the most parsimonious model (Appendix E). Significance was assessed at the 0.05 level. The first non-significant covariate dropped was pregnancy intendedness (p=0.8799), followed by age (p=0.4873), then parity (p=0.5245), then marital status (p=0.4670), and lastly religion (p=0.4266). Confounding was assessed after each covariate was dropped and no confounding was found for any of the covariates. These variables were thus dropped from the model. The remaining covariates were statistically significant: education (p=0.0488) and region (p < 0.0001). The main exposure variable, locality, was also statistically significant (p=0.0007).

Most Parsimonious Model: As such, the most parsimonious model thus includes the main exposure term, the dependent variable, and the following covariates: education and region.

Table 5: Logistic regression summary: fully adjusted, most parsimonious, and final models Reproductive Age Women (15-49 years old) Receiving At Least One Prenatal Care Visit North and South Kivu (MICS 2010)

	Fully Adjusted Model			Most Parsimonious / Final Model		
	OR*	95% C.I.†	Wald ^	OR	95% C.I.†	Wald ^
Locality			0.0018			0.0007
Urban	2.26	(1.36-3.77)		2.34	(1.43-3.82)	
Rural (reference)	1.0	--		1.0	--	
Age			0.4845			
15-20 years old	1.60	(0.71-3.62)				
21-26 years old	1.01	(0.64-1.59)				
27+ years old (reference)	1.0	--				
Marital Status			0.4577			

Never Married	1.07	(0.5-2.30)				
Formerly Married	1.71	(0.68-4.30)				
Currently Married (reference)	1.0	--				
Parity			0.3110			
1-3 live births (reference)	1	--				
4+ live births	1.10	(0.77-1.57)				
Intendedness of pregnancy			0.8851			
No (reference)	1	--				
Yes	0.76	(0.57-1.01)				
Education			0.0655			0.0488
None (reference)	1.0	--		1.0	--	
Primary	1.40	(0.89-2.22)		1.41	(0.90-2.20)	
Secondary	1.87	(1.09-3.20)		1.81	(1.11-2.94)	
Religion			0.3775			
Protestant (reference)	1.0	--				
Other Christian	0.96	(0.49-1.89)				
Other or No Religion	1.34	(0.66-2.75)				
Catholic	1.36	(0.92-2.01)				
Wealth			0.9333			
Poorest and Second (ref)	1.0	--				
Middle	0.91	(0.55-1.51)				
Fourth and Richest	0.93	(0.50-1.71)				
Region			0.0003			<0.0001
North Kivu	2.36	(1.49-3.75)		2.47	(1.62-3.78)	
South Kivu (reference)	1.0	--		1.0	--	
	HL GOF test§: 0.4067			HL GOF test§: 0.6184		

* OR=Odds Ratio
† 95% C.I. = 95% Confidence Interval
^ Wald p-value = chunk test for overall significance of variable
§ Hosmer-Lemeshow goodness of fit test (p-value)

GOODNESS OF FIT AND COLLINEARITY

The goodness of fit test of the final model indicates that the observed data fits the predicted results from the logistic model well (p=0.6184). Collinearity was assessed and no collinearity was found.

FINAL MODEL

The final model includes the main exposure term, the dependent variable, and the following covariates: education and region (Table 5). Study findings indicate a significant association between

urban-rural locality and antenatal care adequacy (p=0.0007). The odds of a woman living in an urban area attending 4 or more visits is 2.34 times larger than the odds for a women living in a rural area, adjusted for education and region. Women who reside in an urban area are more likely (OR=2.34) than a woman residing in an urban area to complete 4 or more antenatal care visits.

Education and region are both significant predictors in the final model. A woman who has an education level of secondary school or higher is more likely (OR=1.81) to complete 4 or more antenatal care visits than a woman with none (reference level) or primary education (OR=1.41). This association is significant (p=0.0488). This finding is not surprising as it agrees with findings from the Simkhada et al review which found education to be one of the best predictors of ANC visits among the variables they studied [11]. A woman residing in North Kivu is more likely (OR=2.47) than a woman in South Kivu to attend 4 or more antenatal care visits. This association is significant (p<0.0001).

DISCUSSION

The study findings indicate that women living in urban areas are more likely than their rural counterparts to receive the recommended 4 or more antenatal care visits during pregnancy. It is important to note that the odds ratio overstates the strength of the association as the outcome (4+ visits) is common. This is evident in looking at the crude odds ratio of 2.64 between locality and ANC adequacy versus the crude prevalence ratio of 1.7.

This finding is not surprising as firstly, they are in agreement with similar research studies done in other settings and secondly, because prenatal care tends to be more readily available in urban areas. Better accessibility in urban areas may explain why women living in urban areas are more likely to receive the recommended amount of prenatal care than women living in rural areas. Furthermore, geographic distance and travel time to clinic may pose less of a barrier for women living in urban areas than women living in rural areas. As discussed in a prior section, health care infrastructure is still inadequate in many of the country's rural areas. In a setting where a majority of the population still resides in rural areas and where neonatal and maternal mortality is high, this finding is particularly unsettling.

It was also observed that women living in North Kivu are more likely to receive the recommended 4 or more antenatal care visits during pregnancy than women in South Kivu. This finding was

unanticipated as both provinces were heavily impacted by conflict, although it should be noted that North Kivu has historically been at the epicenter of violent conflict in eastern DRC [46]. It is possible that this discrepancy in antenatal care accessibility is attributable to the larger presence of humanitarian organizations in Goma, North Kivu - which serves as the headquarters for many humanitarian organizations operating in eastern Congo. In a global survey of humanitarian organizations providing health care services in humanitarian emergencies, which included many key humanitarian agencies such as UNICEF and the World Health Organization that have operations in eastern Congo, 81.2% of respondents indicated that antenatal care was provided by their organization [47]. Thus it is conceivable that the greater presence of humanitarian organizations in North Kivu may explain the disparity between provinces.

Exploratory work should be undertaken to determine the specific characteristics that humanitarian organizations possess which may account for the disparity. A study conducted by Médecins Sans Frontières on HIV treatment in Bukavu, South Kivu demonstrated that successful provision of antiretroviral therapy in chronic conflict, low-resource settings requires adequate preparation in order to overcome the obstacles that arise from chronic conflict such as unstable security and increased population movement [48]. Such preparations can be complex and extensive and include the education of patients on the importance of adherence to therapy and how to prepare for eventual care disruptions; the education of all medical staff on basic HIV management should evacuation of other medical staff occur; the establishment of communication networks between health care providers, secure drug storage and emergency drug stock, decentralized care and cooperation with care centers in other regions, treatment information cards and duplicate medical records; as well as integration with other services [48]. Humanitarian organizations are oftentimes more adequately equipped than their local counterparts with the resources, training, and experience to undertake the preparations necessary in order to deliver stable care in unstable settings.

Although the presence of humanitarian organizations may help explain the disparity in accessibility between North and South Kivu, it is worth examining whether there are other supply and demand side characteristics that may account for the differences in accessibility between the two regions. For example, are there certain patient characteristics of women living in the North Kivu province that are different than those living in the South Kivu province? Or perhaps there is more government health care infrastructure in the North Kivu province that may account for this disparity? Another possibility is that there are geographical or transportation infrastructure differences between the Kivus that make frequent visits to antenatal clinics challenging. For

example, although transportation infrastructure is generally poor in both areas, it is possible that the influx of Chinese businesses building roads in North Kivu have made it easier to reach health care facilities [46]. The terrain is also quite varied in the Kivus and may account for differences. Understanding the full spectrum of factors contributing to the disparity is critical in helping improve accessibility.

The disparity in accessibility between North and South Kivu may further account for the disparity in health outcomes in under-5 mortality that was discussed earlier in the paper. It is plausible to conclude that improving the accessibility of prenatal care in rural areas and in South Kivu may make an impact on reducing adverse health outcomes among mothers and neonates in the Democratic Republic of the Congo. A word of caution is necessary however as much of the literature equates health care services utilization as a proxy for understanding health care accessibility [49]. Although utilization patterns may provide insight into accessibility, examining health care utilization in this manner often assumes that the sole reason for unequal utilization of healthcare is due to unequal access to health care [49]. In reality, this is not always the case. Health care resources may be distributed equitably, however an individual may still choose not to access care. For this reason, it is important that solutions to increasing health care utilization focus not only on overcoming supply-side barriers in order to make prenatal care more widely available, but that equal attention be paid to the individual demand-side barriers that prevent women from accessing prenatal care.

STUDY LIMITATIONS

One of the biggest limitations of this study as that antenatal care adequacy was only studied through one lens – the quantity of visits attended. As mentioned previously, spacing and frequency of visits as well as timing of initiation of care are also factors that are used to measure adequate antenatal care and thus would have been helpful to include in the model. Quality of antenatal care is not typically measured in determining antenatal care utilization adequacy but is important to consider nonetheless.

Provider type is an important measure of quality. One study found that women who report doctors as their antenatal care provider type were more likely to report more antenatal, skilled delivery, and post-partum services than other provider types [50]. Those who report midwives as their antenatal care provider type were more likely to report increased maternal services. Women who report community health workers as their antenatal provider type however, report having relatively less maternal services compared to those who report doctors and midwives as their provider type. The

authors attribute these differences among providers to the amount of professional training doctors and midwives must take to provide the full breadth of maternal care services as well as the limited scope of practice that community health workers have [50]. Provider type was examined in the MICS survey, however was not examined in this analysis. Studying the association between quality of care, as determined by provider type, and antenatal care utilization may be worth examining in future studies.

The Simkhada et al study mentions several other possible confounders and effect modifiers that were not available in the MICS dataset that may have been useful to include in the model. Such variables include additional accessibility factors such as distance or travel time to facilities, demographic characteristics such as occupation of husband and wife, and personal characteristics such as knowledge of family planning or the benefits of antenatal care. Frequent population movement is characteristic of chronic conflict settings and may also explain for some of the differences in utilization [51].

Another limitation of this analysis was that there was no way to directly measure the amount of conflict that occurred during this time period. Exact historical data on conflict related events such as population displacement that were occurring during the time of the survey are difficult to locate and measure quantitatively. Thus any effect that conflict has on antenatal care services utilization for this time period can only be speculated. Furthermore, although conflict in eastern Congo has been chronic, measuring changes in conflict from year to year is also difficult. Thus it is unknown whether the impact conflict has on antenatal care utilization may still be applicable today. Future studies may want to look at developing metrics for measuring conflict in order to be able to examine more directly the association between conflict and antenatal care utilization in eastern Congo as well as to look at changes over time.

As this is self-reported survey data, there is always potential for information bias to exist especially in regard to the outcome variable. A 1997 US-based study that compared self-reported data on birth certificates to data from prenatal clinic records found that overall accuracy on the quantity, timing, and adequacy of prenatal care was poor [52]. Only 14.3% of the prenatal clinic records examined were in agreement with the number of visits listed on the birth certificate [52]. However, 53% of the records were within one and two visits as the number of visits listed on the birth certificate [52]. Thus it is likely that nondifferential misclassification may be present.

Of the 874 women who reported attending at least one antenatal care visit, 24 did not respond as to how many visits they attended. Non-response among these women may have introduced selection bias into the analysis as there may be characteristics that are not known which may have influenced their decision to opt out of answering the question.

Furthermore, as this data is cross-sectional, causality is not always clear for characteristics that are not inherent and may change over time. Examples of such characteristics in this analysis include education and wealth. Longitudinal studies are necessary to examine the various individual and societal characteristics such as changes in a woman's knowledge of ANC services or changes in the availability of ANC services on antenatal care utilization. These types of studies are more likely to suggest more direct cause-and-effect relationships than would be found in cross-sectional studies.

CONCLUSION

Although 92.9% of women in the analysis reported attending at least one prenatal care visit, a majority of these women did not attend the recommended four visits. Accessibility of health care services may play a role in underutilization. It is clear that a key strategy to reducing maternal and neonatal deaths is to improve the accessibility of antenatal care services in low coverage areas in order to improve attendance. The findings of this study suggest deficiencies in accessibility in rural areas and in the South Kivu province. Improving accessibility in rural areas and in South Kivu province may prove beneficial in improving health care outcomes for mothers and newborns.

Increasing accessibility of antenatal care services in these areas however, will require skilled health care workers in order to deliver quality health care services. As is common in other developing countries, addressing the health care worker shortage is critical to increasing health care service accessibility. In North Kivu, there were only 192 doctors for the entire region in 2004 [53]. In South Kivu, there were only 146 [53]. Innovative approaches for increasing the health care workforce and training the workforce on delivering quality care are urgently needed.

Although the association between urban-rural residence and antenatal care utilization is well known throughout the literature, one of the most poignant findings of this study was the discrepancy in antenatal care utilization between North and South Kivu. Due to the higher concentration of humanitarian organizations in North Kivu compared to South Kivu, it is plausible that this association is responsible for the discrepancy. Future studies should be directed toward examining the link

between antenatal care utilization and the concentration of humanitarian organizations. Although these findings may suggest that increasing humanitarian organizations may improve antenatal care accessibility in the short-term, increasing the concentration of humanitarian organizations is not sufficient as a long-term strategy.

In many developing countries, international NGOs are oftentimes the main and sometimes the sole provider of primary health care services [54]. This solution often leads to fragmented and inefficient health care services, which further contributes to deficient and uneven antenatal care coverage. Improving the health care workforce and increasing health care infrastructure are critical components to increasing antenatal care accessibility in the long-term. This solution, although not easy to implement, requires collaboration between all actors involved in delivering primary health care. These actors include local and international NGOs, local governments, and ministries of health. All parties must work together in order to properly assess, coordinate, and deliver the appropriate level and quantity of quality antenatal care. Such efforts should lead to meaningful and sustainable reductions in maternal and newborn deaths not just in the Democratic Republic of the Congo, but would be applicable to other developing countries as well.

APPENDIX

APPENDIX A: SAS CODE AND TABLES FOR DETERMINING CATEGORIZATION OF VARIABLES

STEP 1: These are the original categories chosen for analysis:
1) Antenatal care visits:
ancvisit = 1-3 visits, 4+ visits

2) Urban vs rural locality:
locality = rural, urban

3) Age:
age = 15-20 years old, 21-26 years old, 27+ years old

4) Marital Status:
marital = never married, formerly married, currently married

5) Parity:
parity = 0 live births, 1-3 live births, 4+ live births

6) Pregnancy intendedness:
intention = no, yes

7) Age at marriage:
marry = 15-17 years old, 18+ years old

8) Religion:
relig = catholic, protestant, other Christian, other or no religion

9) Wealth Quintiles:
wealth = poorest and second quintile, middle quintile, fourth and richest quintile

CODE

```
proc import datafile="H:\wm.sav" out=women dbms = sav replace;
run;

proc contents data=women;
run;

proc print data=women (obs=5);
run;

* \\ Data cleaning //

*count clusters;
proc freq data=women;
tables PSU;
run;

* Look for outliers;
proc freq data=women;
tables mn3 hh6 wb2 ma9 cm10 db1 windex5 welevel mstatus hh7 religion/ norow
cmh ;
run;

proc univariate data=women;
```

```
var mn3 hh6 wb2 ma9 cm10 db1 windex5 welevel mstatus hh7 religion;
run;

* Recode MICS missing variables to missing in SAS;
data women1; set women;
if mn3=98 then mn3=.;
if mn3=0 then mn3=.;
if ma9=97 then ma9=.;
if ma9=99 then ma9=.;
if db1=9 then ma9=.;
if windex5=0 then windex5=.;
if welevel=9 then welevel=.;
if welevel=0 then welevel=.;
run;

* check recodes;
proc univariate data=women1;
var mn3 ma9 db1 windex5 welevel;
run;

proc freq data=women1;
tables mn3 ma9 db1 windex5 welevel / norow cmh;
run;

*recode variables for analysis;
data women2; set women1;
IF (1 <= mn3 <= 3) then ancvisit = 0;
IF (mn3 >= 4) then ancvisit = 1;

IF HH6=1 then locality=1;
IF HH6=2 then locality=0;

IF (wb2 < 21) then age = 0;
IF (21 <= wb2 < 27) then age = 1;
if (wb2 > 26) then age=2;

IF MSTATUS=1 then marital=2;
IF MSTATUS=2 then marital=1;
IF MSTATUS=3 then marital=0;

IF (CM10=0) then parity=0;
IF (1 <= CM10 < 4) then parity = 1;
IF (CM10 > 3) THEN parity = 2;

IF DB1=1 then intention=1;
IF DB1=2 then intention=0;

IF (15<= MA9 <= 17) then marry = 0;
IF (MA9 > 17) THEN marry = 1;

IF religion=1 then relig=0;
if religion=2 then relig=1;
if religion=3 then relig=2;
if religion=4 then relig=2;
if religion=5 then relig=2;
if religion=6 then relig=2;
if religion=7 then relig=3;
if religion=8 then relig=3;
if religion=99 then relig=3;

if windex5=1 then wealth=0;
```

```
if windex5=2 then wealth=0;
if windex5=3 then wealth=1;
if windex5=4 then wealth=2;
if windex5=5 then wealth=2;

run;

*test recodes;
proc freq data=women2;
tables ancvisit locality age marital parity intention marry relig
wealth/binomial(cl=wilson);
run;

proc format;
value ancvisit 0='1-3 visits' 1='4+ visits';
value locality 0='rural' 1='urban';
value age 0='15-20 years old' 1='21-26 years old' 2='27+ years old';
value marital 0='never married' 1='formerly married' 2='currently married';
value parity 0='0 live births' 1='1-3 live births' 2='4+ live births';
value intention 0='no' 1='yes';
value marry 0='15-17 years old' 1='18+ years old';
value relig 0='catholic' 1='protestant' 2='other christian' 3='other or no
religion';
value wealth 0='poorest and second quintile' 1='middle quintile' 2='fourth
and richest quintile';
run;

data women3; set women2;
format ancvisit ancvisit.;
format locality locality.;
format age age.;
format marital marital.;
format parity parity.;
format intention intention.;
format marry marry.;
format relig relig.;
format wealth wealth.;
run;

*test formatting;
proc freq data=women3;
tables ancvisit locality age marital parity intention marry relig
wealth/binomial(cl=wilson);
run;

*recode N and S Kivu into one Kivu variable;
data women4; set women3;
IF HH7=6 or HH7=8 then kivu = 1;
else kivu = 0;
run;

*test Kivu recode;
proc freq data=women4;
tables kivu/binomial(cl=wilson);
run;

*exclude all other provinces;
data women5; set women4;
if kivu=0 then delete;
run;
```

```
*check subset for provinces;
proc freq data=women5;
tables hh7 ancvisit;
run;

*create variable for region and urban or rural locality;
data women6; set women5;
reg=hh7;
run;

*check new subset for region predictor variable;
proc freq data=women6;
tables reg;
run;

* recode region and locality using 0/1 scheme;
data women7; set women6;
IF reg=6 then region=1;
IF reg=8 then region=0;
run;

proc format;
value region 0='South Kivu' 1='North Kivu';
run;

data thesis; set women7;
format region region.;

*check new subset for region predictor variable;
proc freq data=thesis;
tables region;
run;


proc print data=thesis (obs=5);
run;

*count clusters;
proc freq data=thesis;
tables PSU;
run;

*// analysis begins //*;

proc surveyfreq data=thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
tables ancvisit locality age marry parity intention wealth welevel marital
region relig/CL(TYPE=wilson) nopercent deff;
run;

*Characteristics of Study Population by Number of ANC Visits Attended;
Proc Surveyfreq data = thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
Tables (locality age marry parity intention wealth welevel marital region
relig)*ancvisit / chisq cl(type=wilson) row(deff) risk1 OR;
Run;
```

```
*Stratified analysis;
Proc Surveyfreq data = thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
Tables locality*ancvisit / nocellpercent chisq cl(type=wilson) row(deff)
risk1 OR;
Run;

Proc Surveyfreq data = thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
Tables age*locality*ancvisit / nocellpercent chisq cl(type=wilson)
row(deff) risk1 OR;
Run;

Proc Surveyfreq data = thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
Tables marry*locality*ancvisit / nocellpercent chisq cl(type=wilson)
row(deff) risk1 OR;
Run;

Proc Surveyfreq data = thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
Tables parity*locality*ancvisit / nocellpercent chisq cl(type=wilson)
row(deff) risk1 OR;
Run;

Proc Surveyfreq data = thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
Tables intention*locality*ancvisit / nocellpercent chisq cl(type=wilson)
row(deff) risk1 OR;
Run;

Proc Surveyfreq data = thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
Tables wealth*locality*ancvisit / nocellpercent chisq cl(type=wilson)
row(deff) risk1 OR;
Run;

Proc Surveyfreq data = thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
Tables welevel*locality*ancvisit / nocellpercent chisq cl(type=wilson)
row(deff) risk1 OR;
Run;

Proc Surveyfreq data = thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
```

```
Tables marital*locality*ancvisit / nocellpercent chisq cl(type=wilson)
row(deff) risk1 OR;
Run;

Proc Surveyfreq data = thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
Tables relig*locality*ancvisit / nocellpercent chisq cl(type=wilson)
row(deff) risk1 OR;
Run;

Proc Surveyfreq data = thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
Tables region*locality*ancvisit / nocellpercent chisq cl(type=wilson)
row(deff) risk1 OR;
Run;
```

STEP 2: These are the results of stratified analysis.

AGE

Table of locality by ancvisit

Controlling for age=15-20 years old

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	50	48.48843	9.98879	32.7710	60.1866	53.9124	8.0326	38.5581	68.5584	2.2592
	4+ visits	38	41.45093	10.68957	26.3761	54.3075	46.0876	8.0326	31.4416	61.4419	2.2592
	Total	88	89.93936	14.93143	73.1074	92.9399	100.000				
urban	1-3 visits	13	6.96881	2.67819	3.2187	13.1967	46.3521	10.3683	28.8086	64.8476	1.0808
	4+ visits	13	8.06569	3.75996	3.2490	17.1009	53.6479	10.3683	35.1524	71.1914	1.0808
	Total	26	15.03450	5.66168	7.0601	26.8926	100.000				
Total	1-3 visits	63	55.45725	10.34159	39.2710	65.9832					
	4+ visits	51	49.51661	11.33156	34.0168	60.7290					
	Total	114	104.97386	15.96879							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for age=21-26 years old

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent

Table of locality by ancvisit

Controlling for age=21-26 years old

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	**1-3 visits**	154	155.20495	29.02119	48.6940	68.6305	68.4180	5.2475	57.3585	77.7231	2.7781
	4+ visits	65	71.64311	13.96849	19.4010	36.8231	31.5820	5.2475	22.2769	42.6415	2.7781
	Total	219	226.84806	34.54029	80.5504	90.5242	100.000				
urban	**1-3 visits**	30	15.07856	1.95063	3.5873	9.0484	41.8099	6.9163	29.3762	55.3795	1.3370
	4+ visits	39	20.98604	5.10764	4.7473	13.1177	58.1901	6.9163	44.6205	70.6238	1.3370
	Total	69	36.06460	5.32540	9.4758	19.4496	100.000				
Total	**1-3 visits**	184	170.28351	29.08668	54.7369	73.6465					
	4+ visits	104	92.62915	14.87302	26.3535	45.2631					
	Total	288	262.91266	34.94841							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for age=27+ years old

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	**1-3 visits**	205	204.38817	36.83686	44.6354	59.0706	63.5647	3.8428	55.6888	70.7754	1.9766
	4+ visits	106	117.15528	22.65718	23.7161	36.5712	36.4353	3.8428	29.2246	44.3112	1.9766
	Total	311	321.54345	53.70732	75.4678	86.5321	100.000				
urban	**1-3 visits**	56	27.53862	3.99783	4.7317	10.2157	38.0762	5.1199	28.6749	48.4653	1.5120
	4+ visits	81	44.78639	5.65211	7.9352	16.0351	61.9238	5.1199	51.5347	71.3251	1.5120
	Total	137	72.32501	5.95070	13.4679	24.5322	100.000				
Total	**1-3 visits**	261	231.92679	37.05316	52.0312	65.4093					
	4+ visits	187	161.94167	23.35154	34.5907	47.9688					
	Total	448	393.86846	54.03598							

Table of locality by ancvisit

Controlling for age=27+ years old

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent

Wilson confidence limits are computed for percents.

AGE AT MARRIAGE

Table of locality by ancvisit

Controlling for marry=15-17 years old

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	23	36.74541	11.74501	47.8685	82.4085	71.7719	9.3875	51.3654	85.9569	1.6529
	4+ visits	16	14.45210	4.61745	13.3469	45.8601	28.2281	9.3875	14.0431	48.6346	1.6529
	Total	39	51.19751	12.39821	83.3564	98.0038	100.000				
urban	1-3 visits	5	2.12967	0.82509	1.0274	13.7581	65.2267	21.0671	32.3585	88.0311	1.3697
	4+ visits	3	1.13536	0.72838	0.3637	11.0464	34.7733	21.0671	11.9689	67.6415	1.3697
	Total	8	3.26503	0.69527	1.9962	16.6436	100.000				
Total	1-3 visits	28	38.87508	11.77396	51.8519	85.2414					
	4+ visits	19	15.58746	4.67454	14.7586	48.1481					
	Total	47	54.46254	12.41769							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for marry=18+ years old

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	12	18.59697	6.88654	42.3505	84.3290	69.8741	11.9669	45.5869	86.5251	1.2926
	4+ visits	8	8.01801	2.76558	12.8888	52.2365	30.1259	11.9669	13.4749	54.4131	1.2926
	Total	20	26.61499	6.71336	77.8778	99.1215	100.000				
urban	1-3 visits	2	1.33542	1.33542	0.8785	22.1222	100.000	0.0000	.	.	.

Table of locality by ancvisit

Controlling for marry=18+ years old

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
	4+ visits	0	.	.	.	.	.	.	.	.	.
	Total	2	1.33542	1.33542	0.8785	22.1222	100.000				
Total	1-3 visits	14	19.93240	7.01483	47.7635	87.1112					
	4+ visits	8	8.01801	2.76558	12.8888	52.2365					
	Total	22	27.95041	6.84489							

Wilson confidence limits are computed for percents.

PARITY

Table of locality by ancvisit

Controlling for parity=1-3 live births

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	204	203.34501	33.67944	47.0020	62.6526	65.2423	4.0804	56.8155	72.8115	2.2467
	4+ visits	103	108.33183	19.33212	22.8581	36.6365	34.7577	4.0804	27.1885	43.1845	2.2467
	Total	307	311.67684	45.83256	78.0711	88.8963	100.000				
urban	1-3 visits	46	23.10689	3.48355	4.2883	9.0080	39.5804	6.0070	28.6650	51.6433	1.6296
	4+ visits	63	35.27272	7.39637	6.0497	14.7042	60.4196	6.0070	48.3567	71.3350	1.6296
	Total	109	58.37961	8.35334	11.1037	21.9289	100.000				
Total	1-3 visits	250	226.45190	33.85911	53.5811	68.2968					
	4+ visits	166	143.60455	20.69872	31.7032	46.4189					
	Total	416	370.05645	46.58757							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for parity=4+ live births

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	205	204.73654	35.12171	44.8649	59.5745	62.6769	4.1861	54.1134	70.5130	2.3222
	4+ visits	106	121.91749	25.15711	24.3216	38.8551	37.3231	4.1861	29.4870	45.8866	2.3222
	Total	311	326.65403	53.52062	77.6140	87.9144	100.000				
urban	1-3 visits	53	26.47910	4.84372	4.3311	10.4030	40.7092	6.4940	28.9117	53.6852	2.1316
	4+ visits	70	38.56539	5.51293	6.7032	14.2365	59.2908	6.4940	46.3148	71.0883	2.1316
	Total	123	65.04449	5.91369	12.0856	22.3860	100.000				
Total	1-3 visits	258	231.21564	35.45414	51.6366	66.0346					
	4+ visits	176	160.48288	25.75408	33.9654	48.3634					
	Total	434	391.69852	53.84635							

Wilson confidence limits are computed for percents.

PREGNANCY INTENDEDNESS

Table of locality by ancvisit

Controlling for intention=no

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	120	122.24881	29.23602	38.4914	56.3883	60.0604	4.9462	50.0688	69.2793	1.9480
	4+ visits	72	81.29440	22.26523	23.4517	40.8158	39.9396	4.9462	30.7207	49.9312	1.9480
	Total	192	203.54321	47.34798	68.5242	86.4516	100.000				
urban	1-3 visits	41	21.53251	3.60795	5.2248	13.0596	39.4288	4.2258	30.4944	49.1306	0.7552
	4+ visits	61	33.07860	5.61536	8.0170	19.8602	60.5712	4.2258	50.8694	69.5056	0.7552
	Total	102	54.61111	7.92296	13.5484	31.4758	100.000				
Total	1-3 visits	161	143.78132	29.45781	47.6084	63.4923					
	4+ visits	133	114.37300	22.96242	36.5077	52.3916					
	Total	294	258.15432	48.00630							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for intention=yes

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	289	285.83274	41.40790	50.3604	62.9375	65.7408	3.2721	58.9974	71.9033	2.0204
	4+ visits	137	148.95492	22.83106	24.2659	35.5077	34.2592	3.2721	28.0967	41.0026	2.0204
	Total	426	434.78766	56.84183	82.1502	89.6634	100.000				
urban	1-3 visits	58	28.05348	5.15484	3.6574	8.3973	40.7677	6.5749	28.8271	53.9080	2.3094
	4+ visits	72	40.75951	5.94674	5.6597	11.4473	59.2323	6.5749	46.0920	71.1729	2.3094
	Total	130	68.81299	6.33342	10.3366	17.8498	100.000				
Total	1-3 visits	347	313.88622	41.72753	56.1262	68.1514					
	4+ visits	209	189.71443	23.59282	31.8486	43.8738					
	Total	556	503.60065	57.19358							

Wilson confidence limits are computed for percents.

WEALTH

Table of locality by ancvisit

Controlling for wealth=fourth and richest quintile

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	123	134.20044	46.79743	30.7730	57.4102	65.3758	4.5179	56.0490	73.6537	1.7403
	4+ visits	71	71.07502	17.16614	18.3864	28.6189	34.6242	4.5179	26.3463	43.9510	1.7403
	Total	194	205.27546	61.81398	51.3827	79.2117	100.000				
urban	1-3 visits	75	36.23504	5.95230	7.1806	18.7344	35.4234	4.5769	27.0145	44.8416	1.7674
	4+ visits	119	66.05614	10.58844	13.1935	32.9852	64.5766	4.5769	55.1584	72.9855	1.7674
	Total	194	102.29117	13.33464	20.7883	48.6173	100.000				
Total	1-3 visits	198	170.43548	47.17446	45.6000	64.8236					
	4+ visits	190	137.13115	20.16907	35.1764	54.4000					

Table of locality by ancvisit

Controlling for wealth=fourth and richest quintile

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
	Total	388	307.56663	63.23591							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for wealth=poorest and second quintile

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	**1-3 visits**	146	134.98238	23.77823	49.5872	70.6071	63.2855	5.5382	51.9174	73.3457	2.7721
	4+ visits	65	78.30878	19.40877	25.3636	46.3629	36.7145	5.5382	26.6543	48.0826	2.7721
	Total	211	213.29116	36.31683	88.3656	98.5142	100.000				
urban	**1-3 visits**	13	7.80335	4.90954	1.0669	10.8864	82.1021	13.2643	51.3582	95.2221	1.7960
	4+ visits	3	1.70110	1.23992	0.1928	2.9729	17.8979	13.2643	4.7779	48.6418	1.7960
	Total	16	9.50445	5.20883	1.4858	11.6344	100.000				
Total	**1-3 visits**	159	142.78573	24.27979	52.9726	73.8724					
	4+ visits	68	80.00988	19.44834	26.1276	47.0274					
	Total	227	222.79560	36.68847							

Wilson confidence limits are computed for percents.

EDUCATION

Table of locality by ancvisit

Controlling for welevel=None

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	**1-3 visits**	177	170.15277	23.66585	53.2720	71.3378	68.1879	4.8535	57.9889	76.8974	2.7040
	4+ visits	73	79.38230	18.17213	21.0688	39.0934	31.8121	4.8535	23.1026	42.0111	2.7040
	Total	250	249.53507	34.39793	85.5415	95.7440	100.000				

Table of locality by ancvisit

Controlling for welevel=None

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
urban	1-3 visits	28	14.42071	5.15763	2.6216	10.4894	66.6706	10.9461	44.6198	83.2395	2.1029
	4+ visits	12	7.20907	3.23505	1.1106	6.2281	33.3294	10.9461	16.7605	55.3802	2.1029
	Total	40	21.62978	6.78769	4.2560	14.4585	100.000				
Total	1-3 visits	205	184.57347	24.22134	58.5295	76.2991					
	4+ visits	85	86.59137	18.45784	23.7009	41.4705					
	Total	290	271.16484	35.06123							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for welevel=Primary

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	176	176.98717	30.93787	48.1620	63.6556	62.8837	4.2010	54.2903	70.7325	2.0189
	4+ visits	92	104.46424	22.03855	25.8709	41.1961	37.1163	4.2010	29.2675	45.7097	2.0189
	Total	268	281.45141	47.24092	83.4592	93.0364	100.000				
urban	1-3 visits	24	11.52814	2.09489	2.1100	6.2466	33.6298	4.7734	23.4136	45.6467	0.6635
	4+ visits	42	22.75145	5.01194	4.3667	11.6661	66.3702	4.7734	54.3533	76.5864	0.6635
	Total	66	34.27959	6.23711	6.9636	16.5408	100.000				
Total	1-3 visits	200	188.51531	31.00872	51.9599	66.9994					
	4+ visits	134	127.21569	22.60127	33.0006	48.0401					
	Total	334	315.73100	47.65088							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for welevel=Secondary +

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	**1-3 visits**	56	60.94161	21.05271	22.4010	49.7833	56.7720	7.2393	42.5926	69.9224	2.1141
	4+ visits	44	46.40278	11.07929	19.0504	35.6699	43.2280	7.2393	30.0776	57.4074	2.1141
	Total	100	107.34439	28.61099	46.7293	74.2386	100.000				
urban	**1-3 visits**	47	23.63714	3.98280	8.8009	20.2028	35.0103	4.4080	26.9367	44.0451	1.0674
	4+ visits	79	43.87759	7.76070	16.3411	36.4881	64.9897	4.4080	55.9549	73.0633	1.0674
	Total	126	67.51473	9.95275	25.7614	53.2707	100.000				
Total	**1-3 visits**	103	84.57876	21.42613	37.5885	59.3047					
	4+ visits	123	90.28037	13.52698	40.6953	62.4115					
	Total	226	174.85913	30.29267							

Wilson confidence limits are computed for percents.

MARITAL STATUS

Table of locality by ancvisit

Controlling for marital=currently married

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	**1-3 visits**	362	364.12265	60.37267	48.1358	63.0743	66.0611	3.9110	57.9463	73.3308	3.6636
	4+ visits	176	187.06766	32.39700	22.5593	35.5919	33.9389	3.9110	26.6692	42.0537	3.6636
	Total	538	551.19031	80.85308	79.2684	88.3973	100.000				
urban	**1-3 visits**	82	40.94063	6.22225	4.2739	9.1001	40.0892	5.4960	29.9267	51.1819	2.4147
	4+ visits	111	61.18331	8.67583	6.5182	13.2787	59.9108	5.4960	48.8181	70.0733	2.4147
	Total	193	102.12395	9.54185	11.6027	20.7316	100.000				
Total	**1-3 visits**	444	405.06328	60.69246	54.7663	68.7396					
	4+ visits	287	248.25098	33.53857	31.2604	45.2337					
	Total	731	653.31425	81.41417							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for marital=formerly married

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	32	27.31489	6.75032	27.2899	56.8486	50.1468	9.9325	32.2363	68.0198	1.9731
	4+ visits	19	27.15493	9.38383	25.5601	58.5332	49.8532	9.9325	31.9802	67.7637	1.9731
	Total	51	54.46982	12.26437	71.9544	89.4319	100.000				
urban	1-3 visits	8	3.87996	1.22314	2.3590	13.8411	33.1906	10.8703	17.0908	54.4892	1.0658
	4+ visits	13	7.80998	2.34746	6.1752	21.3959	66.8094	10.8703	45.5108	82.9092	1.0658
	Total	21	11.68994	2.33958	10.5681	28.0456	100.000				
Total	1-3 visits	40	31.19485	6.86024	32.0334	62.8095					
	4+ visits	32	34.96490	9.67300	37.1905	67.9666					
	Total	72	66.15976	12.48553							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for marital=never married

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	15	16.64401	4.65351	24.1945	56.9074	50.9447	11.8080	30.5261	71.0529	1.5622
	4+ visits	14	16.02673	7.27511	20.3204	59.3693	49.0553	11.8080	28.9471	69.4739	1.5622
	Total	29	32.67074	9.53151	57.8323	89.3919	100.000				
urban	1-3 visits	9	4.76540	1.48278	5.0251	23.3690	49.5868	11.5486	28.6911	70.6278	0.9070
	4+ visits	9	4.84482	2.71850	4.1601	27.8419	50.4132	11.5486	29.3722	71.3089	0.9070
	Total	18	9.61022	3.76375	10.6081	42.1677	100.000				
Total	1-3 visits	24	21.40941	4.88403	33.4312	67.6916					
	4+ visits	23	20.87155	7.76643	32.3084	66.5688					
	Total	47	42.28096	10.24771							

Table of locality by ancvisit

Controlling for marital=never married

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent

Wilson confidence limits are computed for percents.

RELIGION

Table of locality by ancvisit

Controlling for relig=catholic

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	179	137.70512	27.86611	37.2648	52.1397	57.6121	4.6289	48.3242	66.3915	2.4216
	4+ visits	98	101.31625	26.43288	24.8450	41.8833	42.3879	4.6289	33.6085	51.6758	2.4216
	Total	277	239.02137	49.94913	68.2939	84.4569	100.000				
urban	1-3 visits	49	24.35301	3.61487	5.1803	11.8231	34.8566	3.8745	27.2864	43.2769	0.8727
	4+ visits	84	45.51336	5.74569	9.9565	21.2641	65.1434	3.8745	56.7231	72.7136	0.8727
	Total	133	69.86637	7.47633	15.5431	31.7061	100.000				
Total	1-3 visits	228	162.05813	28.09960	45.3467	59.4846					
	4+ visits	182	146.82961	27.05014	40.5154	54.6533					
	Total	410	308.88774	50.50555							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for relig=other christian

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	40	42.70099	12.25262	45.5554	74.3557	67.4158	7.6076	51.6784	80.0104	1.5808
	4+ visits	21	20.63874	4.97047	18.3747	43.5975	32.5842	7.6076	19.9896	48.3216	1.5808
	Total	61	63.33972	13.88556	81.4865	95.2044	100.000				
urban	1-3 visits	6	2.67910	1.14328	1.2698	10.9300	39.5385	16.2625	17.6549	66.6065	1.3276

Table of locality by ancvisit

Controlling for relig=other christian

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
	4+ visits	7	4.09684	1.82746	2.3742	13.6700	60.4615	16.2625	33.3935	82.3451	1.3276
	Total	13	6.77595	1.93650	4.7956	18.5135	100.000				
Total	1-3 visits	46	45.38009	12.30585	49.6851	77.3163					
	4+ visits	28	24.73558	5.29577	22.6837	50.3149					
	Total	74	70.11567	14.01995							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for relig=other or no religion

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	28	40.22712	15.11260	45.3652	72.8750	68.4364	7.1749	53.3489	80.4340	0.9771
	4+ visits	14	18.55322	7.75486	17.0727	41.4409	31.5636	7.1749	19.5660	46.6511	0.9771
	Total	42	58.78034	21.02175	73.2409	94.7302	100.000				
urban	1-3 visits	7	3.60115	1.27071	1.8411	14.6139	42.9732	7.3173	21.4658	67.5064	0.2840
	4+ visits	7	4.77884	1.94968	2.7970	16.9400	57.0268	7.3173	32.4936	78.5342	0.2840
	Total	14	8.37998	2.98142	5.2698	26.7591	100.000				
Total	1-3 visits	35	43.82827	15.16593	51.9327	76.5586					
	4+ visits	21	23.33206	7.99619	23.4414	48.0673					
	Total	56	67.16033	21.23212							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for relig=protestant

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent

Table of locality by ancvisit

Controlling for relig=protestant

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	162	187.44832	39.27646	50.8551	67.4038	67.6246	3.8938	59.5282	74.7874	1.6412
	4+ visits	76	89.74111	18.00479	22.1927	35.6310	32.3754	3.8938	25.2126	40.4718	1.6412
	Total	238	277.18943	52.44423	80.6458	92.5947	100.000				
urban	1-3 visits	37	18.95273	6.27179	2.9920	11.6883	49.3537	9.9868	31.3015	67.5761	2.8330
	4+ visits	35	19.44907	4.62008	3.5458	10.5009	50.6463	9.9868	32.4239	68.6985	2.8330
	Total	72	38.40180	7.93751	7.4053	19.3542	100.000				
Total	1-3 visits	199	206.40105	39.77406	57.7633	72.3201					
	4+ visits	111	109.19018	18.58811	27.6799	42.2367					
	Total	310	315.59123	53.04151							

Wilson confidence limits are computed for percents.

REGION

Table of locality by ancvisit

Controlling for region=North Kivu

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	1-3 visits	164	179.40693	33.66762	37.2405	52.7112	53.7196	4.5999	44.6153	62.5826	2.5788
	4+ visits	140	154.56205	35.32993	30.4728	47.5011	46.2804	4.5999	37.4174	55.3847	2.5788
	Total	304	333.96898	62.11154	76.1547	88.8999	100.000				
urban	1-3 visits	42	21.82343	3.78610	3.4896	8.4332	33.0485	5.0188	24.0788	43.4475	1.2750
	4+ visits	71	44.21107	7.87549	7.0809	16.8482	66.9515	5.0188	56.5525	75.9212	1.2750
	Total	113	66.03450	9.29371	11.1001	23.8453	100.000				
Total	1-3 visits	206	201.23036	33.87984	42.6346	57.9653					
	4+ visits	211	198.77312	36.19707	42.0347	57.3654					

Table of locality by ancvisit

Controlling for region=North Kivu

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
	Total	417	400.00347	62.80300							

Wilson confidence limits are computed for percents.

Table of locality by ancvisit

Controlling for region=South Kivu

locality	ancvisit	Frequency	Weighted Frequency	Std Dev of Wgt Freq	95% Confidence Limits for Percent		Row Percent	Std Err of Row Percent	95% Confidence Limits for Row Percent		Design Effect of Row Percent
rural	**1-3 visits**	245	228.67462	53.86978	55.8878	69.9756	75.1325	2.7303	69.3498	80.1367	1.2489
	4+ visits	69	75.68727	18.37023	16.6185	25.9936	24.8675	2.7303	19.8633	30.6502	1.2489
	Total	314	304.36189	69.64112	76.3693	89.6940	100.000				
urban	**1-3 visits**	57	27.76256	4.83163	4.5919	12.5541	48.3756	8.4983	32.6800	64.3984	3.4124
	4+ visits	62	29.62704	6.54939	4.6355	14.0678	51.6244	8.4983	35.6016	67.3200	3.4124
	Total	119	57.38961	6.00836	10.3060	23.6307	100.000				
Total	**1-3 visits**	302	256.43719	54.08602	64.7438	76.3520					
	4+ visits	131	105.31431	19.50282	23.6480	35.2562					
	Total	433	361.75150	69.89983							

Wilson confidence limits are computed for percents.

STEP 3: Based on the above results of the stratified analysis, the following variables were eliminated due to insufficient sample size:

- Age at first marriage

APPENDIX B: ADDITIONAL TABLE – CHARACTERISTICS OF STUDY POPULATION

Reproductive Age Women (15-49 years old), North and South Kivu (MICS 2010)

	n = 2368	Weighted Percent
Live Birth in Past Two Years		
At Least One Live Birth in Past Two Years	938	58.0%
No Live Births: Past Two Years	750	42.0%
No Live Births: > 2 Years	680	
Received Prenatal Care		
Yes	874	92.9%
No	64	7.1%
Missing	1430	
Number of ANC Visits		
1-3 visits	508	60.1%
4+ visits	342	39.9%
Missing	1518	
Locality		
Rural	1561	78.0%
Urban	807	22.0%
Age		
15-20 years old	666	27.5%
21-26 years old	574	25.3%
27+ years old	1128	47.2%
Parity		
0 live births	680	25.6%
1-3 live births	937	33.5%
4+ live births	751	40.9%
Pregnancy Intendedness		
Yes	322	33.8%
No	616	66.2%
Missing	1430	
Wealth		
Poorest and 2nd quintiles	562	26.8%
Middle quintile	626	29.1%
4th and richest quintiles	1180	44.1%
Education		
None	746	33.0%
Primary	832	38.7%
Secondary and above	790	28.3%
Marital Status		
Currently married	1431	62.5%
Formerly married	251	10.6%
Never married	686	26.9%
Religion		
Catholic	1181	43.5%
Protestant	795	37.9%
Other Christian	216	9.5%
Other or No Religion	176	9.1%
Region		
North Kivu	1247	57.5%
South Kivu	1121	42.5%

APPENDIX C: FINAL SAS CODE

```
proc import datafile="H:\wm.sav" out=women dbms = sav replace;
run;

proc contents data=women;
run;

proc print data=women (obs=5);
run;

* \\ Data cleaning //

*count clusters;
proc freq data=women;
tables PSU;
run;

* Look for outliers;
proc freq data=women;
tables mn3 hh6 wb2 ma9 cm10 db1 windex5 welevel mstatus hh7 religion/ norow
cmh ;
run;

proc univariate data=women;
var mn3 hh6 wb2 ma9 cm10 db1 windex5 welevel mstatus hh7 religion;
run;

* Recode MICS missing variables to missing in SAS;
data women1; set women;
if mn3=98 then mn3=.;
if mn3=0 then mn3=.;
if ma9=97 then ma9=.;
if ma9=99 then ma9=.;
if db1=9 then ma9=.;
if windex5=0 then windex5=.;
if welevel=9 then welevel=.;
if welevel=0 then welevel=.;
run;

* check recodes;
proc univariate data=women1;
var mn3 ma9 db1 windex5 welevel;
run;

proc freq data=women1;
tables mn3 ma9 db1 windex5 welevel / norow cmh;
run;

*recode variables for analysis;
data women2; set women1;
IF (1 <= mn3 <= 3) then ancvisit = 1;
IF (mn3 >= 4) then ancvisit = 2;

IF HH6=1 then locality=1;
IF HH6=2 then locality=2;

IF (wb2 < 21) then age = 1;
IF (21 <= wb2 < 27) then age = 2;
```

```
if (wb2 > 26) then age=3;

IF MSTATUS=1 then marital=3;
IF MSTATUS=2 then marital=2;
IF MSTATUS=3 then marital=1;

IF (CM10=0) then parity=1;
IF (1 <= CM10 < 4) then parity = 2;
IF (CM10 > 3) THEN parity = 3;

IF DB1=1 then intention=2;
IF DB1=2 then intention=1;

IF (15<= MA9 <= 19) then marry = 1;
IF (MA9 > 19) THEN marry = 2;

IF religion=1 then relig=1;
if religion=2 then relig=2;
if religion=3 then relig=3;
if religion=4 then relig=3;
if religion=5 then relig=3;
if religion=6 then relig=3;
if religion=7 then relig=4;
if religion=8 then relig=4;
if religion=99 then relig=4;

if windex5=1 then wealth=1;
if windex5=2 then wealth=1;
if windex5=3 then wealth=2;
if windex5=4 then wealth=3;
if windex5=5 then wealth=3;

if welevel=1 then education=1;
if welevel=2 then education=2;
if welevel=3 then education=3;

run;

*test recodes;
proc freq data=women2;
tables ancvisit locality age marital parity intention marry relig wealth
education/binomial(cl=wilson);
run;

proc format;
value ancvisit 1='1-3 visits' 2='4+ visits';
value locality 1='urban' 2='rural';
value age 1='15-20 years old' 2='21-26 years old' 3='27+ years old';
value marital 1='never married' 2='formerly married' 3='currently married';
value parity 1='0 live births' 2='1-3 live births' 3='4+ live births';
value intention 1='no' 2='yes';
value marry 1='15-19 years old' 2='20+ years old';
value relig 1='catholic' 2='protestant' 3='other christian' 4='other or no
religion';
value wealth 1='poorest and second quintile' 2='middle quintile' 3='fourth
and richest quintile';
value education 1='none' 2='primary' 3='secondary and above';
run;

data women3; set women2;
format ancvisit ancvisit.;
```

```
format locality locality.;
format age age.;
format marital marital.;
format parity parity.;
format intention intention.;
format marry marry.;
format relig relig.;
format wealth wealth.;
format education education.;
run;

*test formatting;
proc freq data=women3;
tables ancvisit locality age marital parity intention marry relig wealth
education/binomial(cl=wilson);
run;

*recode N and S Kivu into one Kivu variable;
data women4; set women3;
IF HH7=6 or HH7=8 then kivu = 1;
else kivu = 0;
run;

*test Kivu recode;
proc freq data=women4;
tables kivu/binomial(cl=wilson);
run;

*exclude all other provinces;
data women5; set women4;
if kivu=0 then delete;
run;

*check subset for provinces;
proc freq data=women5;
tables hh7 ancvisit;
run;

*create variable for region and urban or rural locality;
data women6; set women5;
reg=hh7;
run;

*check new subset for region predictor variable;
proc freq data=women6;
tables reg;
run;

* recode region and locality using 1/2 scheme;
data women7; set women6;
IF reg=6 then region=2;
IF reg=8 then region=1;
run;

proc format;
value region 1='South Kivu' 2='North Kivu';
run;

data thesis; set women7;
format region region.;
```

```
*check new subset for region predictor variable;
proc freq data=thesis;
tables region;
run;


proc print data=thesis (obs=5);
run;

*count clusters;
proc freq data=thesis;
tables PSU;
run;

*// analysis begins //*;

proc surveyfreq data=thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
tables cm13 mn1 ancvisit locality age marry parity intention wealth
education marital region relig/CL(TYPE=wilson) deff;
run;

*descriptive analysis for sample size;
data thesisnum; set thesis;
if mn1=2 then delete;
if mn1=9 then delete;
if mn1=. then delete;
run;

data thesisnum1; set thesisnum;
if ancvisit=. then delete;
run;

*Characteristics of Study Population;
Proc Surveyfreq data = thesisnum1 order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
Tables locality age marry parity intention wealth education marital region
relig ancvisit / chisq cl(type=wilson) row(deff) risk1 OR;
Run;

*Characteristics of Study Population by Number of ANC Visits Attended;
Proc Surveyfreq data = thesis order=formatted;
stratum HH6 HH7;
cluster PSU;
weight wmweight;
Tables (locality age marry parity intention wealth education marital region
relig)*ancvisit / chisq cl(type=wilson) row(deff) risk1 OR;
Run;

*Crude logistic regression models;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural');
model ancvisit (event='4+ visits')= locality;
weight wmweight;
```

```
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class age (param=ref ref='27+ years old');
model ancvisit (event='4+ visits')= age;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class marital (param=ref ref='currently married');
model ancvisit (event='4+ visits')= marital;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class parity (param=ref ref='1-3 live births');
model ancvisit (event='4+ visits')= parity;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class intention (param=ref ref='no');
model ancvisit (event='4+ visits')= intention;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class education (param=ref ref='none');
model ancvisit (event='4+ visits')= education;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class relig (param=ref ref='protestant');
model ancvisit (event='4+ visits')= relig;
weight wmweight;
run;


proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class wealth (param=ref ref='poorest and second quintile');
model ancvisit (event='4+ visits')= wealth;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
```

```
cluster PSU;
class region (param=ref ref='South Kivu');
model ancvisit (event='4+ visits')= region;
weight wmweight;
run;

*Adusted logistic regression models;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural');
model ancvisit (event='4+ visits')= locality;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural');
class age (param=ref ref='27+ years old');
model ancvisit (event='4+ visits')= locality age;
weight wmweight;
run;


proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural');
class parity (param=ref ref='1-3 live births');
model ancvisit (event='4+ visits')= locality parity;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class intention (param=ref ref='no');
class locality (param=ref ref='rural');
model ancvisit (event='4+ visits')= locality intention;
weight wmweight;
run;


proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural');
class education (param=ref ref='none');
model ancvisit (event='4+ visits')= locality education;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class relig (param=ref ref='protestant');
class locality (param=ref ref='rural');
model ancvisit (event='4+ visits')= locality relig;
weight wmweight;
```

```
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class wealth (param=ref ref='poorest and second quintile');
class locality (param=ref ref='rural');
model ancvisit (event='4+ visits')= locality wealth;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class marital (param=ref ref='currently married');
class locality (param=ref ref='rural');
model ancvisit (event='4+ visits')= locality marital;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class region (param=ref ref='South Kivu');
class locality (param=ref ref='rural');
model ancvisit (event='4+ visits')= locality region;
weight wmweight;
run;

*Adusted logistic regression models, check for interaction;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural');
class age (param=ref ref='27+ years old');
model ancvisit (event='4+ visits')= locality age locality*age;
weight wmweight;
run;


proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural');
class parity (param=ref ref='1-3 live births');
model ancvisit (event='4+ visits')= locality parity locality*parity;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class intention (param=ref ref='no');
class locality (param=ref ref='rural');
model ancvisit (event='4+ visits')= locality intention locality*intention;
weight wmweight;
run;


proc surveylogistic data=thesis;
```

```
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural');
class education (param=ref ref='none');
model ancvisit (event='4+ visits')= locality education locality*education;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class relig (param=ref ref='protestant');
class locality (param=ref ref='rural');
model ancvisit (event='4+ visits')= locality relig locality*religion;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class wealth (param=ref ref='poorest and second quintile');
class locality (param=ref ref='rural');
model ancvisit (event='4+ visits')= locality wealth locality*wealth;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class marital (param=ref ref='currently married');
class locality (param=ref ref='rural');
model ancvisit (event='4+ visits')= locality marital locality*marital;
weight wmweight;
run;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class region (param=ref ref='South Kivu');
class locality (param=ref ref='rural');
model ancvisit (event='4+ visits')= locality region locality*region;
weight wmweight;
run;

*Find stratum specific OR for locality-wealth association;
PROC surveylogistic DATA=thesis;
stratum HH6 HH7;
cluster PSU;
  class wealth (ref='poorest and second quintile')/PARAM=REF;
class locality (ref='rural')/param=ref;
  model ancvisit (event='4+ visits')= locality wealth locality*wealth;
  CONTRAST 'locality=2 wealth=3 vs. locality=1 wealth=3' locality 1 wealth
0 0 locality*wealth 0 0/EST = EXP;
  CONTRAST 'locality=2 wealth=2 vs. locality=1 wealth=2' locality 1 wealth
0 0 locality*wealth 0 1/EST = EXP;
  CONTRAST 'locality=2 wealth=1 vs. locality=1 wealth=1' locality 1 wealth
0 0 locality*wealth 1 0/EST = EXP;
weight wmweight;
run;run;

*This is the fully adjusted model;
```

```
proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural')
age (param=ref ref='27+ years old')
parity (param=ref ref='1-3 live births')
intention (param=ref ref='no')
education (param=ref ref='none')
relig (param=ref ref='protestant')
wealth (param=ref ref='poorest and second quintile')
marital (param=ref ref='currently married')
region (param=ref ref='South Kivu')
;
model ancvisit (event='4+ visits')= locality age marital parity intention
education relig region wealth;
weight wmweight;
run;

*Backward selection step 1: test interaction terms for significance;
proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural')
age (param=ref ref='27+ years old')
parity (param=ref ref='1-3 live births')
intention (param=ref ref='no')
education (param=ref ref='none')
relig (param=ref ref='protestant')
wealth (param=ref ref='poorest and second quintile')
marital (param=ref ref='currently married')
region (param=ref ref='South Kivu')
;

model ancvisit (event='4+ visits')= locality age parity intention education
relig region wealth marital
locality*age locality*parity locality*intention locality*education
locality*relig locality*region locality*wealth locality*marital;
weight wmweight;
run;

*All interaction terms were removed (sig level=0.05);
proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural')
age (param=ref ref='27+ years old')
parity (param=ref ref='1-3 live births')
intention (param=ref ref='no')
education (param=ref ref='none')
relig (param=ref ref='protestant')
wealth (param=ref ref='poorest and second quintile')
marital (param=ref ref='currently married')
region (param=ref ref='South Kivu')
;
model ancvisit (event='4+ visits')= locality age marital parity intention
education relig region wealth;
weight wmweight;
run;

*Remove wealth;
proc surveylogistic data=thesis;
```

```
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural')
age (param=ref ref='27+ years old')
parity (param=ref ref='1-3 live births')
education (param=ref ref='none')
relig (param=ref ref='protestant')
intention (param=ref ref='no')
marital (param=ref ref='currently married')
region (param=ref ref='South Kivu')
;
model ancvisit (event='4+ visits')= locality age marital parity education
relig region intention;
weight wmweight;
run;


*Remove pregnancy intendedness;
proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural')
age (param=ref ref='27+ years old')
parity (param=ref ref='1-3 live births')
education (param=ref ref='none')
relig (param=ref ref='protestant')
marital (param=ref ref='currently married')
region (param=ref ref='South Kivu')
;
model ancvisit (event='4+ visits')= locality age marital parity education
relig region;
weight wmweight;
run;

*Remove age;
proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural')
parity (param=ref ref='1-3 live births')
education (param=ref ref='none')
relig (param=ref ref='protestant')
marital (param=ref ref='currently married')
region (param=ref ref='South Kivu')
;
model ancvisit (event='4+ visits')= locality marital parity education relig
region;
weight wmweight;
run;

*Remove parity;
proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural')
education (param=ref ref='none')
relig (param=ref ref='protestant')
marital (param=ref ref='currently married')
region (param=ref ref='South Kivu')
;
model ancvisit (event='4+ visits')= locality marital education relig
```

```
region;
weight wmweight;
run;

*remove marital;
proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural')
education (param=ref ref='none')
relig (param=ref ref='protestant')
region (param=ref ref='South Kivu')
;
model ancvisit (event='4+ visits')= locality education relig region;
weight wmweight;
run;

*Remove religion;
proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural')
education (param=ref ref='none')
region (param=ref ref='South Kivu')
;
model ancvisit (event='4+ visits')= locality education region;
weight wmweight;
run;

*This is the most parsimonious model;
proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
class locality (param=ref ref='rural')
education (param=ref ref='none')
region (param=ref ref='South Kivu')
;
model ancvisit (event='4+ visits')= locality education region;
weight wmweight;
run;

*This is the fully adjusted model - test for GOF;
proc logistic data=thesis;
class locality (param=ref ref='rural')
age (param=ref ref='27+ years old')
parity (param=ref ref='1-3 live births')
intention (param=ref ref='no')
education (param=ref ref='none')
relig (param=ref ref='protestant')
region (param=ref ref='South Kivu')
wealth (param=ref ref='poorest and second quintile')
marital (param=ref ref='currently married')
;
model ancvisit (event='4+ visits')= locality age parity intention education
relig region wealth marital/lackfit;
run;

*Parsimonious model test for GOF;
proc logistic data=thesis;
class locality (param=ref ref='rural')
education (param=ref ref='none')
```

```
region (param=ref ref='South Kivu')
;
model ancvisit (event='4+ visits')= locality education region/lackfit;
run;

*Test for collinearity;
FILENAME collin "H:\AEPI 536D 2013\collin_2011.sas";
%INCLUDE collin;

ODS OUTPUT SURVEYLOGISTIC.COVB=collin_info;

proc surveylogistic data=thesis;
stratum HH6 HH7;
cluster PSU;
model ancvisit (event='4+ visits')= locality education region/covb;
weight wmweight;
run;

%collin(covdsn=collin_info,PROCDR=surveylogistic,output=collin_info2)
```

APPENDIX D: ADJUSTED ODDS RATIOS – INTERACTION TESTING

Step 1: Test for interaction

Model	Cross-Product Term	P-Value
Ancvisit = locality intention locality*intention	locality*intention	0.5447
Ancvisit = locality relig locality*relig	locality*relig	0.9485
Ancvisit = locality age locality*age	locality*age	0.3403
Ancvisit = locality parity locality*parity	locality*parity	0.6913
Ancvisit = locality marital locality*marital	locality*marital	0.3492
Ancvisit = locality region locality*region	locality*region	0.5045
Ancvisit = locality education locality*education	locality*education	0.1045
Ancvisit = locality wealth locality*wealth	locality*wealth	**0.0454**

Step 2: Present stratum specific OR for significant interaction terms

(1) Interaction was found for locality*wealth (p=0.0454). Stratum specific estimates are as follows:

Contrast Estimation and Testing Results by Row

Contrast	Type	Row	Estimate	Standard Error	Alpha	Confidence Limits		Wald Chi-Square	Pr > ChiSq
Rural locality at wealth = poorest and second quintile	EXP	1	**0.3758**	0.3519	0.05	0.0600	2.3548	1.0926	0.2959
Rural locality at wealth = middle quintile	EXP	1	**1.8828**	0.8162	0.05	0.8050	4.4036	2.1302	0.1444
Rural locality at wealth = fourth and richest quntile	EXP	1	**3.4421**	0.9756	0.05	1.9749	5.9992	19.0172	<.0001

APPENDIX E: FINAL MODEL SELECTION

Backwards Elimination of Cross Product Terms

INITIAL MODEL: logit (P(D=1 | LOCALITY, AGE, PARITY, INTENTION, EDUCATION, RELIGION, REGION, WEALTH, MARITAL)) =
b0 + b1*LOCALITY + [b2-b4]*AGE1-3 + b5*PARITY + b6*INTENTION + [b7-b9]*EDUCATION1-3 + [b10-b13] *RELIGION1-4 + b14*REGION + [b15-b17]*WEALTH1-3 + [b18-b20]*MARITAL1-3 + [b21-b23]*[locality]*[age1-3] + [b24]*[locality]*[parity] + [b25]*[locality]*[intention] + [b26-b28]*[locality]*[education1-3] + [b29-b32]*[locality]*[religion1-4] + [b33]*[locality]*[region] + [b34-b36]*[locality]*[wealth] + [b37-b39]*[locality]*[marital]

	Cross-Product Term	Removed or retained p-value
Step 1:	locality*intention	0.8477 (removed)
Step 2:	locality*relig	0.7204 (removed)
Step 3:	locality*age	0.5831 (removed)
Step 4:	locality*parity	0.5010 (removed)
Step 5:	locality*marital	0.4998 (removed)
Step 6:	locality*region	0.4128 (removed)
Step 7:	locality*education	0.2177 (removed)
Step 8:	locality*wealth	0.1157 (removed)

FULLY ADJUSTED MODEL: logit (P(D=1 | LOCALITY, AGE, PARITY, INTENTION, EDUCATION, RELIGION, REGION, WEALTH, MARITAL)) =
$b0 + b1*LOCALITY + b2*AGE + b3*PARITY + b_4*INTENTION + b_5*EDUCATION + b_6*RELIGION + b_7*REGION$

10% of 2.263 = 2.0367 - 2.4893
This will be used to assess confounding. ORs outside of this range will mean that confounding has been found.

Backwards Elimination of Main Effects Terms

	Fully Adjusted Model
Urban-rural locality	
Rural (reference)	1.000
Urban	2.263

Step1:

Main Effects Term	Removed or retained p-value
wealth	**0.9333 (removed)**

	Step 1 Model
Urban-rural locality	
Rural (reference)	1.0
Urban	2.243

Step 2:

Main Effects Term	Removed or retained p-value
intention	**0.8799 (removed)**

	Step 2 Model
Urban-rural locality	
Rural (reference)	1.0
Urban	2.240

Step 3:

Main Effects Term	Removed or retained p-value
age	**0.4873 (removed)**

	Step 1 Model
Urban-rural locality	
Rural (reference)	1.0
Urban	2.221

Step 4:

Main Effects Term	Removed or retained p-value
parity	**0.5245 (removed)**

	Step 1 Model
Urban-rural locality	
Rural (reference)	1.0
Urban	2.240

Step 5:

Main Effects Term	Removed or retained p-value
marital	**0.4670 (removed)**

	Step 1 Model
Urban-rural locality	Urban-rural locality
Rural (reference)	1.0
Urban	2.244

Step 6:

Main Effects Term	Removed or retained p-value
relig	**0.4266 (removed)**

	Step 1 Model

Urban-rural locality	
Rural (reference)	1.0
Urban	2.339

All remaining terms are significant at 0.05 level:

- Education (p=0.0488)
- Locality (p=0.0007)
- Region (p < 0.0001)

MICS

QUESTIONNAIRE FOR INDIVIDUAL WOMEN

[*name of country*]

WOMAN'S INFORMATION PANEL	WM
This questionnaire is to be administered to all women age 15 through 49 (see Household Listing Form, column HL7). A separate questionnaire should be used for each eligible woman.	
WM1. Cluster number: ___ ___ ___	WM2. Household number: ___ ___
WM3. Woman's name: Name_____	WM4. Woman's line number: ___ ___
WM5. Interviewer name and number: Name_____ ___ ___	WM6. Day / Month / Year of interview: ___ ___ / ___ ___ / ___ ___ ___ ___

Repeat greeting if not already read to this woman:

WE ARE FROM (***country-specific affiliation***). WE ARE WORKING ON A PROJECT CONCERNED WITH FAMILY HEALTH AND EDUCATION. I WOULD LIKE TO TALK TO YOU ABOUT THESE SUBJECTS. THE INTERVIEW WILL TAKE ABOUT (***number***) MINUTES. ALL THE INFORMATION WE OBTAIN WILL REMAIN STRICTLY CONFIDENTIAL AND YOUR ANSWERS WILL NEVER BE SHARED WITH ANYONE OTHER THAN OUR PROJECT TEAM.

If greeting at the beginning of the household questionnaire has already been read to this woman, then read the following:

NOW I WOULD LIKE TO TALK TO YOU MORE ABOUT YOUR HEALTH AND OTHER TOPICS. THIS INTERVIEW WILL TAKE ABOUT (***number***) MINUTES. AGAIN, ALL THE INFORMATION WE OBTAIN WILL REMAIN STRICTLY CONFIDENTIAL AND YOUR ANSWERS WILL NEVER BE SHARED WITH ANYONE OTHER THAN OUR PROJECT TEAM.

MAY I START NOW?

☐ *Yes, permission is given ⇨ Go to WM10 to record the time and then begin the interview.*

☐ *No, permission is not given ⇨ Complete WM7. Discuss this result with your supervisor.*

WM7. Result of woman's interview	Completed ..... 01 Not at home ..... 02 Refused ..... 03 Partly completed ..... 04 Incapacitated ..... 05 Other (*specify*) _____ 96

WM8. Field edited by (Name and number): Name _____ ___ ___	WM9. Data entry clerk (Name and number): Name _____ ___ ___

WM10. *Record the time.*	Hour and minutes ..... __ __ : __ __	

WOMAN'S BACKGROUND		WB
WB1. IN WHAT MONTH AND YEAR WERE YOU BORN?	Date of birth Month..... __ __ DK month..... 98 Year ..... __ __ __ __ DK year..... 9998	
WB2. HOW OLD ARE YOU? *Probe:* HOW OLD WERE YOU AT YOUR LAST BIRTHDAY? *Compare and correct WB1 and/or WB2 if inconsistent*	Age (in completed years)..... __ __	
WB3. HAVE YOU EVER ATTENDED SCHOOL OR PRESCHOOL?	Yes ..... 1 No..... 2	2⇨WB7
WB4. WHAT IS THE HIGHEST LEVEL OF SCHOOL YOU ATTENDED?	Preschool..... 0 Primary ..... 1 Secondary ..... 2 Higher..... 3	0⇨WB7
WB5. WHAT IS THE HIGHEST GRADE YOU COMPLETED AT THAT LEVEL? *If less than 1 grade, enter "00"*	Grade..... __ __	

WB6. *Check WB4:* ☐ *Secondary or higher. ⇨ Go to Next Module* ☐ *Primary ⇨ Continue with WB7*		
WB7. NOW I WOULD LIKE YOU TO READ THIS SENTENCE TO ME. *Show sentence on the card to the respondent.* *If respondent cannot read whole sentence, probe:* CAN YOU READ PART OF THE SENTENCE TO ME?	Cannot read at all ..... 1 Able to read only parts of sentence ..... 2 Able to read whole sentence ..... 3 No sentence in required language_____ 4 *(specify language)* Blind / visually impaired 5	

ACCESS TO MASS MEDIA AND USE OF INFORMATION/COMMUNICATION TECHNOLOGY		MT
MT1. *Check WB7:* ☐ *Question left blank (Respondent has secondary or higher education) ⇨ Continue with MT2* ☐ *Able to read or no sentence in required language (codes 2, 3 or 4) ⇨ Continue with MT2* ☐ *Cannot read at all or blind (codes 1 or 5) ⇨ Go to MT3*		
MT2. HOW OFTEN DO YOU READ A NEWSPAPER OR MAGAZINE: ALMOST EVERY DAY, AT LEAST ONCE A WEEK, LESS THAN ONCE A WEEK OR NOT AT ALL?	Almost every day ..... 1 At least once a week ..... 2 Less than once a week ..... 3 Not at all 4	
MT3. DO YOU LISTEN TO THE RADIO ALMOST EVERY DAY, AT LEAST ONCE A WEEK, LESS THAN ONCE A WEEK OR NOT AT ALL?	Almost every day ..... 1 At least once a week ..... 2 Less than once a week ..... 3 Not at all 4	
MT4. HOW OFTEN DO YOU WATCH TELEVISION: WOULD YOU SAY THAT YOU WATCH ALMOST EVERY DAY, AT LEAST ONCE A WEEK, LESS THAN ONCE A WEEK OR NOT AT ALL?	Almost every day ..... 1 At least once a week ..... 2 Less than once a week ..... 3 Not at all 4	
MT5. *Check WB2: Age of respondent?* ☐ *Age 15-24 ⇨ Continue with MT6* ☐ *Age 25-49 ⇨ Go to Next Module*		
MT6. HAVE YOU EVER USED A COMPUTER?	Yes ..... 1 No 2	 2⇨MT9

MT7. HAVE YOU USED A COMPUTER FROM ANY LOCATION IN THE LAST 12 MONTHS?	Yes ..... 1 No 2	 2⇨MT9
MT8. DURING THE LAST ONE MONTH, HOW OFTEN DID YOU USE A COMPUTER: ALMOST EVERY DAY, AT LEAST ONCE A WEEK, LESS THAN ONCE A WEEK OR NOT AT ALL?	Almost every day ..... 1 At least once a week ..... 2 Less than once a week ..... 3 Not at all 4	
MT9. HAVE YOU EVER USED THE INTERNET?	Yes ..... 1 No 2	 2⇨Next Module
MT10. IN THE LAST 12 MONTHS, HAVE YOU USED THE INTERNET? *If necessary, probe for use from any location, with any device.*	Yes ..... 1 No 2	 2⇨ Next Module
MT11. DURING THE LAST ONE MONTH, HOW OFTEN DID YOU USE THE INTERNET: ALMOST EVERY DAY, AT LEAST ONCE A WEEK, LESS THAN ONCE A WEEK OR NOT AT ALL?	Almost every day ..... 1 At least once a week ..... 2 Less than once a week ..... 3 Not at all 4	

CHILD MORTALITY		**CM**
All questions refer only to LIVE births.		
CM1. NOW I WOULD LIKE TO ASK ABOUT ALL THE BIRTHS YOU HAVE HAD DURING YOUR LIFE. HAVE YOU EVER GIVEN BIRTH?	Yes ..... 1 No 2	2⇨CM8
CM4. DO YOU HAVE ANY SONS OR DAUGHTERS TO WHOM YOU HAVE GIVEN BIRTH WHO ARE NOW LIVING WITH YOU?	Yes ..... 1 No 2	2⇨CM6
CM5. HOW MANY SONS LIVE WITH YOU? HOW MANY DAUGHTERS LIVE WITH YOU? *If none, record '00'.*	Sons at home ..... __ __ Daughters at home ..... __ __	
CM6. DO YOU HAVE ANY SONS OR DAUGHTERS TO WHOM YOU HAVE GIVEN BIRTH WHO ARE ALIVE BUT DO NOT LIVE WITH YOU?	Yes ..... 1 No 2	2⇨CM8
CM7. HOW MANY SONS ARE ALIVE BUT DO NOT LIVE WITH YOU? HOW MANY DAUGHTERS ARE ALIVE BUT DO NOT LIVE WITH YOU? *If none, record '00'.*	Sons elsewhere ..... __ __ Daughters elsewhere..... __ __	
CM8. HAVE YOU EVER GIVEN BIRTH TO A BOY OR GIRL WHO WAS BORN ALIVE BUT LATER DIED? *If "No" probe by asking:* I MEAN, TO A CHILD WHO EVER BREATHED OR CRIED OR SHOWED OTHER SIGNS OF LIFE – EVEN IF HE OR SHE LIVED ONLY A FEW MINUTES OR HOURS?	Yes ..... 1 No 2	2⇨CM10

CM9. HOW MANY BOYS HAVE DIED? HOW MANY GIRLS HAVE DIED? *If none, record '00'.*	Boys dead..... __ __ Girls dead ..... __ __	
CM10. *Sum answers to CM5, CM7, and CM9.*	Sum ..... __ __	

CM11. JUST TO MAKE SURE THAT I HAVE THIS RIGHT, YOU HAVE HAD IN TOTAL (*total number in CM10*) LIVE BIRTHS DURING YOUR LIFE. IS THIS CORRECT?

☐ *Yes. Check below:*

☐ *No live births ⇨ Go to ILLNESS SYMPTOMS Module*

☐ *One or more live births ⇨ Continue with the BIRTH HISTORY module*

☐ *No ⇨ Check responses to CM1-CM10 and make corrections as necessary before proceeding to the BIRTH HISTORY Module or ILLNESS SYMPTOMS Module*

BIRTH HISTORY

NOW I WOULD LIKE TO RECORD THE NAMES OF ALL OF YOUR BIRTHS, WHETHER STILL ALIVE OR NOT, STARTING WITH THE FIRST ONE YOU HAD.

Record names of all of the births in BH1. Record twins and triplets on separate line. If there are more than 14 births, use an additional questionnaire.

BH Line No.	BH1. WHAT NAME WAS GIVEN TO YOUR (*first/next*) BABY?	BH2. WERE ANY OF THESE BIRTHS TWINS? 1 Single 2 Multiple	BH3. IS (*name*) A BOY OR A GIRL? 1 Boy 2 Girl	BH4. IN WHAT MONTH AND YEAR WAS (*name*) BORN? *Probe*: WHAT IS HIS/HER BIRTHDAY?		BH5. IS (*name*) STILL ALIVE? 1 Yes 2 No	BH6. HOW OLD WAS (*name*) AT HIS/HER LAST BIRTHDAY? *Record age in completed years.*	BH7. IS (*name*) LIVING WITH YOU? 1 Yes 2 No	BH8. *Record household line number of child (from HL1) Record "00" if child is not listed.*	BH9. *If dead:* HOW OLD WAS (*name*) WHEN HE/SHE DIED? *If "1 year", probe:* HOW MANY MONTHS OLD WAS (*name*)? *Record days if less than 1 month; record months if less than 2 years; or years*	BH10. WERE THERE ANY OTHER LIVE BIRTHS BETWEEN (*name of previous birth*) AND (*name*), INCLUDING ANY CHILDREN WHO DIED AFTER BIRTH? 1 Yes 2 No	
Line	Name	S M	B G	Month	Year	Y N	Age	Y N	Line No	Unit	Number	Y N
01		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ Next Line	Days..... 1 Months..... 2 Years 3	___ ___	
02		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth
03		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth
04		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth

BH Line No.	BH1. WHAT NAME WAS GIVEN TO YOUR (*first/next*) BABY?	BH2. WERE ANY OF THESE BIRTHS TWINS? 1 Single 2 Multiple	BH3. IS (*name*) A BOY OR A GIRL? 1 Boy 2 Girl	BH4. IN WHAT MONTH AND YEAR WAS (*name*) BORN? *Probe*: WHAT IS HIS/HER BIRTHDAY?		BH5. IS (*name*) STILL ALIVE? 1 Yes 2 No	BH6. HOW OLD WAS (*name*) AT HIS/HER LAST BIRTHDAY? *Record age in completed years.*	BH7. IS (*name*) LIVING WITH YOU? 1 Yes 2 No	BH8. *Record household line number of child (from HL1) Record "00" if child is not listed.*	BH9. *If dead:* HOW OLD WAS (*name*) WHEN HE/SHE DIED? *If "1 year", probe:* HOW MANY MONTHS OLD WAS (*name*)? *Record days if less than 1 month; record months if less than 2 years; or years*	BH10. WERE THERE ANY OTHER LIVE BIRTHS BETWEEN (*name of previous birth*) AND (*name*), INCLUDING ANY CHILDREN WHO DIED AFTER BIRTH? 1 Yes 2 No	
05		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth
06		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth
07		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth

BH Line No.	BH1. WHAT NAME WAS GIVEN TO YOUR (*first/next*) BABY?	BH2. WERE ANY OF THESE BIRTHS TWINS? 1 Single 2 Multiple	BH3. IS (*name*) A BOY OR A GIRL? 1 Boy 2 Girl	BH4. IN WHAT MONTH AND YEAR WAS (*name*) BORN? *Probe*: WHAT IS HIS/HER BIRTHDAY?		BH5. IS (*name*) STILL ALIVE? 1 Yes 2 No	BH6. HOW OLD WAS (*name*) AT HIS/HER LAST BIRTHDAY? *Record age in completed years.*	BH7. IS (*name*) LIVING WITH YOU? 1 Yes 2 No	BH8. *Record household line number of child (from HL1) Record "00" if child is not listed.*	BH9. *If dead:* HOW OLD WAS (*name*) WHEN HE/SHE DIED? *If "1 year", probe:* HOW MANY MONTHS OLD WAS (*name*)? *Record days if less than 1 month; record months if less than 2 years; or years*	BH10. WERE THERE ANY OTHER LIVE BIRTHS BETWEEN (*name of previous birth*) AND (*name*), INCLUDING ANY CHILDREN WHO DIED AFTER BIRTH? 1 Yes 2 No	
08		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth
09		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth
10		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth
11		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth
12		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth
13		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth

BH Line No.	BH1. WHAT NAME WAS GIVEN TO YOUR (*first/next*) BABY?	BH2. WERE ANY OF THESE BIRTHS TWINS?	BH3. IS (*name*) A BOY OR A GIRL?	BH4. IN WHAT MONTH AND YEAR WAS (*name*) BORN? *Probe*: WHAT IS HIS/HER BIRTHDAY?		BH5. IS (*name*) STILL ALIVE?	BH6. HOW OLD WAS (*name*) AT HIS/HER LAST BIRTHDAY?	BH7. IS (*name*) LIVING WITH YOU?	BH8. *Record household line number of child (from HL1)*	BH9. *If dead:* HOW OLD WAS (*name*) WHEN HE/SHE DIED? *If "1 year", probe:* HOW MANY MONTHS OLD WAS (*name*)?	BH10. WERE THERE ANY OTHER LIVE BIRTHS BETWEEN (*name of previous birth*) AND (*name*), INCLUDING ANY CHILDREN WHO DIED AFTER BIRTH?	
		1 Single 2 Multiple	1 Boy 2 Girl			1 Yes 2 No	*Record age in completed years.*	1 Yes 2 No	*Record "00" if child is not listed.*	*Record days if less than 1 month; record months if less than 2 years; or years*	1 Yes 2 No	
14		1 2	1 2			1 2 ⇨ BH9	___ ___	1 2	___ ___ ⇨ BH10	Days..... 1 Months..... 2 Years 3	___ ___	1 Add Birth 2 Next Birth

BH11. HAVE YOU HAD ANY LIVE BIRTHS SINCE THE BIRTH OF (*name of last birth in Birth History*)?		
	Yes	1⇨Record Birth(s) in Birth History
	No.....	

CM12. *Compare number in CM10 with number of births in the Birth History above and check:*

☐ *Numbers are same ⇨ Continue with CM13*

☐ *Numbers are different ⇨ Probe and reconcile*

CM13. *Check BH4 in BIRTH HISTORY: Last birth occurred within the last 2 years, that is, since (month of interview) in* ***2010***

☐ *No live birth in last 2 years. ⇨ Go to ILLNESS SYMPTOMS Module.*

☐ *One or more live births in last 2 years. ⇨ Record name of last born child and continue with next module*

*Name of last-born child*_____

If child has died, take special care when referring to this child by name in the following modules.

DESIRE FOR LAST BIRTH		DB
This module is to be administered to all women with a live birth in the 2 years preceding date of interview. *Check child mortality module CM13 and record name of last-born child here _____.* *Use this child's name in the following questions, where indicated.*		
DB1. WHEN YOU GOT PREGNANT WITH (*name*), DID YOU WANT TO GET PREGNANT AT THAT TIME?	Yes ..... 1 No 2	1⇨Next Module
DB2. DID YOU WANT TO HAVE A BABY LATER ON, OR DID YOU NOT WANT ANY (MORE) CHILDREN?	Later ..... 1 No more 2	2⇨Next Module
DB3. HOW MUCH LONGER DID YOU WANT TO WAIT?	Months ..... 1 __ __ Years ..... 2 __ __ DK 998	

MATERNAL AND NEWBORN HEALTH		MN
This module is to be administered to all women with a live birth in the 2 years preceding date of interview. *Check child mortality module CM13 and record name of last-born child here _____.* *Use this child's name in the following questions, where indicated.*		
MN1. DID YOU SEE ANYONE FOR ANTENATAL CARE DURING YOUR PREGNANCY WITH (*name*)?	Yes ..... 1 No 2	2⇨MN5
MN2. WHOM DID YOU SEE? *Probe:* ANYONE ELSE? *Probe for the type of person seen and circle all answers given.*	Health professional: Doctor ..... A Nurse / Midwife ..... B Auxiliary midwife ..... C Other person Traditional birth attendant ..... F Community health worker ..... G Other (*specify*) _____ X	
MN3. HOW MANY TIMES DID YOU RECEIVE ANTENATAL CARE DURING THIS PREGNANCY?	Number of times ..... __ __ DK 98	
MN4. AS PART OF YOUR ANTENATAL CARE DURING THIS PREGNANCY, WERE ANY OF THE FOLLOWING DONE AT LEAST ONCE: [A] WAS YOUR BLOOD PRESSURE MEASURED? [B] DID YOU GIVE A URINE SAMPLE?	Yes No Blood pressure ..... 1 2 Urine sample 1 2	

[C] DID YOU GIVE A BLOOD SAMPLE?	Blood sample 1 2	
MN5. DO YOU HAVE A CARD OR OTHER DOCUMENT WITH YOUR OWN IMMUNIZATIONS LISTED? MAY I SEE IT PLEASE? *If a card is presented, use it to assist with answers to the following questions.*	Yes (card seen) ..... 1 Yes (card not seen) ..... 2 No ..... 3 DK 8	
MN6. WHEN YOU WERE PREGNANT WITH (*name*), DID YOU RECEIVE ANY INJECTION IN THE ARM OR SHOULDER TO PREVENT THE BABY FROM GETTING TETANUS, THAT IS CONVULSIONS AFTER BIRTH?	Yes ..... 1 No ..... 2 DK 8	 2⇨MN9 8⇨MN9
MN7. HOW MANY TIMES DID YOU RECEIVE THIS TETANUS INJECTION DURING YOUR PREGNANCY WITH (*name*)? *If 7 or more times, record '7'.*	Number of times ..... __ DK 8	 8⇨MN9
MN8. *How many tetanus injections during last pregnancy were reported in MN7?* ☐ *At least two tetanus injections during last pregnancy. ⇨ Go to MN12* ☐ *Only one tetanus injection during last pregnancy. ⇨ Continue with MN9*		

MN9. DID YOU RECEIVE ANY TETANUS INJECTION AT ANY TIME BEFORE YOUR PREGNANCY WITH (*name*), EITHER TO PROTECT YOURSELF OR ANOTHER BABY?	Yes ..... 1 No ..... 2 DK 8	 2⇨MN12 8⇨MN12
MN10. HOW MANY TIMES DID YOU RECEIVE A TETANUS INJECTION BEFORE YOUR PREGNANCY WITH (*name*)? *If 7 or more times, record '7'.*	Number of times ..... __ DK 8	 8⇨MN12
MN11. HOW MANY YEARS AGO DID YOU RECEIVE THE LAST TETANUS INJECTION BEFORE YOUR PREGNANCY WITH (*name*)?	Years ago ..... __ __	
MN12. *Check MN1 for presence of antenatal care during this pregnancy:* ☐ *Yes, antenatal care received.⇨ Continue with MN13* ☐ *No antenatal care received ⇨ Go to MN17*		
MN13. DURING ANY OF THESE ANTENATAL VISITS FOR THE PREGNANCY, DID YOU TAKE ANY MEDICINE IN ORDER TO PREVENT YOU FROM GETTING MALARIA?	Yes ..... 1 No ..... 2 DK..... 8	 2⇨MN17 8⇨MN17
MN14. WHICH MEDICINES DID YOU TAKE TO PREVENT MALARIA? *Circle all medicines taken. If type of medicine is not determined, show typical anti-malarial to*	SP / Fansidar.....A Chloroquine .....B Other (*specify*) _____X	

respondent.	DK..... Z	
MN15. *Check MN14 for medicine taken:* ☐ *SP / Fansidar taken.⇨ Continue with MN16* ☐ *SP / Fansidar not taken.⇨ Go to MN17*		
MN16. DURING THIS PREGNANCY, HOW MANY TIMES DID YOU TAKE SP/ FANSIDAR?	Number of times ..... __ __ DK..... 98	
MN17. WHO ASSISTED WITH THE DELIVERY OF (*name*)? *Probe:* ANYONE ELSE? *Probe for the type of person assisting and circle all answers given.* *If respondent says no one assisted, probe to determine whether any adults were present at the delivery.*	Health professional: Doctor ..... A Nurse / Midwife ..... B Auxiliary midwife ..... C Other person Traditional birth attendant ..... F Community health worker ..... G Relative / Friend..... H Other (*specify*) _____ X No one ..... Y	

MN18. WHERE DID YOU GIVE BIRTH TO (*name*)? *Probe to identify the type of source.* *If unable to determine whether public or private, write the name of the place.* _____ *(Name of place)*	Home Your home ..... 11 Other home ..... 12 Public sector Govt. hospital ..... 21 Govt. clinic / health centre ..... 22 Govt. health post ..... 23 Other public (*specify*)_____ 26 Private Medical Sector Private hospital ..... 31 Private clinic ..... 32 Private maternity home ..... 33 Other private medical (*specify*)_____ 36 Other (*specify*)_____ 96	11⇨MN20 12⇨MN20 96⇨MN20
MN19. WAS (*name*) DELIVERED BY CAESAREAN SECTION? THAT IS, DID THEY CUT YOUR BELLY OPEN TO TAKE THE BABY OUT?	Yes ..... 1 No 2	
MN20. WHEN (*name*) WAS BORN, WAS HE/SHE VERY LARGE, LARGER THAN AVERAGE, AVERAGE, SMALLER THAN AVERAGE, OR VERY SMALL?	Very large ..... 1 Larger than average ..... 2 Average ..... 3 Smaller than average ..... 4 Very small 5	

	DK 8	
MN21. WAS (*name*) WEIGHED AT BIRTH?	Yes .....1 No.....2 DK 8	 2⇨MN23 8⇨MN23
MN22. HOW MUCH DID (*name*) WEIGH? *Record weight from health card, if available.*	From card..... 1 (kg) __ . __ __ __ From recall ..... 2 (kg) __ . __ __ __ DK 99998	
MN23. HAS YOUR MENSTRUAL PERIOD RETURNED SINCE THE BIRTH OF (*name*)?	Yes .....1 No.....2	
MN24. DID YOU EVER BREASTFEED (*name*)?	Yes .....1 No.....2	 2⇨Next Module
MN25. HOW LONG AFTER BIRTH DID YOU FIRST PUT (*name*) TO THE BREAST? *If less than 1 hour, record '00' hours.* *If less than 24 hours, record hours.* *Otherwise, record days.*	Immediately.....000 Hours.....1 __ __ Days .....2 __ __ Don't know / remember 998	

MN26. IN THE FIRST THREE DAYS AFTER DELIVERY, WAS (*name*) GIVEN ANYTHING TO DRINK OTHER THAN BREAST MILK?	Yes .....1 No.....2	2⇨Next Module
MN27. WHAT WAS (*name*) GIVEN TO DRINK? *Probe:* ANYTHING ELSE?	Milk (other than breast milk)..... A Plain water ..... B Sugar or glucose water ..... C Gripe water..... D Sugar-salt-water solution ..... E Fruit juice..... F Infant formula ..... G Tea / Infusions..... H Honey .....I Other (*specify*)_____ X	

POST-NATAL HEALTH CHECKS		PN
This module is to be administered to all women with a live birth in the 2 years preceding the date of interview. *Check child mortality module CM13 and record name of last-born child here _____.* *Use this child's name in the following questions, where indicated.*		
PN1. *Check MN18: Was the child delivered in a health facility?* ☐ *Yes, the child was delivered in a health facility (MN18=21-26 or 31-36) ⇨ Continue with PN2* ☐ *No, the child was not delivered in a health facility (MN18=11-12 or 96) ⇨ Go to PN6*		
PN2. NOW I WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT WHAT HAPPENED IN THE HOURS AND DAYS AFTER THE BIRTH OF (*name).* YOU HAVE SAID THAT YOU GAVE BIRTH IN (*name or type of facility in MN18*). HOW LONG DID YOU STAY THERE AFTER THE DELIVERY? *If less than one day, record hours.* *If less than one week, record days.* *Otherwise, record weeks.*	Hours.....1 __ __ Days.....2 __ __ Weeks.....3 __ __ Don't know / remember.....998	

PN3. I WOULD LIKE TO TALK TO YOU ABOUT CHECKS ON (*name*)'S HEALTH AFTER DELIVERY – FOR EXAMPLE, SOMEONE EXAMINING (*name*), CHECKING THE CORD, OR SEEING IF (*name*) IS OK. BEFORE YOU LEFT THE (*name or type of facility in MN18*), DID ANYONE CHECK ON (*name*)'S HEALTH?	Yes .....1 No.....2	
PN4. AND WHAT ABOUT CHECKS ON YOUR HEALTH – I MEAN, SOMEONE ASSESSING YOUR HEALTH, FOR EXAMPLE ASKING QUESTIONS ABOUT YOUR HEALTH OR EXAMINING YOU. DID ANYONE CHECK ON YOUR HEALTH BEFORE YOU LEFT (*name or type or facility in MN18*)?	Yes .....1 No.....2	
PN5. NOW I WOULD LIKE TO TALK TO YOU ABOUT WHAT HAPPENED AFTER YOU LEFT (*name or type of facility in MN18*). DID ANYONE CHECK ON (*name*)'S HEALTH AFTER YOU LEFT (*name or type of facility in MN18*)?	Yes .....1 No.....2	1⇨PN11 2⇨PN16

PN6. *Check MN17: Did a health professional, traditional birth attendant, or community health worker assist with the delivery?*

☐ *Yes, delivery assisted by a health professional, traditional birth attendant, or community health worker (MN17=A-G) ⇨ Continue with PN7*

☐ *No, delivery not assisted by a health professional, traditional birth attendant, or community health worker (A-G not circled in MN17) ⇨ Go to PN10*

PN7. YOU HAVE ALREADY SAID THAT (*person or persons in MN17*) ASSISTED WITH THE BIRTH. NOW I WOULD LIKE TO TALK TO YOU ABOUT CHECKS ON (*name*)'S HEALTH AFTER DELIVERY, FOR EXAMPLE EXAMINING (*name*), CHECKING THE CORD, OR SEEING IF (*name*) IS OK. AFTER THE DELIVERY WAS OVER AND BEFORE (*person or persons in MN17*) LEFT YOU, DID (*person or persons in MN17*) CHECK ON (*name*)'S HEALTH?	Yes .....1 No.....2	
PN8. AND DID (*person or persons in MN17*) CHECK ON <u>YOUR</u> HEALTH BEFORE LEAVING? BY CHECK ON YOUR HEALTH, I MEAN ASSESSING YOUR HEALTH, FOR EXAMPLE ASKING QUESTIONS ABOUT YOUR HEALTH OR EXAMINING YOU.	Yes .....1 No.....2	
PN9. AFTER THE (*person or persons in MN17*) LEFT YOU, DID ANYONE CHECK ON THE HEALTH OF (*name*)?	Yes .....1 No.....2	1⇨PN11 2⇨PN18
PN10. I WOULD LIKE TO TALK TO YOU ABOUT CHECKS ON (*name*)'S HEALTH AFTER DELIVERY – FOR EXAMPLE, SOMEONE EXAMINING (*name*), CHECKING THE CORD, OR SEEING IF THE BABY IS OK. AFTER (*name*) WAS DELIVERED, DID ANYONE CHECK ON HIS/HER HEALTH?	Yes .....1 No.....2	2⇨PN19

PN11. DID SUCH A CHECK HAPPEN ONLY ONCE, OR MORE THAN ONCE?	Once.....1 More than once 2	1⇨PN12A 2⇨PN12B
PN12A. HOW LONG AFTER DELIVERY DID THAT CHECK HAPPEN? PN12B. HOW LONG AFTER DELIVERY DID THE FIRST OF THESE CHECKS HAPPEN? *If less than one day, record hours.* *If less than one week, record days.* *Otherwise, record weeks.*	Hours.....1 __ __ Days .....2 __ __ Weeks .....3 __ __ Don't know / remember 998	
PN13. WHO CHECKED ON (*name*)'S HEALTH AT THAT TIME?	Health professional Doctor..... A Nurse / Midwife..... B Auxiliary midwife..... C Other person Traditional birth attendant..... F Community health worker..... G Relative / Friend ..... H Other (*specify*)_____ X	

PN14. WHERE DID THIS CHECK TAKE PLACE? *Probe to identify the type of source.* *If unable to determine whether public or private, write the name of the place.* _____ *(Name of place)*	Home Your home.....11 Other home .....12 Public sector Govt. hospital .....21 Govt. clinic / health centre .....22 Govt. health post .....23 Other public (*specify*)_____26 Private medical sector Private hospital.....31 Private clinic .....32 Private maternity home .....33 Other private medical (*specify*)_____36 Other (*specify*)_____96	
PN15. *Check MN18: Was the child delivered in a health facility?* ☐ *Yes, the child was delivered in a health facility (MN18=21-26 or 31-36) ⇨ Continue with PN16* ☐ *No, the child was not delivered in a health facility (MN18=11-12 or 96) ⇨ Go to PN17*		
PN16. AFTER YOU LEFT (*name or type of facility in MN18*), DID ANYONE CHECK ON YOUR HEALTH?	Yes .....1 No.....2	1⇨PN20 2⇨Next Module

PN17. *Check MN17: Did a health professional, traditional birth attendant, or community health worker assist with the delivery?*

☐ *Yes, delivery assisted by a health professional, traditional birth attendant, or community health worker (MN17=A-G) ⇨ Continue with PN18*

☐ *No, delivery not assisted by a health professional, traditional birth attendant, or community health worker (A-G not circled in MN17) ⇨ Go to PN19*

PN18. AFTER THE DELIVERY WAS OVER AND (*person or persons in MN17*) LEFT, DID ANYONE CHECK ON YOUR HEALTH?	Yes .....1 No.....2	1⇨PN20 2⇨Next Module
PN19. AFTER THE BIRTH OF (*name*), DID ANYONE CHECK ON YOUR HEALTH? I MEAN SOMEONE ASSESSING YOUR HEALTH, FOR EXAMPLE ASKING QUESTIONS ABOUT YOUR HEALTH OR EXAMINING YOU.	Yes .....1 No.....2	2⇨Next Module
PN20. DID SUCH A CHECK HAPPEN ONLY ONCE, OR MORE THAN ONCE?	Once.....1 More than once 2	1⇨PN21A 2⇨PN21B

PN21A. HOW LONG AFTER DELIVERY DID THAT CHECK HAPPEN? PN21B. HOW LONG AFTER DELIVERY DID THE FIRST OF THESE CHECKS HAPPEN? *If less than one day, record hours.* *If less than one week, record days.* *Otherwise, record weeks.*	Hours.....1 __ __ Days .....2 __ __ Weeks .....3 __ __ Don't know / remember 998	
PN22. WHO CHECKED ON YOUR HEALTH AT THAT TIME?	Health professional Doctor..... A Nurse / Midwife..... B Auxiliary midwife..... C Other person Traditional birth attendant..... F Community health worker.....G Relative / Friend .....H Other (*specify*)_____ X	

PN23. WHERE DID THIS CHECK TAKE PLACE? *Probe to identify the type of source.* *If unable to determine whether public or private, write the name of the place.* _____ *(Name of place)*	Home Your home.....11 Other home .....12 Public sector Govt. hospital .....21 Govt. clinic / health centre .....22 Govt. health post .....23 Other public (*specify*)_____26 Private medical sector Private hospital.....31 Private clinic .....32 Private maternity home .....33 Other private medical (*specify*)_____36 Other (*specify*)_____96	

ILLNESS SYMPTOMS		IS
IS1. *Check Household Listing, column HL9* *Is the respondent the mother or caretaker of any child under age 5?* ☐ *Yes ⇨ Continue with IS2.* ☐ *No ⇨ Go to Next Module.*		
IS2. SOMETIMES CHILDREN HAVE SEVERE ILLNESSES AND SHOULD BE TAKEN IMMEDIATELY TO A HEALTH FACILITY. WHAT TYPES OF SYMPTOMS WOULD CAUSE YOU TO TAKE YOUR CHILD TO A HEALTH FACILITY RIGHT AWAY? *Probe:* ANY OTHER SYMPTOMS? *Keep asking for more signs or symptoms until the mother/caretaker cannot recall any additional symptoms.* *Circle all symptoms mentioned, but do <u>not</u> prompt with any suggestions*	Child not able to drink or breastfeed..... A Child becomes sicker ..... B Child develops a fever ..... C Child has fast breathing..... D Child has difficult breathing ..... E Child has blood in stool ..... F Child is drinking poorly .....G Other (*specify*) _____ X Other (*specify*) _____ Y Other (*specify*) _____ Z	

CONTRACEPTION		CP
CP1. I WOULD LIKE TO TALK WITH YOU ABOUT ANOTHER SUBJECT – FAMILY PLANNING. ARE YOU PREGNANT NOW?	Yes, currently pregnant ..... 1 No ..... 2 Unsure or DK 8	1⇨Next Module
CP2. COUPLES USE VARIOUS WAYS OR METHODS TO DELAY OR AVOID A PREGNANCY. ARE YOU CURRENTLY DOING SOMETHING OR USING ANY METHOD TO DELAY OR AVOID GETTING PREGNANT?	Yes ..... 1 No 2	2⇨Next Module
CP3. WHAT ARE YOU DOING TO DELAY OR AVOID A PREGNANCY? *Do not prompt.* *If more than one method is mentioned, circle each one.*	Female sterilization ..... A Male sterilization ..... B IUD ..... C Injectables ..... D Implants ..... E Pill ..... F Male condom ..... G Female condom ..... H Diaphragm ..... I Foam / Jelly ..... J Lactational amenorrhoea method (LAM) ..... K Periodic abstinence / Rhythm ..... L Withdrawal ..... M	

	Other (*specify*) _____X	

UNMET NEED		UN
UN1. *Check CP1. Currently pregnant?* ☐ *Yes, currently pregnant ⇨ Continue with UN2* ☐ *No, unsure or DK ⇨ Go to UN5*		
UN2. NOW I WOULD LIKE TO TALK TO YOU ABOUT YOUR CURRENT PREGNANCY. WHEN YOU GOT PREGNANT, DID YOU WANT TO GET PREGNANT AT THAT TIME?	Yes ..... 1 No 2	1⇨UN4
UN3. DID YOU WANT TO HAVE A BABY LATER ON OR DID YOU NOT WANT ANY (MORE) CHILDREN?	Later ..... 1 No more 2	
UN4. NOW I WOULD LIKE TO ASK SOME QUESTIONS ABOUT THE FUTURE. AFTER THE CHILD YOU ARE NOW EXPECTING, WOULD YOU LIKE TO HAVE ANOTHER CHILD, OR WOULD YOU PREFER NOT TO HAVE ANY MORE CHILDREN?	Have another child ..... 1 No more / None ..... 2 Undecided / Don't know 8	1⇨UN7 2⇨UN13 8⇨UN13
UN5. *Check CP3. Currently using "Female sterilization"?* ☐ *Yes ⇨ Go to UN13* ☐ *No ⇨ Continue with UN6*		

UN6. NOW I WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT THE FUTURE. WOULD YOU LIKE TO HAVE (A/ANOTHER) CHILD, OR WOULD YOU PREFER NOT TO HAVE ANY (MORE) CHILDREN?	Have (a/another) child.....1 No more / None.....2 Says she cannot get pregnant .....3 Undecided / Don't know 8	 2⇨UN9 3⇨UN11 8⇨UN9
UN7. HOW LONG WOULD YOU LIKE TO WAIT BEFORE THE BIRTH OF (A/ANOTHER) CHILD?	Months .....1 __ __ Years.....2 __ __ Soon / Now.....993 Says she cannot get pregnant .....994 After marriage .....995 Other .....996 Don't know 998	 994⇨UN11

UN8. *Check CP1. Currently pregnant?*

☐ *Yes, currently pregnant ⇨ Go to UN13*

☐ *No, unsure or DK ⇨ Continue with UN9*

UN9. *Check CP2. Currently using a method?* ☐ *Yes ⇨ Go to UN13* ☐ *No ⇨ Continue with UN10*		
UN10. DO YOU THINK YOU ARE PHYSICALLY ABLE TO GET PREGNANT AT THIS TIME?	Yes ..... 1 No ..... 2 DK 8	1 ⇨UN13 8 ⇨UN13
UN11. WHY DO YOU THINK YOU ARE NOT PHYSICALLY ABLE TO GET PREGNANT?	Infrequent sex / No sex ..... A Menopausal ..... B Never menstruated ..... C Hysterectomy (surgical removal of uterus) ..... D Has been trying to get pregnant for 2 years or more without result ..... E Postpartum amenorrheic ..... F Breastfeeding ..... G Too old ..... H Fatalistic ..... I Other (*specify*) _____ X Don't know ..... Z	

UN12. *Check UN11. "Never menstruated" mentioned?* ☐ *Mentioned ⇨ Go to Next Module* ☐ *Not mentioned ⇨ Continue with UN13*		
UN13. WHEN DID YOUR LAST MENSTRUAL PERIOD START? *Record the answer using the same unit stated by the respondent*	Days ago ..... 1 __ __ Weeks ago ..... 2 __ __ Months ago ..... 3 __ __ Years ago ..... 4 __ __ In menopause / Has had hysterectomy ..... 994 Before last birth ..... 995 Never menstruated 996	

FEMALE GENITAL MUTILATION/CUTTING		FG
FG1. HAVE YOU EVER HEARD OF FEMALE CIRCUMCISION?	Yes ..... 1 No 2	1⇨FG3
FG2. IN SOME COUNTRIES, THERE IS A PRACTICE IN WHICH A GIRL MAY HAVE PART OF HER GENITALS CUT. HAVE YOU EVER HEARD ABOUT THIS PRACTICE?	Yes ..... 1 No 2	2⇨Next Module
FG3. HAVE YOU YOURSELF EVER BEEN CIRCUMCISED?	Yes ..... 1 No 2	2⇨FG9
FG4. NOW I WOULD LIKE TO ASK YOU WHAT WAS DONE TO YOU AT THAT TIME. WAS ANY FLESH REMOVED FROM THE GENITAL AREA?	Yes ..... 1 No ..... 2 DK 8	1⇨FG6
FG5. WAS THE GENITAL AREA JUST NICKED WITHOUT REMOVING ANY FLESH?	Yes ..... 1 No ..... 2 DK 8	
FG6. WAS THE GENITAL AREA SEWN CLOSED? *If necessary, probe*: WAS IT SEALED?	Yes ..... 1 No ..... 2 DK 8	
FG7. HOW OLD WERE YOU WHEN YOU WERE CIRCUMCISED? *If the respondent does not know the exact age, probe to get an estimate*	Age at circumcision ..... __ __ DK / Don't remember / Not sure 98	
FG8. WHO PERFORMED THE CIRCUMCISION?	Health professional Doctor 11	

	Nurse/Midwife ..... 12 Other health professional (*specify*) _____ 16 Traditional persons Traditional 'circumciser' ..... 21 Traditional birth attendant ..... 22 Other traditional (*specify*) _____ 26 DK 98	
FG9. *Check CM5 for Number of daughters at home and CM7 for Number of daughters elsewhere, and sum the answers here*	Total number of living daughters..... ___ ___	

FG10. JUST TO MAKE SURE THAT I HAVE THIS RIGHT, YOU HAVE *(total number in FG9)* LIVING DAUGHTERS.

IS THIS CORRECT?

☐ *Yes*

☐ *One or more living daughters ⇨ Continue with FG11*

☐ *Does not have any living daughters ⇨ Go to FG22*

☐ *No ⇨ Check responses to CM1 – CM10 and make corrections as necessary, until FG10 = Yes*

FG11. *Ask the respondent to tell you the name(s) of her daughter(s), beginning with the youngest daughter (if more than one daughter). Write down the name of each daughter in FG12. Then, ask questions FG13 to FG20 for each daughter at a time.*

The total number of daughters in FG12 should be equal to the number in FG9

If more than 4 daughters, use additional questionnaires

	Daughter #1	Daughter #2	Daughter #3	Daughter #4
FG12. *Name of daughter*	_____	_____	_____	_____
FG13. HOW OLD IS (*name)*?	Age..... ___ ___	Age ..... ___ ___	Age ..... ___ ___	Age..... ___ ___
FG14. *Is (name) younger than 15 years of age?*	Yes.....1 No.....2 *If "No", go to FG13 for next daughter. If no more daughters, go to FG22*	Yes.....1 No.....2 *If "No", go to FG13 for next daughter. If no more daughters, go to FG22*	Yes.....1 No.....2 *If "No", go to FG13 for next daughter. If no more daughters, go to FG22*	Yes.....1 No.....2 *If "No", go to FG13 for next daughter. If no more daughters, go to FG22*

FG15. IS (*name*) CIRCUMCISED?	Yes ..... 1 No..... 2 *If "No", go to FG13 for next daughter. If no more daughters, go to FG22*	Yes..... 1 No ..... 2 *If "No", go to FG13 for next daughter. If no more daughters, go to FG22*	Yes ..... 1 No ..... 2 *If "No", go to FG13 for next daughter. If no more daughters, go to FG22*	Yes ..... 1 No..... 2 *If "No", go to FG13 for next daughter. If no more daughters, go to FG22*
FG16. HOW OLD WAS (*name*) WHEN THIS OCCURRED? *If the respondent does not know the age, probe to get an estimate.*	Age..... ___ ___ DK 98	Age ..... ___ ___ DK..... 98	Age ..... ___ ___ DK..... 98	Age..... ___ ___ DK 98
FG17. NOW I WOULD LIKE TO ASK YOU WHAT WAS DONE TO (*name*) AT THAT TIME. WAS ANY FLESH REMOVED FROM THE GENITAL AREA?	Yes ..... 1 ⇨FG19 No..... 2 DK 8	Yes..... 1 ⇨FG19 No ..... 2 DK..... 8	Yes ..... 1 ⇨FG19 No ..... 2 DK..... 8	Yes ..... 1 ⇨FG19 No..... 2 DK 8
FG18. WAS HER GENITAL AREA JUST NICKED WITHOUT REMOVING ANY FLESH?	Yes ..... 1 No..... 2 DK 8	Yes..... 1 No ..... 2 DK..... 8	Yes ..... 1 No ..... 2 DK..... 8	Yes ..... 1 No..... 2 DK 8

FG19. WAS HER GENITAL AREA SEWN CLOSED? *If necessary, probe*: WAS IT SEALED?	Yes ..... 1 No..... 2 DK 8	Yes..... 1 No ..... 2 DK..... 8	Yes ..... 1 No ..... 2 DK..... 8	Yes ..... 1 No..... 2 DK 8
FG20. WHO PERFORMED THE CIRCUMCISION?	Health professional Doctor..... 11 Nurse/midwife 12 Other health professional (*specify*) ____ 16 Traditional persons Traditional 'circumciser' .. 21 Traditional birth attendant ..... 22 Other traditional (*specify*) _____ 26 DK 98	Health professional Doctor ..... 11 Nurse/midwife 12 Other health professional (*specify*)____ 16 Traditional persons Traditional 'circumciser' .. 21 Traditional birth attendant..... 22 Other traditional (*specify*) ____ 26 DK..... 98	Health professional Doctor .....11 Nurse/midwife.12 Other health professional (*specify*) ____ 16 Traditional persons Traditional 'circumciser'...21 Traditional birth attendant.....22 Other traditional (*specify*) ____ 26 DK.....98	Health professional Doctor..... 11 Nurse/midwife 12 Other health professional (*specify*) ____16 Traditional persons Traditional 'circumciser' .. 21 Traditional birth attendant ..... 22 Other traditional (*specify*)_____26 DK 98
FG21.	*Go back to FG13 for next daughter. If no more daughters, go to FG22*	*Go back to FG13 for next daughter. If no more daughters, go to FG22*	*Go back to FG13 for next daughter. If no more daughters, go to FG22*	*Go back to FG13 in first column of additional questionnaire for next daughter. If no more daughters, go to FG22*

	Tick here if additional questionnaire used ☐

FG22. DO YOU THINK THIS PRACTICE SHOULD BE CONTINUED OR SHOULD IT BE DISCONTINUED?	Continued.....1 Discontinued .....2 Depends.....3 DK 8	

ATTITUDES TOWARD DOMESTIC VIOLENCE		DV
DV1. SOMETIMES A HUSBAND IS ANNOYED OR ANGERED BY THINGS THAT HIS WIFE DOES. IN YOUR OPINION, IS A HUSBAND JUSTIFIED IN HITTING OR BEATING HIS WIFE IN THE FOLLOWING SITUATIONS: [A] IF SHE GOES OUT WITHOUT TELLING HIM? [B] IF SHE NEGLECTS THE CHILDREN? [C] IF SHE ARGUES WITH HIM? [D] IF SHE REFUSES TO HAVE SEX WITH HIM? [E] IF SHE BURNS THE FOOD?	Yes No DK Goes out without telling ..... 1 2 8 Neglects children ..... 1 2 8 Argues with him ..... 1 2 8 Refuses sex..... 1 2 8 Burns food 1 2 8	

MARRIAGE/UNION		MA
MA1. ARE YOU CURRENTLY MARRIED OR LIVING TOGETHER WITH A MAN AS IF MARRIED?	Yes, currently married ..... 1 Yes, living with a man ..... 2 No, not in union 3	 3⇨MA5
MA2. HOW OLD IS YOUR HUSBAND/PARTNER? *Probe*: HOW OLD WAS YOUR HUSBAND/PARTNER ON HIS LAST BIRTHDAY?	Age in years..... __ __ DK..... 98	
MA3. BESIDES YOURSELF, DOES YOUR HUSBAND/PARTNER HAVE ANY OTHER WIVES OR PARTNERS OR DOES HE LIVE WITH OTHER WOMEN AS IF MARRIED?	Yes ..... 1 No 2	 2⇨MA7
MA4. HOW MANY OTHER WIVES OR PARTNERS DOES HE HAVE?	Number..... __ __ DK..... 98	⇨MA7 98⇨MA7
MA5. HAVE YOU EVER BEEN MARRIED OR LIVED TOGETHER WITH A MAN AS IF MARRIED?	Yes, formerly married ..... 1 Yes, formerly lived with a man..... 2 No 3	 3 ⇨Next Module
MA6. WHAT IS YOUR MARITAL STATUS NOW: ARE YOU WIDOWED, DIVORCED OR SEPARATED?	Widowed..... 1 Divorced ..... 2 Separated 3	
MA7. HAVE YOU BEEN MARRIED OR LIVED WITH A MAN ONLY ONCE OR MORE THAN ONCE?	Only once ..... 1 More than once..... 2	

MA8. IN WHAT MONTH AND YEAR DID YOU FIRST MARRY OR START LIVING WITH A MAN AS IF MARRIED?	Date of first marriage Month..... __ __ DK month..... 98 Year ..... __ __ __ __ DK year..... 9998	⇨Next Module
MA9. HOW OLD WERE YOU WHEN YOU STARTED LIVING WITH YOUR FIRST HUSBAND/PARTNER?	Age in years..... __ __	

SEXUAL BEHAVIOUR		SB
Check for the presence of others. Before continuing, ensure privacy.		
SB1. NOW I WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT SEXUAL ACTIVITY IN ORDER TO GAIN A BETTER UNDERSTANDING OF SOME IMPORTANT LIFE ISSUES. THE INFORMATION YOU SUPPLY WILL REMAIN STRICTLY CONFIDENTIAL. HOW OLD WERE YOU WHEN YOU HAD SEXUAL INTERCOURSE FOR THE VERY FIRST TIME?	Never had intercourse..... 00 Age in years ..... __ __ First time when started living with (first) husband/partner 95	00⇨Next Module
SB2. THE FIRST TIME YOU HAD SEXUAL INTERCOURSE, WAS A CONDOM USED?	Yes..... 1 No ..... 2 DK / Don't remember 8	
SB3. WHEN WAS THE LAST TIME YOU HAD SEXUAL INTERCOURSE? *Record answers in days, weeks or months if less than 12 months (one year).* *If more than 12 months (one year), answer must be recorded in years.*	Days ago..... 1 __ __ Weeks ago ..... 2 __ __ Months ago ..... 3 __ __ Years ago..... 4 __ __	4⇨SB15
SB4. THE LAST TIME YOU HAD SEXUAL INTERCOURSE, WAS A CONDOM USED?	Yes..... 1 No 2	
SB5. WHAT WAS YOUR RELATIONSHIP TO THIS PERSON WITH WHOM YOU LAST HAD SEXUAL	Husband..... 1	

INTERCOURSE? *Probe to ensure that the response refers to the relationship at the time of sexual intercourse* *If 'boyfriend', then ask:* WERE YOU LIVING TOGETHER AS IF MARRIED? *If 'yes', circle '2'. If 'no', circle'3'.*	Cohabiting partner ..... 2 Boyfriend..... 3 Casual acquaintance ..... 4 Other (*specify*) _____ 6	 3⇨SB7 4⇨SB7 6⇨SB7
SB6. *Check MA1:* ☐ *Currently married or living with a man (MA1 = 1 or 2) ⇨ Go to SB8* ☐ *Not married / Not in union (MA1 = 3) ⇨ Continue with SB7*		
SB7. HOW OLD IS THIS PERSON? *If response is DK, probe:* ABOUT HOW OLD IS THIS PERSON?	Age of sexual partner..... __ __ DK..... 98	
SB8. HAVE YOU HAD SEXUAL INTERCOURSE WITH ANY OTHER PERSON IN THE LAST 12 MONTHS?	Yes..... 1 No 2	 2⇨SB15
SB9. THE LAST TIME YOU HAD SEXUAL INTERCOURSE WITH THIS OTHER PERSON, WAS A CONDOM USED?	Yes..... 1 No 2	

SB10. WHAT WAS YOUR RELATIONSHIP TO THIS PERSON? *Probe to ensure that the response refers to the relationship at the time of sexual intercourse* *If 'boyfriend' then ask:* WERE YOU LIVING TOGETHER AS IF MARRIED? *If 'yes', circle '2'. If 'no', circle' 3'.*	Husband..... 1 Cohabiting partner ..... 2 Boyfriend..... 3 Casual acquaintance ..... 4 Other (*specify*) _____ 6	 3⇨SB12 4⇨SB12 6⇨SB12
SB11. *Check MA1 and MA7:* ☐ *Currently married or living with a man (MA1 = 1 or 2)* *AND* *Married only once or lived with a man only once (MA7 = 1) ⇨ Go to SB13* ☐ *Else ⇨ Continue with SB12*		
SB12. HOW OLD IS THIS PERSON? *If response is DK, probe:* ABOUT HOW OLD IS THIS PERSON?	Age of sexual partner..... __ __ DK..... 98	
SB13. OTHER THAN THESE TWO PERSONS, HAVE YOU HAD SEXUAL INTERCOURSE WITH ANY OTHER PERSON IN THE LAST 12 MONTHS?	Yes..... 1 No 2	 2⇨SB15
SB14. IN TOTAL, WITH HOW MANY DIFFERENT PEOPLE HAVE YOU HAD SEXUAL INTERCOURSE IN THE LAST 12 MONTHS?	Number of partners..... __ __	
SB15. IN TOTAL, WITH HOW MANY DIFFERENT PEOPLE HAVE YOU HAD SEXUAL INTERCOURSE		

IN YOUR LIFETIME?	Number of lifetime partners..... __ __	
If a non-numeric answer is given, probe to get an estimate.	DK..... 98	
If number of partners is 95 or more, write '95'.		

HIV/AIDS		HA
HA1. NOW I WOULD LIKE TO TALK WITH YOU ABOUT SOMETHING ELSE. HAVE YOU EVER HEARD OF AN ILLNESS CALLED AIDS?	Yes ..... 1 No 2	2 ⇨Next Module
HA2. CAN PEOPLE REDUCE THEIR CHANCE OF GETTING THE AIDS VIRUS BY HAVING JUST ONE UNINFECTED SEX PARTNER WHO HAS NO OTHER SEX PARTNERS?	Yes ..... 1 No ..... 2 DK 8	
HA3. CAN PEOPLE GET THE AIDS VIRUS BECAUSE OF WITCHCRAFT OR OTHER SUPERNATURAL MEANS?	Yes ..... 1 No ..... 2 DK 8	
HA4. CAN PEOPLE REDUCE THEIR CHANCE OF GETTING THE AIDS VIRUS BY USING A CONDOM EVERY TIME THEY HAVE SEX?	Yes ..... 1 No ..... 2 DK 8	
HA5. CAN PEOPLE GET THE AIDS VIRUS FROM MOSQUITO BITES?	Yes ..... 1 No ..... 2 DK 8	
HA6. CAN PEOPLE GET THE AIDS VIRUS BY SHARING FOOD WITH A PERSON WHO HAS THE AIDS VIRUS?	Yes ..... 1 No ..... 2 DK 8	

HA7. IS IT POSSIBLE FOR A HEALTHY-LOOKING PERSON TO HAVE THE AIDS VIRUS?	Yes ..... 1 No ..... 2 DK 8	
HA8. CAN THE VIRUS THAT CAUSES AIDS BE TRANSMITTED FROM A MOTHER TO HER BABY: [A] DURING PREGNANCY? [B] DURING DELIVERY? [C] BY BREASTFEEDING?	Yes No DK During pregnancy ..... 1 2 8 During delivery ..... 1 2 8 By breastfeeding 1 2 8	
HA9. IN YOUR OPINION, IF A FEMALE TEACHER HAS THE AIDS VIRUS BUT IS NOT SICK, SHOULD SHE BE ALLOWED TO CONTINUE TEACHING IN SCHOOL?	Yes ..... 1 No ..... 2 DK / Not sure / Depends 8	
HA10. WOULD YOU BUY FRESH VEGETABLES FROM A SHOPKEEPER OR VENDOR IF YOU KNEW THAT THIS PERSON HAD THE AIDS VIRUS?	Yes ..... 1 No ..... 2 DK / Not sure / Depends 8	
HA11. IF A MEMBER OF YOUR FAMILY GOT INFECTED WITH THE AIDS VIRUS, WOULD YOU WANT IT TO REMAIN A SECRET?	Yes ..... 1 No ..... 2 DK / Not sure / Depends 8	
HA12. IF A MEMBER OF YOUR FAMILY BECAME SICK WITH AIDS, WOULD YOU BE WILLING TO CARE FOR HER OR HIM IN YOUR OWN HOUSEHOLD?	Yes ..... 1 No ..... 2 DK / Not sure / Depends 8	

HA13. *Check CM13: Any live birth in last 2 years?*

☐ *No live birth in last 2 years (CM13="No" or blank) ⇨ Go to HA24*

☐ *One or more live births in last 2 years ⇨ Continue with HA14*

HA14. *Check MN1: Received antenatal care?*

☐ *Received antenatal care ⇨ Continue with HA15*

☐ *Did not receive antenatal care ⇨ Go to HA24*

HA15. DURING ANY OF THE ANTENATAL VISITS FOR YOUR PREGNANCY WITH (*name*),		
WERE YOU GIVEN ANY INFORMATION ABOUT:	Y N DK	
[A] BABIES GETTING THE AIDS VIRUS FROM THEIR MOTHER?	AIDS from mother 1 2 8	
[B] THINGS THAT YOU CAN DO TO PREVENT GETTING THE AIDS VIRUS?	Things to do 1 2 8	
[C] GETTING TESTED FOR THE AIDS VIRUS?	Tested for AIDS 1 2 8	
WERE YOU:		
[D] OFFERED A TEST FOR THE AIDS VIRUS?	Offered a test 1 2 8	
HA16. I DON'T WANT TO KNOW THE RESULTS, BUT WERE YOU TESTED FOR THE AIDS VIRUS AS PART OF YOUR ANTENATAL CARE?	Yes ..... 1 No 2	2⇨HA19

	DK..... 8	8⇨HA19
HA17. I DON'T WANT TO KNOW THE RESULTS, BUT DID YOU GET THE RESULTS OF THE TEST?	Yes ..... 1 No ..... 2 DK..... 8	 2⇨HA22 8⇨HA22
HA18. REGARDLESS OF THE RESULT, ALL WOMEN WHO ARE TESTED ARE SUPPOSED TO RECEIVE COUNSELING AFTER GETTING THE RESULT. AFTER YOU WERE TESTED, DID YOU RECEIVE COUNSELLING?	Yes ..... 1 No ..... 2 DK..... 8	1⇨HA22 2⇨HA22 8⇨HA22
HA19. *Check MN17: Birth delivered by health professional (A, B or C)?* ☐ *Yes, birth delivered by health professional ⇨ Continue with HA20* ☐ *No, birth not delivered by health professional ⇨ Go to HA24*		
HA20. I DON'T WANT TO KNOW THE RESULTS, BUT WERE YOU TESTED FOR THE AIDS VIRUS BETWEEN THE TIME YOU WENT FOR DELIVERY BUT BEFORE THE BABY WAS BORN?	Yes ..... 1 No 2	 2⇨HA24
HA21. I DON'T WANT TO KNOW THE RESULTS, BUT DID YOU GET THE RESULTS OF THE TEST?	Yes ..... 1 No 2	
HA22. HAVE YOU BEEN TESTED FOR THE AIDS VIRUS SINCE THAT TIME YOU WERE TESTED DURING YOUR PREGNANCY?	Yes ..... 1 No 2	1⇨HA25

HA23. WHEN WAS THE MOST RECENT TIME YOU	Less than 12 months ago 1	1 ⇨Next

WERE TESTED FOR THE AIDS VIRUS?	12-23 months ago ..... 2 2 or more years ago 3	Module 2 ⇨Next Module 3 ⇨Next Module
HA24. I DON'T WANT TO KNOW THE RESULTS, BUT HAVE YOU EVER BEEN TESTED TO SEE IF YOU HAVE THE AIDS VIRUS?	Yes .....1 No.....2	2⇨HA27
HA25. WHEN WAS THE MOST RECENT TIME YOU WERE TESTED?	Less than 12 months ago .....1 12-23 months ago .....2 2 or more years ago 3	
HA26. I DON'T WANT TO KNOW THE RESULTS, BUT DID YOU GET THE RESULTS OF THE TEST?	Yes .....1 No.....2 DK 8	1 ⇨Next Module 2 ⇨Next Module 8 ⇨Next Module
HA27. DO YOU KNOW OF A PLACE WHERE PEOPLE CAN GO TO GET TESTED FOR THE AIDS VIRUS?	Yes .....1 No.....2	

MATERNAL MORTALITY	MM
NOW I WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT YOUR BROTHERS AND SISTERS, THAT IS, ALL OF THE CHILDREN BORN TO YOUR NATURAL MOTHER. PLEASE INCLUDE ALL YOUR SISTERS AND BROTHERS WHO ARE LIVING WITH YOU, THOSE WHO ARE LIVING ELSEWHERE, AND THOSE WHO HAVE DIED.	
MM1. HOW MANY CHILDREN DID YOUR MOTHER GIVE BIRTH TO, INCLUDING YOURSELF?	Number of births to natural mother ..... ___ ___
MM2. *Check MM1.* ☐ *Two or more births ⇨ Continue with MM3* ☐ *Only one birth (respondent only) ⇨ Go to Next Module*	
MM3. HOW MANY OF THESE BIRTHS DID YOUR MOTHER HAVE BEFORE YOU WERE BORN?	Number of preceding births ..... ___ ___

	[S1] Oldest	[S2] Next oldest	[S3] Next oldest	[S4] Next oldest
MM4. WHAT NAME WAS GIVEN TO YOUR OLDEST (NEXT OLDEST) BROTHER OR SISTER?	_____	_____	_____	_____
MM5. IS (*name*) MALE OR FEMALE?	Male .....1 Female 2	Male.....1 Female.....2	Male .....1 Female 2	Male.....1 Female 2
MM6. IS (*name*) STILL ALIVE?	Yes.....1 No.....2 ⇨MM8 DK .....8 ⇨[S2]	Yes .....1 No.....2 ⇨MM8 DK.....8 ⇨[S3]	Yes.....1 No .....2 ⇨MM8 DK .....8 ⇨[S4]	Yes .....1 No.....2 ⇨MM8 DK .....8 ⇨[S5]

MM7. HOW OLD IS (*name*)?	___ ___ ⇨ Go to [S2]	___ ___ Go to [S3]	___ ___ Go to [S4]	___ ___ Go to [S5]
MM8. HOW MANY YEARS AGO DID (*name*) DIE?	___ ___	___ ___	___ ___	___ ___
MM9. HOW OLD WAS (*name)* WHEN HE/SHE DIED?	___ ___ *If male or died before age 12, go to [S2]*	___ ___ *If male or died before age 12, go to [S3]*	___ ___ *If male or died before age 12, go to [S4]*	___ ___ *If male or died before age 12, go to [S5]*
MM10. WAS (*name*) PREGNANT WHEN SHE DIED?	Yes.....1 ⇨MM13 No.....2	Yes .....1 ⇨MM13 No 2	Yes.....1 ⇨MM13 No 2	Yes .....1 ⇨MM13 No.....2
MM11. DID (*name*) DIE DURING CHILDBIRTH?	Yes.....1 ⇨MM13 No.....2	Yes .....1 ⇨MM13 No 2	Yes.....1 ⇨MM13 No 2	Yes .....1 ⇨MM13 No.....2
MM12. DID (*name*) DIE WITHIN TWO MONTHS AFTER THE END OF A PREGNANCY OR CHILDBIRTH?	Yes.....1 No.....2	Yes .....1 No 2	Yes.....1 No 2	Yes .....1 No.....2
MM13. HOW MANY LIVE BORN CHILDREN DID (*name*) GIVE BIRTH TO DURING HER LIFETIME?	___ ___	___ ___	___ ___	___ ___
MM14.	*If no more siblings, go to next module*	*If no more siblings, go to next module*	*If no more siblings, go to next module*	*If no more siblings, go to next module*

	[S5]	[S6]	[S7]	[S8]
	Oldest	Next oldest	Next oldest	Next oldest

MM4. WHAT NAME WAS GIVEN TO YOUR OLDEST (NEXT OLDEST) BROTHER OR SISTER?	_____	_____	_____	_____
MM5. IS (*name*) MALE OR FEMALE?	Male.....1 Female 2	Male ..... 1 Female..... 2	Male .....1 Female 2	Male..... 1 Female..... 2
MM6. IS (*name*) STILL ALIVE?	Yes .....1 No.....2 ⇨MM8 DK .....8 ⇨[S6]	Yes..... 1 No ..... 2 ⇨MM8 DK..... 8 ⇨[S7]	Yes .....1 No.....2 ⇨MM8 DK .....8 ⇨[S8]	Yes ..... 1 No ..... 2 ⇨MM8 DK..... 8 ⇨[S9]
MM7. HOW OLD IS (*name*)?	__ __ ⇨ Go to [S6]	__ __ Go to [S7]	__ __ Go to [S8]	__ __ Go to [S9]
MM8. HOW MANY YEARS AGO DID (*name*) DIE?	__ __	__ __	__ __	__ __
MM9. HOW OLD WAS (*name)* WHEN HE/SHE DIED?	__ __ *If male or died before age 12, go to [S6]*	__ __ *If male or died before age 12, go to [S7]*	__ __ *If male or died before age 12, go to [S8]*	__ __ *If male or died before age 12, go to [S9]*
MM10. WAS (*name*) PREGNANT WHEN SHE DIED?	Yes .....1 ⇨MM13 No.....2	Yes..... 1 ⇨MM13 No 2	Yes .....1 ⇨MM13 No.....2	Yes ..... 1 ⇨MM13 No 2
MM11. DID (*name*) DIE DURING CHILDBIRTH?	Yes .....1 ⇨MM13 No.....2	Yes..... 1 ⇨MM13 No 2	Yes .....1 ⇨MM13 No.....2	Yes ..... 1 ⇨MM13 No 2
MM12. DID (*name*) DIE WITHIN TWO MONTHS AFTER THE END OF A PREGNANCY OR	Yes 1	Yes..... 1	Yes 1	Yes 1

CHILDBIRTH?	No.....2	No 2	No.....2	No 2
MM13. HOW MANY LIVE BORN CHILDREN DID (*name*) GIVE BIRTH TO DURING HER LIFETIME?	___ ___	___ ___	___ ___	___ ___
MM14.	*If no more siblings, go to next module*	*If no more siblings, go to next module*	*If no more siblings, go to next module*	*If no more siblings, go to next module*
				Tick here if additional questionnaire used ☐

TOBACCO AND ALCOHOL USE		TA
TA1. HAVE YOU EVER TRIED CIGARETTE SMOKING, EVEN ONE OR TWO PUFFS?	Yes ..... 1 No 2	 2⇨TA6
TA2. HOW OLD WERE YOU WHEN YOU SMOKED A WHOLE CIGARETTE FOR THE FIRST TIME?	Never smoked a whole cigarette ..... 00 Age ..... ___ ___	00⇨TA6
TA3. DO YOU CURRENTLY SMOKE CIGARETTES?	Yes ..... 1 No 2	 2⇨TA6
TA4. IN THE LAST 24 HOURS, HOW MANY CIGARETTES DID YOU SMOKE?	Number of cigarettes ..... ___ ___	
TA5. DURING THE LAST ONE MONTH, ON HOW MANY DAYS DID YOU SMOKE CIGARETTES? *If less than 10 days, record the number of days.* *If 10 days or more but less than a month, circle "10".* *If "everyday" or "almost every day", circle "30"*	Number of days ..... 0 ___ 10 days or more but less than a month .... 10 Everyday / Almost every day 30	
TA6. HAVE YOU EVER TRIED ANY SMOKED TOBACCO PRODUCTS OTHER THAN CIGARETTES, SUCH AS CIGARS, WATER PIPE, CIGARILLOS OR PIPE?	Yes ..... 1 No 2	 2⇨TA10

TA7. DURING THE LAST ONE MONTH, DID YOU USE ANY SMOKED TOBACCO PRODUCTS?	Yes ..... 1 No 2	 2⇨TA10
TA8. WHAT TYPE OF SMOKED TOBACCO PRODUCT DID YOU USE OR SMOKE DURING THE LAST ONE MONTH? *Circle all mentioned.*	Cigars .....A Water pipe .....B Cigarillos .....C Pipe .....D Other (*specify*) _____X	
TA9. DURING THE LAST ONE MONTH, ON HOW MANY DAYS DID YOU USE SMOKED TOBACCO PRODUCTS? *If less than 10 days, record the number of days.* *If 10 days or more but less than a month, circle "10".* *If "everyday" or "almost every day", circle "30"*	Number of days ..... 0 ___ 10 days or more but less than a month .... 10 Everyday / Almost every day 30	
TA10. HAVE YOU EVER TRIED ANY FORM OF SMOKELESS TOBACCO PRODUCTS, SUCH AS CHEWING TOBACCO, SNUFF, OR DIP?	Yes ..... 1 No 2	 2 ⇨TA14
TA11. DURING THE LAST ONE MONTH, DID YOU USE ANY SMOKELESS TOBACCO PRODUCTS?	Yes ..... 1 No 2	 2 ⇨TA14

TA12. WHAT TYPE OF SMOKELESS TOBACCO PRODUCT DID YOU USE DURING THE LAST ONE MONTH? *Circle all mentioned.*	Chewing tobacco ..... A Snuff ..... B Dip ..... C Other (*specify*) _____ X	
TA13. DURING THE LAST ONE MONTH, ON HOW MANY DAYS DID YOU USE SMOKELESS TOBACCO PRODUCTS? *If less than 10 days, record the number of days.* *If 10 days or more but less than a month, circle "10".* *If "everyday" or "almost every day", circle "30"*	Number of days ..... 0 ___ 10 days or more but less than a month .... 10 Everyday / Almost every day 30	
TA14. NOW I WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT DRINKING ALCOHOL. HAVE YOU EVER DRUNK ALCOHOL?	Yes ..... 1 No 2	2⇨Next Module
TA15. WE COUNT ONE DRINK OF ALCOHOL AS ONE CAN OR BOTTLE OF BEER, ONE GLASS OF WINE, OR ONE SHOT OF COGNAC, VODKA, WHISKEY OR RUM. HOW OLD WERE YOU WHEN YOU HAD YOUR FIRST DRINK OF ALCOHOL, OTHER THAN A FEW SIPS?	Never had one drink of alcohol..... 00 Age ..... ___ ___	00⇨Next Module
TA16. DURING THE LAST ONE MONTH, ON HOW MANY DAYS DID YOU HAVE AT LEAST ONE DRINK OF ALCOHOL?	Did not have one drink in last one month . 00	00⇨Next Module

If respondent did not drink, circle "00". *If less than 10 days, record the number of days.* *If 10 days or more but less than a month, circle "10".* *If "everyday" or "almost every day", circle "30"*	Number of days ..... 0 ___ 10 days or more but less than a month .... 10 Everyday / Almost every day 30	
TA17. IN THE LAST ONE MONTH, ON THE DAYS THAT YOU DRANK ALCOHOL, HOW MANY DRINKS DID YOU USUALLY HAVE?	Number of drinks ..... ___ ___	

LIFE SATISFACTION		LS
LS1. *Check WB2: Age of respondent is between 15 and 24?* ☐ *Age 25-49 ⇨ Go to WM11* ☐ *Age 15-24 ⇨ Continue with LS2*		
LS2. I WOULD LIKE TO ASK YOU SOME SIMPLE QUESTIONS ON HAPPINESS AND SATISFACTION. FIRST, TAKING ALL THINGS TOGETHER, WOULD YOU SAY YOU ARE VERY HAPPY, SOMEWHAT HAPPY, NEITHER HAPPY NOR UNHAPPY, SOMEWHAT UNHAPPY OR VERY UNHAPPY? YOU CAN ALSO LOOK AT THESE PICTURES TO HELP YOU WITH YOUR RESPONSE. *Show side 1 of response card and explain what each symbol represents. Circle the response code pointed by the respondent.*	Very happy .....1 Somewhat happy.....2 Neither happy nor unhappy .....3 Somewhat unhappy.....4 Very unhappy 5	

LS3. NOW I WILL ASK YOU QUESTIONS ABOUT YOUR LEVEL OF SATISFACTION IN DIFFERENT AREAS. IN EACH CASE, WE HAVE FIVE POSSIBLE RESPONSES: PLEASE TELL ME, FOR EACH QUESTION, WHETHER YOU ARE VERY SATISFIED, SOMEWHAT SATISFIED, NEITHER SATISFIED NOR UNSATISFIED, SOMEWHAT UNSATISFIED OR VERY UNSATISFIED. AGAIN, YOU CAN LOOK AT THESE PICTURES TO HELP YOU WITH YOUR RESPONSE. *Show side 2 of response card and explain what each symbol represents. Circle the response code shown by the respondent, for questions LS3 to LS13.* HOW SATISFIED ARE YOU WITH YOUR FAMILY LIFE?	Very satisfied.....1 Somewhat satisfied .....2 Neither satisfied nor unsatisfied .....3 Somewhat unsatisfied .....4 Very unsatisfied.....5	

LS4. HOW SATISFIED ARE YOU WITH YOUR FRIENDSHIPS?	Very satisfied.....1 Somewhat satisfied .....2 Neither satisfied nor unsatisfied .....3 Somewhat unsatisfied .....4 Very unsatisfied.....5	
LS5. DURING THE (***current / 2011-2012***) SCHOOL YEAR, DID YOU ATTEND SCHOOL AT ANY TIME?	Yes .....1 No.....2	 2⇨LS7
LS6. HOW SATISFIED (*are/were*) YOU WITH YOUR SCHOOL?	Very satisfied.....1 Somewhat satisfied .....2 Neither satisfied nor unsatisfied .....3 Somewhat unsatisfied .....4 Very unsatisfied.....5	
LS7. HOW SATISFIED ARE YOU WITH YOUR CURRENT JOB? *If the respondent says that he/she does not have a job, circle "0" and continue with the next question. Do not probe to find out how she feels about not having a job, unless she tells you herself.*	Does not have a job .....0 Very satisfied.....1 Somewhat satisfied .....2 Neither satisfied nor unsatisfied .....3 Somewhat unsatisfied .....4 Very unsatisfied.....5	

LS8. HOW SATISFIED ARE YOU WITH YOUR HEALTH?	Very satisfied.....1 Somewhat satisfied .....2 Neither satisfied nor unsatisfied .....3 Somewhat unsatisfied .....4 Very unsatisfied.....5	
LS9. HOW SATISFIED ARE YOU WITH WHERE YOU LIVE? *If necessary, explain that the question refers to the living environment, including the neighbourhood and the dwelling.*	Very satisfied.....1 Somewhat satisfied .....2 Neither satisfied nor unsatisfied .....3 Somewhat unsatisfied .....4 Very unsatisfied.....5	
LS10. HOW SATISFIED ARE YOU WITH HOW PEOPLE AROUND YOU GENERALLY TREAT YOU?	Very satisfied.....1 Somewhat satisfied .....2 Neither satisfied nor unsatisfied .....3 Somewhat unsatisfied .....4 Very unsatisfied.....5	
LS11. HOW SATISFIED ARE YOU WITH THE WAY YOU LOOK?	Very satisfied.....1 Somewhat satisfied .....2 Neither satisfied nor unsatisfied .....3 Somewhat unsatisfied .....4 Very unsatisfied.....5	

LS12. HOW SATISFIED ARE YOU WITH YOUR LIFE, OVERALL?	Very satisfied.....1 Somewhat satisfied .....2 Neither satisfied nor unsatisfied .....3 Somewhat unsatisfied .....4 Very unsatisfied.....5	
LS13. HOW SATISFIED ARE YOU WITH YOUR CURRENT INCOME? *If the respondent responds that he/she does not have any income, circle "0" and continue with the next question. Do not probe to find out how she feels about not having any income, unless she tells you herself.*	Does not have any income.....0 Very satisfied.....1 Somewhat satisfied .....2 Neither satisfied nor unsatisfied .....3 Somewhat unsatisfied .....4 Very unsatisfied.....5	
LS14. COMPARED TO THIS TIME LAST YEAR, WOULD YOU SAY THAT YOUR LIFE HAS IMPROVED, STAYED MORE OR LESS THE SAME, OR WORSENED, OVERALL?	Improved .....1 More or less the same.....2 Worsened 3	
LS15. AND IN ONE YEAR FROM NOW, DO YOU EXPECT THAT YOUR LIFE WILL BE BETTER, WILL BE MORE OR LESS THE SAME, OR WILL BE WORSE, OVERALL?	Better.....1 More or less the same.....2 Worse 3	

WM11. *Record the time.*	Hour and minutes ..... __ __ : __ __	

WM12. *Check Household Listing Form, column HL9.*

Is the respondent the mother or caretaker of any child age 0-4 living in this household?

☐ *Yes ⇨ Go to QUESTIONNAIRE FOR CHILDREN UNDER FIVE for that child and start the interview with this respondent.*

☐ *No ⇨ End the interview with this respondent by thanking her for her cooperation.*

Check for the presence of any other eligible woman, man or child under-5 in the household.

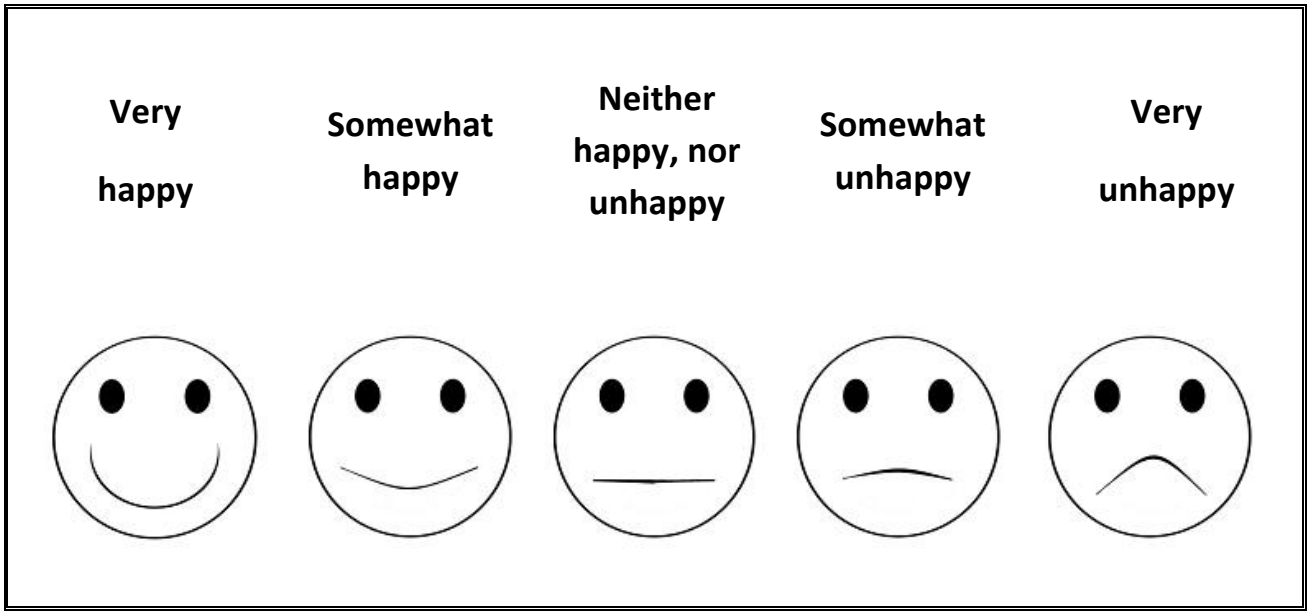
Interviewer's Observations

Field Editor's Observations

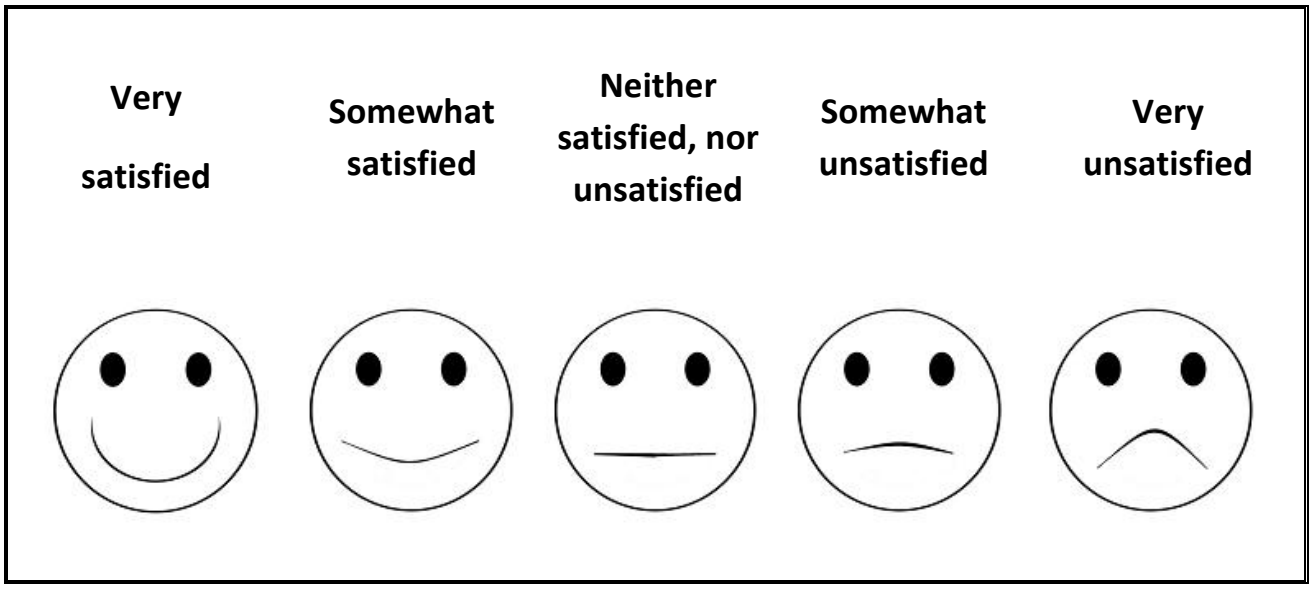
Supervisor's Observations

RESPONSE CARD:

SIDE 1



SIDE 2



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