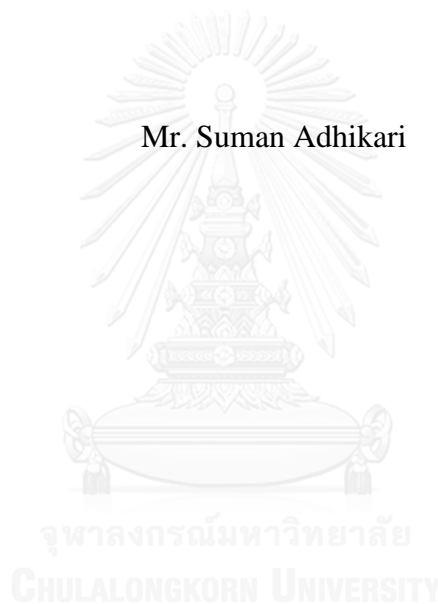


INFLUENCES ON THE UTILIZATION OF ANTENATAL CARE SERVICES
AMONG REPRODUCTIVE AGE GROUP WOMEN IN MID-WESTERN
DEVELOPMENT REGION OF NEPAL: A POPULATION BASED
STUDY USING THE NEPAL MULTIPLE INDICATOR CLUSTER SURVEY
(MICS) 2014.

Mr. Suman Adhikari



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A Thesis Submitted in Partial Fulfillment of the Requirements
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ผลของการใช้บริการฝากครรภ์ในกลุ่มหญิงวัยเจริญพันธุ์ ในภาคตะวันออกเฉียงเหนือ ประเทศ
เนปาล: การศึกษาจากประชากร โดยใช้ข้อมูลจากการสำรวจพหุดัชนีแบบจัดกลุ่ม (MICS) 2557



วิทยานิพนธ์นี้เป็นส่วนหนึ่งของการศึกษาตามหลักสูตรปริญญาสาธาณสุขศาสตรมหาบัณฑิต
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สุมาลย์ อติการิ : ผลของการใช้บริการฝากครรภ์ในกลุ่มหญิงวัยเจริญพันธุ์ ในภาคตะวันตกกลาง ประเทศเนปาล: การศึกษาจากประชากรโดยใช้ข้อมูลจากการสำรวจพหุดัชนีแบบจัดกลุ่ม (MICS) 2557 (INFLUENCES ON THE UTILIZATION OF ANTENATAL CARE SERVICES AMONG REPRODUCTIVE AGE GROUP WOMEN IN MID-WESTERN DEVELOPMENT REGION OF NEPAL: A POPULATION BASED STUDY USING THE NEPAL MULTIPLE INDICATOR CLUSTER SURVEY(MICS) 2014.) อ.ที่ปรึกษาวิทยานิพนธ์หลัก: รัตนา สำโรงทอง, 113 หน้า.

การฝากครรภ์ (ANC) นับเป็นการรวบรวมข้อมูลและให้บริการด้านสุขภาพของมารดาและทารกเพื่อการมีสุขภาพที่ดี ประเทศเนปาลมีความก้าวหน้าในการพัฒนาสุขภาพมารดาเป็นอย่างมาก อย่างไรก็ตามอัตราการตายของมารดา (MMR) ยังคงสูงมาก โดยเฉพาะ

ในภูมิภาคตะวันตกในเนปาลเมื่อเทียบกับภูมิภาคอื่น ๆ การศึกษาครั้งนี้มีวัตถุประสงค์เพื่อศึกษาปัจจัยที่มีผลต่อการใช้บริการฝากครรภ์ การศึกษาครั้งนี้ใช้ข้อมูลจากการสำรวจพหุดัชนีแบบกลุ่ม ของกระทรวงสาธารณสุขและประชากร ประเทศเนปาล โดยได้รับการสนับสนุนด้านเทคนิคจากยูนิเซฟ โดยวิเคราะห์ข้อมูลสตรีจำนวน 322 คนที่คลอดบุตรในช่วงสองปีที่ผ่านมา ก่อนการสำรวจ โดยใช้การวิเคราะห์การถดถอยโลจิสติกสองตัวแปรและแบบหลายตัวแปร เพื่อหาปัจจัยที่มีผลต่อการมาใช้บริการฝากครรภ์ การศึกษาพบว่า ในกลุ่มตัวอย่างร้อยละ 79 ไปฝากครรภ์ ซึ่งในกลุ่มที่ไปฝากครรภ์ ร้อยละ 54 ฝากครรภ์ครบตามที่ UNICEF แนะนำ พบว่าปัจจัยที่มีผลต่อการฝากครรภ์ได้แก่ อายุครรภ์การศึกษาดัชนีความมั่งคั่งการฟังวิทยุและการดูโทรทัศน์ ปัจจัยที่มีอิทธิพลต่อการใช้บริการการฝากครรภ์ครบวงจร (ตั้งแต่สี่ครั้งขึ้นไป) ได้แก่อายุ ระดับการศึกษาภูมิภาค ดัชนีความมั่งคั่ง และการดูโทรทัศน์ พบว่าในภาพรวมของการฝากครรภ์อย่างน้อย 1 ครั้ง เป็นร้อยละ 79.8 หากแต่จำนวนครั้งของการฝากครรภ์ครบ 4 ครั้ง ยังอยู่ระดับที่ไม่น่าพอใจ อายุ การศึกษา และดัชนีความมั่งคั่ง มีผลต่อการใช้บริการ ฝากครรภ์(อย่างน้อย 1 ครั้ง) สำหรับปัจจัยตั้งครรภ์ การศึกษาของสามี และถิ่นที่อยู่อาศัย ไม่มีผลต่อการใช้บริการฝากครรภ์(อย่างน้อย 1 ครั้ง)

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SUMAN ADHIKARI: INFLUENCES ON THE UTILIZATION OF ANTENATAL CARE SERVICES AMONG REPRODUCTIVE AGE GROUP WOMEN IN MID-WESTERN DEVELOPMENT REGION OF NEPAL: A POPULATION BASED STUDY USING THE NEPAL MULTIPLE INDICATOR CLUSTER SURVEY(MICS) 2014.. ADVISOR: ASSOC. PROF. RATANA SOMRONGTHONG, Ph.D., 113 pp.

The antenatal care (ANC) provides an opportunity for health information and services that can significantly enhance the health of women and their babies. Nepal has shown a significant progress in improving maternal health. However, maternal mortality rate (MMR) still remains high mostly in Mid-Western region in Nepal in comparison to other regions. This study aimed to explore the influencing factors associated with utilization of ANC. This study uses the data taken from the Multiple Indicator Cluster Survey (MICS) conducted in Nepal by the Ministry of Health and Population with a technical support from UNICEF. The analysis was conducted on 322 women who gave live birth in last two years preceding the survey. Bivariate and multivariate logistic regression analysis was carried out to identify influencing factors associated with ANC utilizations. Seventy-nine percent women attended ANC visits. Out of them only fifty-four percent women attended complete (four or more) ANC visits. Studies finds following factors affecting antenatal care utilization: Maternal age, education, wealth index, listening to radio and watching television. The following factors influences complete (four or more visits) antenatal care utilization: Education, Sub-region, wealth index and watching television. Overall ANC utilization was 79.8%. Frequency of antenatal care visits is not satisfactory in this region. Out of 257 who received ANC care, only 54% women received complete ANC (four or more visits). Maternal age, education and wealth index had prominent effect on utilization of ANC service. Parity, husband's education and residence had no effect on the utilization of antenatal care visits in this study

Field of Study: Public Health

Student's Signature

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List of Abbreviations

ANC	Antenatal Care
DHS	Department of Health Services
DHS/N	Department of Health Services, Nepal
Hb	Hemoglobin
HIV	Human Immune Deficiency Virus
ICT	Information and Communication Technology
MCH	Maternal and Child Health
MDG	Millennium Development Goal
MMR	Maternal Mortality Rate/Ratio
MICS	Multiple Indicator Cluster Survey
MPH	Masters of Public Health
MWDR	Mid-Western Development Region
NDHS	Nepal Demographic and Health Survey
NGO	Non-Governmental Organization
PPH	Postpartum Hemorrhage
PSU	Primary Sampling Unit
SPSS	Statistical Package for Social Science
SSU	Secondary Sampling Unit
STD	Sexually Transmitted Disease
TT	Tetanus Toxoid
UNICEF	United Nations Population Fund
WHO	World Health Organizations

Chapter One: Introduction

1.1 Background and Rationale

Globally, the complications associated with the pregnancy and childbirths are the leading causes of mortality and morbidity among women of reproductive age [1]. In 2015, it was estimated approximately 303,000 women lost their life from those complications related to the maternal health. The majority of the women approximately 99% who died were from the developing countries of Sub-Saharan Africa and South Asia [2]. Antenatal care (ANC) is a critical determinant of high maternal death rate and one of the fundamental parts of maternal human services on which the life of mother and children depend. Maternal Mortality Ratio (MMR) is 14 times higher in developing countries than in developed countries [2]. The pattern of maternal mortality in developing nations has been expanding and different international organization have reported that an essential element with maternal and newborn child mortality has been connected to absence of antenatal care [3] .

Antenatal care, a primary component of safe motherhood is mainly concerned with the birth preparedness and provides effective measure to handle pregnancy complications. Antenatal care main objective is to prevent, early detection and prompt effective management of pregnancy related complications. Antenatal care provides the pregnant women an opportunity for the interventions that may be vital to her and upcoming baby life [4]. Although antenatal screening not able to predict every obstetric emergencies, still women can be educated to identify the symptoms early and act to prevent potentially serious conditions [5, 6][5, 6]. In a developing country with a limited resource, there is a high need to ensure value for money. The utilization of antenatal care services is considered to be a cost-effective component of maternity care to reduce maternal mortality and morbidity in safe motherhood programs.

According to UNICEF 2011, globally only 53 percent of the pregnant women attended the WHO recommended 4 antenatal care visits between years 2005 to 2010. Within the same year, only 36 percentage of the pregnant women from low-income countries visited antenatal care center. In developed countries, antenatal care instituted for a long time has been able to reduce maternal and neonatal mortality rate remarkably.

In Nepal (South Asia), MMR is estimated to be 258 per 100,000 live births, which is higher than estimated in the world i.e. 216 per 100,000 live births [2]. According to the National Demographic Health survey 2011, it demonstrated that more than one-fourth (26.1 rates) of pregnant women visit their ANC between fourth- fifth month of their pregnancy, where as 1.7% of pregnant women get their first antenatal visit on eight or after eight months. In expansion, there is additionally distinction in the utilization of antenatal care administrations among urban and rural pregnant women. Exposure to mass media like reading newspaper, listening radio, watching TV plays a critical role in social marketing the maternal health information to citizens, improving health knowledge and changing health behaviors. Lack of exposure to mass media is also affecting the underutilization of antenatal care. The importance of mass media on motivating maternal health behaviors have been recognized in low-and-middle income countries [7]. Evidence shows that mass media impacts general populations public health knowledge, attitude, belief and behavior [8]. In rural Malawi, women exposed to community driven the mass media like newspaper, television and radio are more likely to use antenatal care services than non-exposed. Which directly help to reduce maternal mortality rate [9]. The utilization of antenatal care is unequivocally identified with the moms' instructive level; mothers with secondary or higher education are twice as liable to get antenatal care. In Nepal just 50% of the pregnant ladies make four or more ANC visits. There is considerable variation by foundation qualities, for example, women's age at pregnancy, parity, spot of pregnancy and women's education level.

Difficult in accessibility and under-utilization of modern health services are one of the main reasons behind poor health quality in developing countries . Most common factors for under-utilization of ANC services in developing countries are women and husband's educational level, parity, birth order, age of women at marriage and pregnancy, marital status, religion, caste /ethnicity, family size, accessibility and

affordability [11]. The direct causes of maternal mortality are postpartum hemorrhage, puerperal sepsis, unsafe abortion and hypertension in pregnancy. These problems can be prevented by utilization to ANC services during pregnancy [12, 13]. ANC is an important for obtaining pregnancy related information and services that is useful to improve the health of women and their babies [14]. Empirical evidence has shown that four ANC visit is required for normal pregnancy and hence WHO has recommended at least four visits before delivery [3].

At present, there is a significant reduction in Maternal Mortality Rate (MMR) in the world. Still MMR is a key health issue in developing countries. Nepal has significantly improved its maternal health services, which did help in reducing MMR. Despite its effort, lots of improvement is needed [15]. Nepal is situated between two giant nation India and China. Nepal has high MMR than its neighbor countries (i.e. 174 deaths per 1000,000 in India and 22 deaths per 100,000 in China) [15]. According to the National Demographic Health Survey 2011, the proportion of women obtaining antenatal care from skilled provider (Doctor, Nurse, Midwives) is 58% and only 29% women visiting the recommended four visits [16]. Nepal government is aiming to increase the four ANC visit to 80% by 2017 [16]. With minimum infrastructure and low economic development Nepal Government is facing a problem to provide minimal ANC [17].

Nepal has got five development regions. Out of which the poorest and low developed is Mid-Western Region. Mid-Western region is the largest region by land area with around 3.5 million populations. Low education level, extreme poverty and accessibility are the main problems of this region. It has lowest percentage of ANC visits and the timing of first visit. This region has the second highest MMR out five development regions [18].

There are few studies focusing on the specific development regions in Nepal. There is a need to find factors that demotivate the low utilization rate of antenatal care. This will be of some help for better planning and development of health policies in future. The Nepal MICS data collected is important for monitoring the situation of mother and children in the country. In this study further analysis of the MICS data will be done with an aim of exploring influences on utilization of ANC services in Mid-Western Region. The result may be useful for future researches, to public health policy

makers and for the comparisons with other studies done elsewhere to strengthen the availability of information in this field.

1.2 Aim

To explore the influences on the utilization of antenatal care service in Mid-Western Development Region of Nepal.

1.3 Research Question

What are influencing factors on the utilization of antenatal care among reproductive age women (15-49) in Mid-Western Region of Nepal?

1.4 Research Objectives

- 1) To explore the relationship between the socio-demographic characteristics, household characteristics, obstetrics characteristics and media exposure with antenatal care services utilization.
- 2) To determine factors that influence on the utilization of antenatal care attendance in Mid- Western region of Nepal

1.5 Operational Definitions

- 1) Antenatal Care (ANC): ANC is health promotional program, a care given to the women during pregnancy. WHO recommended at least 4 antenatal care visit in normal pregnancy.
- 2) Antenatal Care Utilization: Antenatal care utilization is classified into non-utilization, incomplete utilization and complete utilization. The pregnant women who didn't visit any antenatal care is regarded as non-utilization, who had one to three antenatal care visits are considered as incomplete antenatal care

utilization and the women who had four or more antenatal care visits are regarded as complete utilization of ANC.

- 3) Maternal Age: It refers to mother's age at birth, which has been classified into 3 categories. Less than 20 years, 20-34 years and 35-49 years.
- 4) Education: It refers to highest level of education completed as none, primary, secondary and beyond.
- 5) Region: It referred to the geographic location of household in Mid – Western Region i.e. Mountain, Hill and Terai.
- 6) Residence refers living in urban or rural area.
- 7) Marital Status: Marital Status is classified as Single, Currently Married, Widowed, Divorced or Living with a Man
- 8) Parity: Parity refers to number of living children. It is categories as 1, 2-3, 4-6 and 7+.
- 9) Wanted Last Child refers to willingness to have a child delivered at last.
- 10) Wealth Index Quintile: A quintile is 20% of the population. The wealth index involves giving each person in the population a score, which represents how wealthy they are based on the characteristics of their household. With this score, you can create five 'wealth quintiles' as follows: put the poorest 20% into quintile one, the second poorest 20% into quintile two, the middle 20% into quintile three, the second wealthiest 20% into quintile four and the wealthiest 20% into quintile five. This has already been done for most developing countries in the Demographic and Health Surveys.
- 11) Religion refers to whether head of household is Hindu, Christian, Buddhist, Muslim, or others.
- 12) Ethnicity refers to whether head of household is in Disadvantaged Ethnic group or Advantaged Ethnic Group. In advantaged group there 3 most dominant ethnicity of Nepal i.e. Brahmin, Chhettri and Newar. Remaining is placed under disadvantaged ethnic group.
- 13) Media Exposure refers to exposure to maternal health information thorough reading newspaper, listening to radio or watching television. It has been

classified into 4 categories as almost every day, at least once a week, less than once a week and not at all.

- 14) The Multiple Indicator Cluster Surveys (MICS) are surveys implemented by countries under the program developed by the United Nations Children's Fund (UNICEF) to provide internationally comparable, statistically rigorous data on the situation of children and women.



1.6 Conceptual Frame

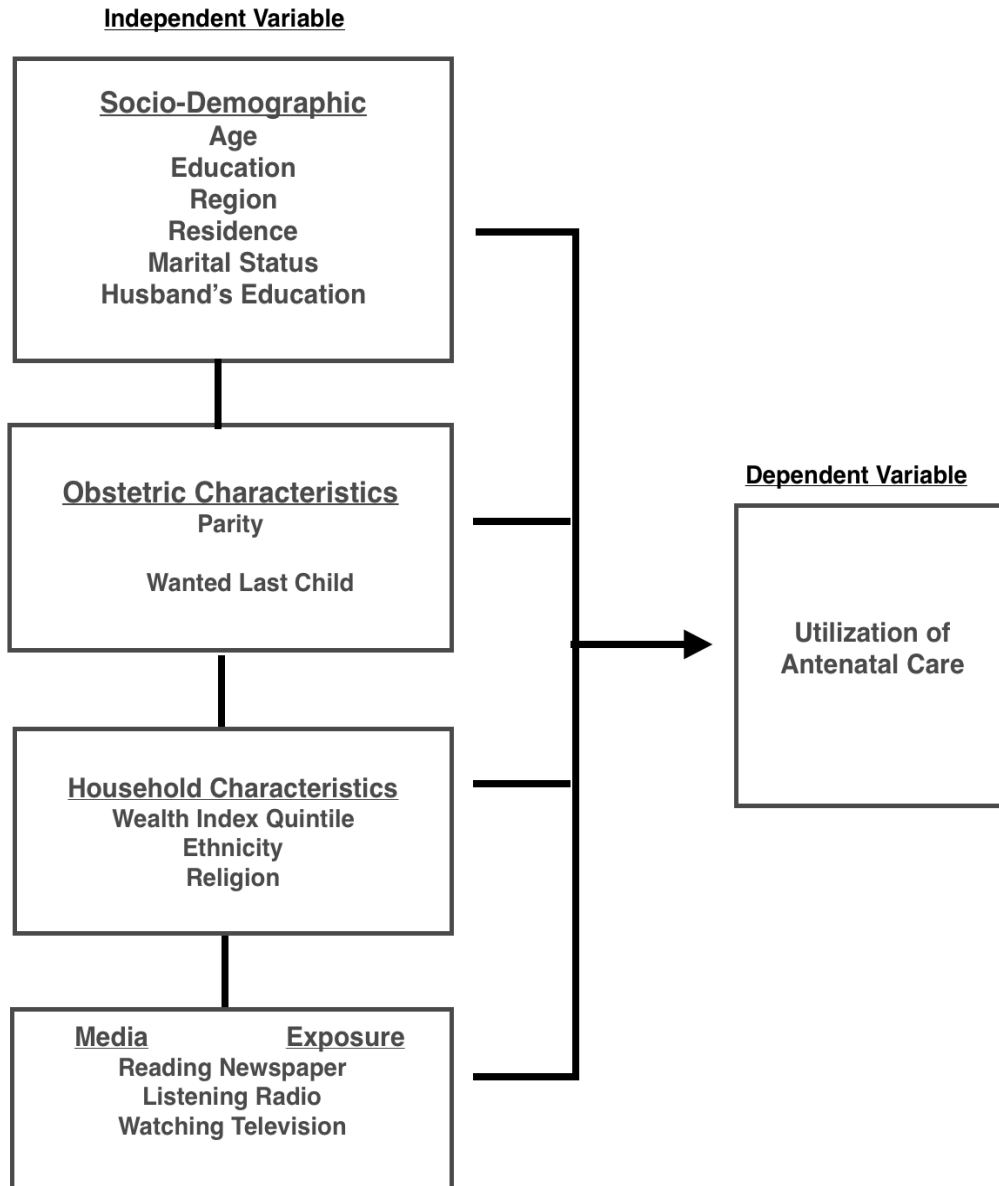


Figure 1 Conceptual Framework

Chapter Two: Literature Review

The following section reviews the literature on the antenatal care and the factors influencing the utilization of antenatal care services. It tries to explore the woman's health in context of antenatal care utilization, in terms of frequency of antenatal care visits. Determinants of antenatal care utilization highlighted in the literature are investigated and presented

2.1 Antenatal Care

Maternal health refers to the health of women during pregnancy, childbirth and the postpartum period. Maternal mortality remains one of the biggest public health problems. Globally approximately every day 830 women die due to pregnancy and childbirth, which can be prevented. The top five causes of death are post-partum hemorrhage, puerperal sepsis, unsafe abortion, obstructed labor and high blood pressure. 99% of maternal death occurs in developing countries of Sub-Saharan Africa and South Asia. According to WHO, Antenatal care (ANC) is key to reduce this maternal death. ANC cares encompass medical history of pregnant women, education on safe delivery, early detection of the complication and follow up treatment. Based on empirical study, WHO recommended 4 ANC visit incases of uncomplicated pregnancy.

2.2 Components of Antenatal Care

Antenatal care is a preventive medicine that deals in prevention and early detection of pregnancy related complications [19]. It consists of three main categories. They are as follows:

- a- Assessment: history taking, physical examination, and laboratory test to identify problems or risk factors.
- b- Health Promotion: advice on nutrition, birth planning, information about danger signs, subsequent contraception and breast-feeding.

- c- Care provision: iron and folate supplements, TT immunization, deworming, psychological support and record keeping [20].

2.3 Importance of Antenatal Care and Minimum Requirements of ANC visits.

WHO Technical working group (1994) recommended a minimum of four antenatal visits required for normal pregnancy and the minimum requirement of antenatal care visit is for:

- a) Health Promotion: advice on nutrition, counseling on danger signs and to help plan for the birth.
- b) Health Assessment: history taking, physical examination and screening test.
- c) Early detection and management of complications, prevention of malaria, hook worm infestations and tetanus.
- d) Treatment of anemia, STD and other diseases.

In 2001, WHO has recommended the basic component of the new WHO Antenatal care model. It divides pregnant women into two groups: one who is eligible to receive a routine ANC (basic component) and other who needs a special care based on her health status. The basic components describe the time and contents of each four ANC visits.

a) The First ANC Visit:

It should be in the first trimester (around 8-12 weeks of pregnancy). The content includes:

- 1) Record information on personal, medical and obstetric history.
- 2) Complete general physical examination
- 3) Perform laboratory tests for syphilis, HIV, proteinuria, Blood/RH grouping, blood hemoglobin and urine test.
- 4) Provide intervention to anemia (iron and folate tablets) and TT immunizations
- 5) Health education and advice about self-care, nutrition and information about next ANC visit.

b) The Second ANC visit:

It should be around 24-26 weeks of pregnancy. The contents of this visit includes:

- 1) Review of the history taken at first visit and check symptoms at present situation.
- 2) General Physical Examination:
- 3) Account blood pressure, fetal growth and movements.
- 4) Repeat urine test and blood Hemoglobin.
- 5) Continue supplement of iron and folate.
- 6) Continue health education, advice and schedule next visit.

c) The Third ANC visit:

It should be around 32 weeks of pregnancy. The contents of this visit includes:

- a) Obtain information on history like in first and second visit. Review past medical history recorded.
- b) Perform general physical examination.
- c) Account blood pressure, multiple fetus, fetus growth, fetal heart sound and movements.
- d) Repeat urine test, blood hemoglobin, and if indicated examination for bacteriuria.
- e) Continue iron and folate supplement, second dose of TT immunization
- f) Continue health education, advice and schedule next visit.

d) The Fourth ANC visit:

It's a final visit and should be in around in 36-38 weeks of pregnancy. The contents include:

- 1) History Taking: Looks for any unusual symptoms and obtains personal history. Review of medical and obstetric history recorded in previous visit.
- 2) General Physical Examination
- 3) Account blood pressure, fetal growth and movements. Include difference in fetal growth size than previous visit.
- 4) Repeat urine and blood hemoglobin tests.

- 5) Health education, advice and counseling about birth and emergency preparedness, postnatal care and birth spacing.

2.4 The Influencing Factors Related to the Utilization of Antenatal Care:

There is huge gap between Maternal Mortality Rate between developed and developing countries. Everyday approximately, 830 women dies of complication related to pregnancy and childbirth, which can be prevented. Out of all maternal deaths 99% is occurring in developing countries.

Globally, it is estimated 85 % of pregnant women access antenatal care with some skilled health personnel at least once; only six in ten (58%) receive at least four antenatal visits. In Sub-Saharan Africa and South Asia, women receiving at least four antenatal visits 49% and 42 % respectively.

Mullany, Brita (2007) [21] studied the role of husband's education on maternal health practices. This research was conducted with 422 women seeking ANC in Nepal's capital city Kathmandu. This study found that husband in maternal health can enhance positive health outcomes. Education of husband rather than only wife yields a greater impact on maternal health behaviors, which improve maternal health outcomes.

Another research, Celik and Hotchkiss (2000) [22] , conducted to found out socio-economic determinants of maternal care services utilization in Turkey. The researcher used a secondary data from Turkish Demographic and Health Survey 1993. Evaluating the data, the research concluded education attainment,]] parity level, ethnicity, wealth and geographic regions are the key factors influencing utilization of maternal care services. In case of parity it says, women delivering for the first time are more likely to use antenatal care services and seek trained birth attendant. The possible reason was; women were more cautious in the first pregnancy. It also mentions women felt less important of modern health services after their third pregnancy.

Deo, Paudel [23], studied barriers to utilization of antenatal care services in eastern Nepal doing a cross-sectional survey. The study was conducted with 372

randomly selected women who delivered in the last year in Sunsari district. The study shows women from advantage ethnic group is more likely to visit ANC service 4 times than women from disadvantage ethnic group. Women from rich family is twice likely to visit ANC services 4 times than women form low economic group. He concluded, maternal health programs need to address socio-cultural barriers for effective health care utilization.

Navaneetham [24] studied factors influencing the utilization of maternal health care services in Uttarkhand, India. They used the dataset of National Family Planning Survey III, 2005-2006. Bivariate and multivariate analysis had been used to present the paper. They found only one fifth of women had visited ANC services. Urban women had uses full ANC visit. Women in first parity are more likely to visit ANC than women with multiple parities. Education level had positive influence in ANC visit. He concluded the need of systematic study and public discussion to achieved maternal health services utilization effectively and efficiently.

Eric Arthur, 2012 [25]: studied the effect of wealth on ANC in Ghana. He uses dataset from Ghana Demographic and Health Survey, 2008. The Pearson's Chi-Square test is used to find the association between variables. Results shows wealth had no effect in the utilization of ANC services after the government had introduce the free national care policy, which eliminate the cost barrier for utilization of services. However, it concluded there is a regional barrier due to inaccessibility and unavailability of health services.

Sakaya Barasa [26] assesses antenatal care service utilization and determines factors associated with the ANC non- attendance in Nairobi County, Kenya. A cross-sectional design was conducted among 306 women. The study shows age of a women, employment status, parity, women and husband education level as the key determinants of ANC utilization in Nairobi County. Due to lack of maternal care knowledge and ignorance, many women with low or no education were not able to utilize ANC care. Furthermore, young pregnant women are more likely to attend ANC services.

Fatami Z. 2002 [27], conducted a cross-sectional study to determine the factor affecting utilization of antenatal care by women of a rural area in Sindh, Pakistan. They research found 29.3% of the women utilized ANC during the last pregnancy. Presence of electricity and husband occupation are strongly associated with the utilization of

ANC care. They highlighted for the improvement of socio-economic status to increase the utilization of antenatal care service.

Neupane S. 2011 [28], investigate the factors determining the timing of first ANC visit and number of ANC visits among a National representative sample of Nepali women. They use the data from the Nepal Demographic and Health Survey 2006. They found 45% of women started ANC care after 3 months of pregnancy and 29% had not used ANC at all. About only 43% of women had 1-3 ANC visits. The study mentions many Nepali women are missing out the opportunity that ANC offers in detecting complications during pregnancy. They concluded age, education, parity and wealth are associated with timing and number of ANC visits.

Acharaya D. 2015 [29], conducted a study on the impact of mass media on the utilization of antenatal care services among women in rural community of Nepal. A community based cross sectional study was conducted in Sinurjoda VDC, Dhanusha District. A total number of 205 mothers having children less than 1 year of age were selected by random sampling. The study shows a strong association between the utilization of antenatal care and mass media exposure. Mothers exposed to mass media are more likely to use ANC services and received TT immunization in that village.

Zamawe, Banda [30], studied the impact of community driven mass media campaign on the utilization of maternal health care services in rural Malawi. Total numbers of 3825 reproductive age women were interview to evaluate the impact of a campaign. The results highlight the significant association between women exposed to mass media campaign and use of antenatal care services. The studies concluded, the women exposed to community driven mass media campaign in rural Malawi were more likely to use the maternal care services than women not exposed to mass media.

Manithip, Sihavong [31], studied the factors associated with ANC utilization among rural women in Lao People's Democratic Republic. They conducted a, cross-sectional interview among 460 eligible women 15-49 years of age with a gestational period beyond 32 weeks and women who had given birth during last 12 months. Result shows 63% has visited ANC three times or more but only 28% attended

during first tri-semester. Results show positive association between husband employment, women age and education in utilization of ANC services.

Ghaffar, Pongponich [32], studied the factors associated with utilization of antenatal care services in Baluchistan Province of Pakistan. They used the MICS 2010 dataset for analysis. They found strong association household wealth, education, age at first marriage and numbers of children with utilization of Antenatal care. Educated mothers were 2.5 times more likely to have ANC visit.

Bangladesh MICS 2012-13 [33], survey interviewed 7,950 women in Bangladesh. The study shows only 58.7 % of women were receiving antenatal care from any skilled provider during the pregnancy. Women from rich households and high education were twice more likely to receive antenatal care than those from the poorest households and with low or no education at all. About 65.7 % of the mothers received ANC service at least once and 24.7 women received four or more visits.

2.5 Conclusion

A several studies had outlined multiple factors for underutilization of antenatal care services. There are no any single universal factors. Multiple researches are focused on rural area of developing countries. A factor varies in context of socio-cultural and demographic characteristics. Society with low education, high parity, inadequate information, difficult terrain, low family income, under waged occupation, lack of social support, religion barriers are more likely to have poor antenatal care utilization, which eventually leads to rise in maternal mortality and morbidity.

2.6 Antenatal care service in Nepal

Nepal's antenatal care protocol provisions antenatal care visits in the fourth, sixth, eighth and ninth months of pregnancy under the focused safe motherhood program in line with UNICEF and WHO recommendations. In Nepal, maternal mortality still remains the biggest public health problem. Multiple circumstances like lack of access to basic maternal healthcare, tough geographical terrain, under developed

transportation and communication systems, poverty, illiteracy, political instability and underutilization of currently available services are major challenges to improving maternal health in Nepal.

In Nepal, although significant improvements have been made in the availability of routine antenatal care (ANC), the need for effective initiatives still persists.



Figure 2 Map of Nepal

Nepal Government Ministry of Health plays a leading role in improving the health of the people including mental, physical and social wellbeing, for overall national development with the increased participation of the private sector and non-government institutions in the implementation of programs. The Department of Health Services (DoHS) under the Ministry of Health is to deliver preventive, promotive and curative

health services throughout Nepal. The DoHS is one of three departments under Ministry of Health (MoH). The Department of Health Services (DoHS) recommended ANC visit issued by WHO.

In Nepal ANC service consist of:

- a) History taking
Obtaining information personal, medical and obstetric history
- b) Physical examination
General physical examination for the assessment of women present health
- c) Screening and tests
Laboratory test for pregnancy test, syphilis, HIV test, blood grouping, blood hemoglobin and urine test.
- d) Treatment
Treatment of iron deficiency anemia and urinary tract infection
- e) Preventive measures
Iron and folate tablets for anemia, TT immunization.
- f) Health Education, advice and counseling
- g) Maintain complete records: Provide antenatal care service card to women from the date of first ANC visit.

Source: Nepal Government; Ministry of Health and Population:

Safe Motherhood Program in Nepal [34]:

Globally, awareness of the issue of maternal mortality started in 1987 at the Safe Motherhood Conference in Nairobi, which drew the attention of the world and developed nations specifically to this issue and the dedication to take a step at diminishing the mortality and morbidity identified with pregnancy and labor. In Nepal, since the Safe Motherhood (SM) program initiated in 1997, the project has developed significantly. The Nepal Maternal Mortality and Morbidity Study done in 1998 is a milestone study, which highlighted the importance of the issue for maternal mortality in the nation and aroused the consideration and assets for access to quality maternal wellbeing. At first 10 areas were chosen as SM districts and in the principal stage the

project was dispatched in three regions. Following three years the project was assessed and was developed and is at present being adopted in 13 districts.

Major activities of the Safe Motherhood programs include:

- Birth preparedness package and maternal and neonatal activities at community level.
- Rural ultrasound program
- Uterine prolapsed treatment and surgical camp
- Recruitment of staff
- Equity and access program
- Emergency Referral Fund
- Maternal and neonatal update
- Safe abortion services
- Aama Surakchhya Program and antenatal incentive program
- Incentive to health facilities
- Antenatal incentive program.

(Source Annual Health Report 2011, Department of Health Services, Nepal)

2.6 Selected Model Related to the Study

Anderson Healthcare Utilization Model:

The Anderson Healthcare Utilization model is a theoretical model, which demonstrates the factors that lead to the use of health services. Ronald M. Andersen developed the original model, in 1968. According to the model, usage of health services (including inpatient care, physician visits, dental care etc.) is determined by three dynamics:

1) Predisposing factors

The characteristics such as age, education, ethnicity, religion, husband's education, health knowledge and media exposure towards health services.

2) Enabling factors

It includes family support, family income, health insurance, distance, time factor, availability and accessibility of health service.

3) Need

It can be a perceived need (care seeking) and actual need (presence of symptoms or disease) for health care services.

In this model, the use of health service is a sequential and conditional function of an individual's predisposition to use health service.



Theoretical framework of a range of risk factors associated with non-use of Antenatal Care . This framework adopted from Anderson behavioral model.

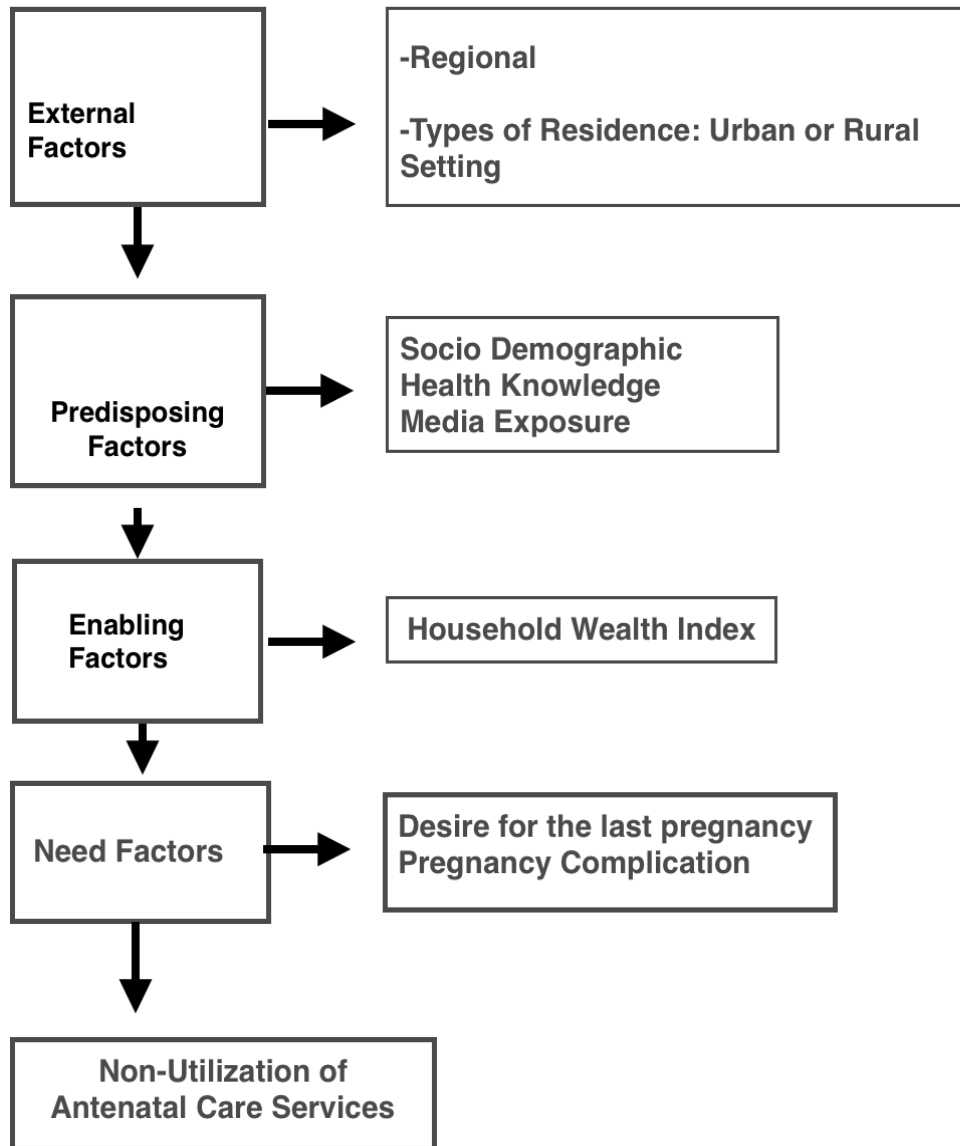


Figure 3 Anderson Behavior Model

(Andersen RM. Families' use of health services: a behavioral model of predisposing, enabling and need components) [35].

2.7 Multiple Indicator Cluster Survey (MICS)

The global MICS program was developed by UNICEF in the 1990s as an international household survey program to support countries in the collection of internationally comparable data on a wide range of indicators on the situation of children and women.

The MICS was originally developed in response to the World Summit for Children to measure progress towards an internationally agreed set of mid-decade goals. The first round of MICS was conducted around 1995 in more than 60 countries.

As key data sources generating data on equity, MICS will play a key role in tracking progress towards elimination of disparities and inequities. While UNICEF and partners work with national governments to accelerate improvements in the lives of the most vulnerable, MICS will produce the data to validate the results of these focused interventions. MICS surveys measure key indicators that allow countries to generate data for use in policies and programs.

UNICEF assists countries in collecting and analyzing data in order to fill data gaps for monitoring the situation of children and women through its international household survey initiative. The global Multiple Indicator Cluster Surveys (MICS) program is the centerpiece of this strategy. UNICEF supports governments in carrying out these household surveys through a global program of methodological research and technical assistance in settings as diverse. The first round of surveys (MICS1) was carried out in over 60 countries in mainly 1995 and 1996 in response to the World Summit for Children and measurement of the mid-decade progress. A second round (MICS2) in 2000 increased the depth of the survey, allowing monitoring of a larger number of globally agreed indicators. A third round (MICS3) started in 2006 and aimed at producing data measuring progress also toward the Millennium Development Goals (MDGs), A World Fit for Children, and other major relevant international commitments. The fourth round, launched in 2009, aimed at most data collection conducted in 2010, but in reality most MICS4s were implemented in 2011 and even

into 2012 and 2013. This represented a scale-up of frequency of MICS from UNICEF, now offering the survey program on a three-year cycle.

The fifth round, launched in 2012, was aimed at offering countries the tools to do the final MDG data collection. More than 40 countries had conducted about 50 surveys by 2015. In 2016, the sixth round has been launched with an effort towards collecting baseline data for the new set of global goals and targets - the Sustainable Development Goals (SDGs).¹situation of children and women around the world.

Survey Tools

At the core of MICS is the list of indicators. In MICS this is a compilation of now 200 distinct indicators (237 counting those requiring sex disaggregate). The list is not inclusive of all standard tabulations produced in a full survey, but forms those that are central to global monitoring by UNICEF and others.

Questionnaires

The MICS questionnaires are:

- Household, administered to any knowledgeable adult member of the household (in MICS1–MICS3 this was to the head of household).
- Women, administered to all eligible women (age 15–49) of the household.
- Children under age five, administered to their mothers. If the mother is not listed as a member of the household, a primary caregiver is identified as the respondent to this questionnaire.
- As of 2011, a questionnaire for men (age 15–49) has also been developed and is included in the generic set of questionnaires.
- As of MICS6, a questionnaire for children age 5-17, administered to the mother of a randomly selected child per household.

Household Questionnaire

- Household Information Panel
- List of Household Members
- Education
- Household Characteristics
- Social Transfers

- Household Energy Use
- Insecticide Treated Nets
- Indoor Residual Spraying
- Water and Sanitation
- Hand Washing
- Salt Iodization
- Water Quality (a module, but designed as a separate questionnaire, due to sub-sample selection)

Individual Questionnaire for Women

- Woman's Information Panel
- Woman's Background
- Mass Media and ICT
- Fertility/Birth History (Mortality)
- Desire for Last Birth
- Maternal and Newborn Health
- Post-Natal Health Checks
- Contraception
- Unmet Need
- Female Genital Mutilation/Cutting
- Attitudes Toward Domestic Violence
- Victimization
- Marriage/Union
- Adult Functioning
- Sexual Behavior
- HIV/AIDS
- Maternal Mortality
- Tobacco and Alcohol Use
- Life Satisfaction

Questionnaire for Children Under Five

- Under-five Child Information Panel
- Under-Five's Background

- Birth Registration
- Early Childhood Development
- Child Discipline
- Child Functioning
- Breastfeeding and Dietary Intake
- Immunization
- Anthropometry

Individual Questionnaire for Men

- Man's Information Panel
- Man's Background
- Access to Mass Media and Use of ICT
- Fertility
- Attitudes Toward Domestic Violence
- Marriage/Union
- Sexual Behavior
- HIV/AIDS
- Circumcision
- Tobacco and Alcohol Use
- Life Satisfaction

Questionnaire for Children Age 5-17

- Child's Information Panel
- Child's Background
- Child Labor
- Child Discipline
- Child Functioning
- Parental Involvement

(Source: MICS UNICEF: <http://mics.unicef.org/tools>)[36]

2.8 Nepal MICS

The Nepal Multiple Indicator Cluster Survey (MICS 2014) was conducted by the Central Bureau of Statistics under the National Planning Commission from January

to June 2014. Technical and financial support for the survey was provided by the United Nations Children's Fund (UNICEF) Nepal.

Nepal MICS 2014 provides valuable information and the latest evidence on the situation of children and women in Nepal before an earthquake of 7.8 magnitudes hit the country on 25 April 2015. The survey presents data from an equity perspective by indicating disparities by sex, region, area, education, household wealth, and other characteristics. Nepal MICS 2014 is based on a sample of 12,405 households interviewed and provides a comprehensive picture of children and women in the 15 sub-regions of the country.

Survey Objectives

The Nepal MICS 2014 has its primary objectives as:

- To provide up-to-date information for assessing the situation of children and women in Nepal;
- To generate data for the critical assessment of the progress made in various areas, and to put additional efforts in those areas that require more attention;
- To furnish data needed for monitoring progress toward goals established in the Millennium Declaration and other internationally agreed upon goals, as a basis for future action;
- To collect disaggregated data for the identification of disparities, to allow for evidence-based policy-making aimed at social inclusion of the most vulnerable;
- To contribute to the generation of baseline data for the post-2015 agenda;
- To validate data from other sources and the results of focused interventions.

Nepal Multiple Indicator Cluster Survey (MICS), conducted in 2014 by the Central Bureau of Statistics, Government of Nepal, with technical support from

UNICEF. The survey provides statistically sound and internationally comparable data essential for developing evidence- based policies and programs, and for monitoring progress toward national goals and global commitments. Among these global commitments are those emanating from the World Fit for Children Declaration and Plan of Action, the goals of the United Nations General Assembly Special Session on HIV/AIDS, the Education for All Declaration and the Millennium Development Goals (MDGs).

Nepal MICS 2014, survey interviewed 2,048 numbers of women with a live birth in last two years. The results show 13% percent of women didn't attend ANC service. Regionally, the highest proportion of women seeing a skilled provider was in the Central Hills (83 percent) and the lowest proportion was in the Mid-Western Mountains (42 percent). Women with not education and poor households were least likely to have ANC visit. Table 1 below shows the percentage of women who had attended antenatal care, published by MICS Nepal 2014.

(Source: Nepal MICS 2014, http://mics.unicef.org/news_entries/41/NEPAL-2014-MICS-FINAL-REPORT-RELEASED [37]).

Table 1 The percentage of women who had attended antenatal care

Mid - Western Region	Percent of women who had					
	No visit (%)	One Visits (%)	Two Visits (%)	Three Visits (%)	Four or more Visits (%)	Total (%)
Mountain	31.1	6.0	12.9	18.9	30.5	100.0

Hills	25.2	5.8	8.3	11.9	48.9	100.0
Terai	8.4	3.5	5.9	11.6	70.7	100.0

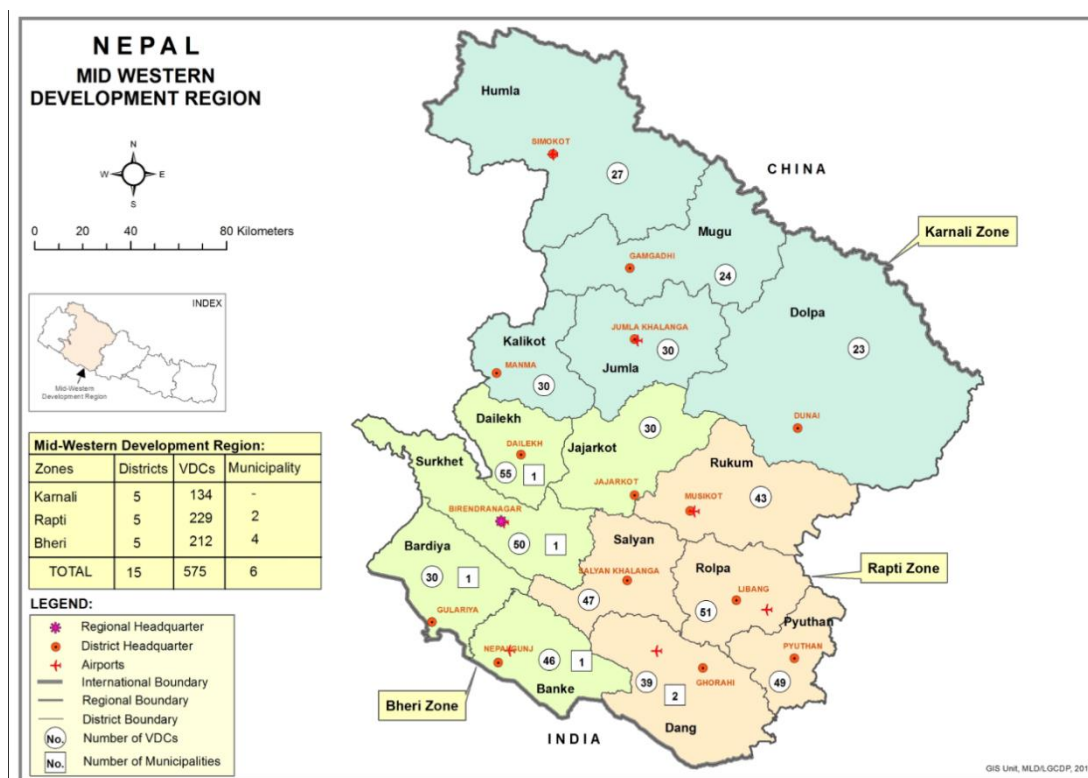


Figure 4 Map showing Mid-Western Development Region (MWDR)

Chapter Three: Methodology

This study uses the data taken from the Multiple Indicator Cluster Survey (MICS) conducted in Nepal by the Ministry of Health and Population with a technical support from UNICEF from February – June 2014. It is household survey program developed by UNICEF. It is utilized to monitor the situation of children and women in particular.

3.1 Study Design

A secondary analysis of the Nepal MICS data collected through a cross-sectional study design.

3.2 Study Area

The MICS was carried out throughout Nepal. This study uses the data collected from Mid-Western Development Region (MWDR), one of the five-development regions in Nepal. MWDR is the largest development region by land area. It has approximately 3.5 million residents. Data was collected from all three sub-regions i.e. Terai, Hill and Mountain

3.3 Study Population

The study population selected for this study was the reproductive age women aged 15-49 years who had given live birth within last 2 years.

Inclusion Criteria:

- The women in reproductive age group (15-49 years) who had given live birth in the last 2 years (before 2014) living in Mid- Western Development Region of Nepal were included in the study

Exclusion Criteria:

- In this study, available data which were incomplete, for example missing, non-weighted were excluded from the study.

3.4 Sampling Technique

According to MICS, a multistage, stratified cluster sampling approach was used. The urban and rural areas in each 15 ecological regions in Nepal were identified as the main sampling strata. The 2011 census frame was used for the selection of clusters. Census enumeration areas were defined as primary sampling units (PSUs), and were selected from each of the sampling strata by using systematic probability proportional to size sampling procedures, based on the number of households in each enumeration area from the 2011 Population and Housing Census frame. The first stage of sampling was thus completed by selecting the required number of enumeration areas from each of the ecological zones, separately for the urban and rural strata.

A new listing of households was conducted in all the sample enumeration areas prior to the selection of households. For this purpose, 30 listing team was formed. Each team consists of a listing and a mapping person. They were employed into each enumeration area. Wards were used as the PSU. In Urban area the wards having less than 225 households and in rural area having less than 150 households were not separated. Larger wards were separated. The households were then sequentially numbered from 1 to N (the total number of households in each enumeration area) at the Central Bureau of Statistics, where the selection of 25 households in each enumeration area was carried out using random systematic selection procedures.

3.5 Sample Size

The MICS national level report includes total sample size of 13,000 households in 520-sample enumeration areas. The birth registration prevalence among children

aged 0-4 years was used as the key indicator in sample size calculation. The following formula has been used.

$$n = \frac{[4(r)(1-r)(deff)]}{[(0.12r)^2 (pb)(AveSize)(RR)]}$$

Where,

- - n is the required sample size, expressed as number of households
- - 4 is a factor to achieve the 95 percent level of confidence
- - r is the predicted or anticipated value of the indicator, expressed in the form of a proportion
- - deff is the design effect for the indicator, estimated from a previous survey or using a default value of 1.5
- -0.12r is the margin of error to be tolerated at the 95 percent level of confidence, defined as 12 percent of r (relative margin of error of r)
- - pb is the proportion of the total population upon which the indicator, r, is based
- -*AveSize* is the average household size (number of persons per household)
- -RR is the predicted response rate

For the calculation, r (birth registration) was assumed to be 42.3 percent. The value of deff (design effect) was taken as 2 based on estimates from previous surveys, pb (percentage of children aged 0–4 years in the total population) was taken as 9.7 percent, *AveSize* (average household size) was taken as 4.88 persons per household, and the response rate was assumed to be 95 percent, based on experience from previous surveys.

A systemic sample of 25 households was drawn in each enumeration area. Dividing the total number of households by the number of sample households per cluster, it was calculated that 40, 32 or 16 sample clusters would need to be selected in each zone.

In total 2046 numbers of women with a live birth in the last two years were interviewed throughout Nepal. In Mid–Western Region, there is 96 sample enumeration area and 2,400 households. From each household, Women who had given birth in last two years before 2014 AD were identified. In total, 428 numbers of women were interviewed in MWDR. In MICS 2014 study, sample is not self-weighting. Different sampling fractions were used in each zone since the sizes of the ecological zones varied. For this reason, sample weights were calculated. After calculation, 322 respondents were used to study MWDR (Ref: Appendix B).

3.6 Measurement Tool

According to MICS, 4 sets of questionnaires were used. Out of which, two sets of questionnaires were used in demographic and reproductive health survey:

1. Household questionnaire to collect basic demographic information on all de jure household members, the household and dwelling.
2. A questionnaire of individual women to all women aged 15-49 years
3. An under-5 questionnaires, administered to mothers (or caretakers) for all children less than five years of age living in the household
4. A water quality-testing questionnaire to test for bacteria and measure E. Coli.

The set of questionnaires were based on the English version of the MICS model questionnaires. The model questionnaires were translated into Nepali language.

3.7 Data Collection

According to MICS, before data collection, master training of trainers was held from 12-20 January 2014. Then, residential training for field workers for 3 weeks was given from 30 January to 19 February. Training consists of lectures on interviewing techniques and interviews between trainees to gain experience. Teams of 15 collected the data. Each team consists of 3 female interviewers, one editor, one measurer and one supervisor. The MICS area representative provided overall supervision with regular visit to the study area.

Data were entered using CSPro software, Version 5.0. 10 data-entry operators entered data on 10 laptop computers, one questionnaire administrator, overseen by one data-entry supervisor with two secondary editors. For quality assurance purposes, all questionnaires were double entered and internal consistency checks were performed. Procedures and standard programs developed under the global MICS program and adapted to the Nepal questionnaire were used throughout. Data processing began simultaneously with data collection in March 2014 and was completed in July 2014.

3.7 Data Preparation

This study is based on the factors influencing the complete utilization of antenatal care (dependent variable) among the MWDR reproductive age women. The independent variables include demographic, obstetric, household characteristics and media exposure of a woman.

Dependent variable

The study focuses on a binary variable outcome indicating the use of complete antenatal care service, asking the respondents the question: “Did you see anyone for antenatal care during your pregnancy with (*name*)?” The variable was coded 1 if the respondent reported the receipt of antenatal care during the pregnancy and 0 if not. Respondent having 1-3 ANC visits was coded 0 as an incomplete ANC visits and

respondent having four or more visits was coded 1.

Independent (Explanatory) variables

Building on the literature review of published research, influencing factors associated with the use of antenatal care services, explanatory variables were identified. The theoretically potential variables included maternal age, status of education, reason (mountain, hill, terai), area of residence (urban or rural), marital status, husband's education, parity, wanted last child, wealth index quintile, ethnicity, religion and media exposure (reading newspaper, listening radio, watching television).

Individual's characteristics Maternal age: Age of a woman at the time of survey. Age is measured in years.

Education level: Highest level of education a woman has attained.

Region: It refers to the region where the woman lived at the time of survey and the region is categorized into three regions, namely Mountains, Hills and Terai.

Place of residence: It refers to the place where the woman resided at the time of survey and it is categorized as urban and rural.

Husband's Education: Highest level of education a woman's husband has attained.

Wanted Last Child: willingness to have a child delivered (YES/NO)

Parity: Parity refers to the number of living children woman gave birth. Socio-economic characteristics

Wealth Index: It is a measure of cumulative possession of household assets. It is constructed into three quintiles, such as rich, middle and poor accordingly.

Ethnicity: Classified as Advantaged and Disadvantaged

Religion: Hindu, Christian, Buddhist, Muslim and others.

Media Exposure: Reading newspaper, listening to radio or watching television never or sometimes.

Table 2 Lists Of Variables

Variables	Description	Measurement Scale
Antenatal Care utilization	Yes or No	Dichotomous
Complete Antenatal Care Utilization	Attending 4 or more ANC	Dichotomous
Maternal Age	Age of a women during pregnancy	Ordinal
Education	Education level of a mother	Ordinal
Sub-Region	Mountain / Hill / Terai	Nominal
Residence	Urban / Rural	Nominal
Husband's Education	Education level of a Women's Husband	Ordinal
Parity	Number of Children	Ordinal
Wanted Last Child	Want or Not	Nominal
Wealth Index Quintile	Possession of Household Assets	Ordinal
Ethnicity	Advantaged / Disadvantaged	Nominal
Religion	Head of household	Ordinal

	religion	
Reading Newspaper	Never/ Sometimes	Nominal
Listening Radio	Never/ Sometimes	Nominal
Watching Television	Never/ Sometimes	Nominal

3.8 Data Analysis

Four Nepal MICS data sets (women data set, children data set, household data set and individual household member data set) were obtained from UNICEF. Most of the independent and dependent were found in women data set and household data set from where it was computed/recoded into the new data set.

The Statistical Package for the Social Sciences (SPSS) version 22.0 was used to analyzed the data. The analysis includes descriptive statistics (i.e. frequency, percentage, standard deviation and cross- tabulation) to examine the levels and characteristics of the respondents. In inferential statistics Bivariate analysis was done using Pearson's Chi Square test to the categorical data to find out the associations and multivariate analysis was done using binary logistic regression analysis to explore the strength of relationship between dependent and independent explanatory variables. Results were presented with unadjusted OR, adjusted OR with 95% CI and respective p-values. P-values of less than or equal to 0.05 were considered statistically significant.

3.9 Validity/ Reliability of the Questionnaires

The questionnaire used in this research had already been used in a many prior research. It is a gold standard questionnaire developed by UNICEF and had been used

in many countries where MICS research had been conducted. Nevertheless, a meticulous check was performed before using questionnaires in accordance with the respective country culture and beliefs.

3.10 Study Period

The primary study took place from February 2014 to June 2014. This secondary study was conducted from August 2016 to September 2016.

3.11 Ethical Consideration

The study approval will be taken from the Ethical Review Committee for Research, Chulalongkorn University (857/2559)



Chapter Four: Result of the Study

In this chapter, it presents the analysis of MICS data (2014), it's primary aims is to understand the utilization of antenatal care and to examine the different variables influencing on the utilization of antenatal care among reproductive age group women in Mid-Western Development Region of Nepal. This chapter also illustrates the association between each explanatory variables and dependent variable using bivariate and multivariate analyses. The result of this study according to its specific objectives has been presented below:

4.1. Antenatal Care Use

From the total of 322 women, 257 (79.8 percent) visited the health center for antenatal care at least once while remaining 65 women (20.9 percent) did not visit ANC even once during the course of pregnancy. It is shown in the table 3 below:

ANC Visit	Numbers	Percent
<i>None</i>	65	20.9
<i>Yes</i>	257	79.8
<i>One Visit</i>	16	5.0
<i>Two Visits</i>	26	8.0
<i>Three Visits</i>	41	13.0
<i>Four or More Visits</i>	174	54.0

Table 3: ANC visit of 322 pregnant women

Frequency of ANC visit is crucial for maternal and child health care. Out 257 women who attended antenatal care, 174 (54.0 percent) women visited ANC clinic four

or more times. 16 (5.0 percent) women visited only once, 26 (8.0 percent) visited two times and 41 women (13 percent) women visited three times during their last pregnancy. In overall, 174 (54 percent) women visited complete (four or more) antenatal care clinic and 84 (46 percent) women visited less than four.

4.2 General Characteristics

The results of general characteristics are categories into four different sections. They are Socio-Demographic Characters (age, education, region, residence marital status and husband's education), Obstetric Characters (parity and wanted last child), Household characters (wealth index quintile, ethnicity and religion) and Media Exposure (newspaper, radio, television).

4.2.1 Socio-Demographic Characteristics:

The maternal ages of the women were categorized into three groups. The mean age of the respondents (15-49) was 25.32 years with standard deviation 1.6 years. Out of 100 percent, 166 (51.6 percent) of women fell under the age group of 15- 24. Whereas, 128 (39.8) women were in the age group 25-34 and remaining 28 (8.7) falls in 35-49 years' age group of women.

The education of the women was categorized into 4 subgroups. Women with no education, who never attended school was classified as 'none'. 'Primary' as attended class up to 5 grades, 'Secondary' to those who studied from grade 6 up to grade 12 and above that is classified as 'Higher'. From the information obtained after descriptive analysis, about 141 (43.7 percent) women never received any education at all. About 66 (20.4 percent) women were with primary education, 78 (24.2) were with secondary education and only 38 (11.7) had received higher education.

Region was classified into Mountain, Hill and Terai according to geographical locations. Most of the respondents were from Hill region. Out of 322, 166 (51.5) women live in Hill region. Similarly, 133 (35.1 percent) women lives in Terai and 46 (13.4 percent) live in Mountain region.

Residences were classified into Urban and Rural. There was much unequal distribution in urban and rural. 304 (94.7 percent) women live in rural area. Only remaining 17 (5.3 percent women) lives in rural area.

Marital status doesn't show any significant variance in this study. 321 (99.6 percent) women were married and only 1 (0.4 percent) woman was windowed.

Husband's education plays a vital role in using a health care services and getting required home care. Husbands that are primarily head of the household, 179 (55.8) which is more than that of women never received any education at all. Husbands with primary education were 55 (17.1 percent) and 34 (10.7 percent) attained secondary education. But husband receiving higher education were more than women. 53 (16.4 percent) husbands received higher education.

Table 4: Socio-Demographic Characteristics

Maternal Characteristics		Numbers	Percent(%)
Maternal Age (Years)			
	<i>15-24</i>	166	51.6
	<i>25-34</i>	128	39.8
	<i>35+</i>	28	8.7
	<i>Mean (years)</i>	25.32	
	<i>SD (years)</i>	1.16	
Education Status			
	<i>None</i>	140	43.7
	<i>Primary</i>	66	20.4
	<i>Secondary</i>	78	24.2
	<i>Higher</i>	38	11.7
	<i>Total</i>	322	100
Region			
	<i>Mountain</i>	45	13.4

	<i>Hill</i>	165	51.5
	<i>Terai</i>	112	35.1
	<i>Total</i>	322	100
Residence			
	<i>Urban</i>	18	5.3
	<i>Rural</i>	304	94.7
	<i>Total</i>	322	100
Marital Status			
	<i>Single</i>	0	0.0
	<i>Married</i>	321	99.6
	<i>Widowed</i>	1	0.4
	<i>Total</i>	322	100
Husbands' Education			
	<i>None</i>	179	55.8
	<i>Primary</i>	55	17.1
	<i>Secondary</i>	34	10.7
	<i>Higher</i>	54	16.4
	<i>Total</i>	322	100

4.2.2 Obstetric Characteristics

Parity was classified into the 4 groups. Higher number of women had 2-3 numbers of children, 158 (49.0 percent) women had 2-3 numbers of children. Women with 1 child comprised 108 (33.6 percent), 4-6 comprised 54 (16.8 percent) and only 2 (0.5 percent) comprised 7 or more children.

Out of 322, about 283 (88.0 percent) wanted their last child. Remaining 39 (12.0 percent) women didn't desired to have their last child.

Table 5: Obstetric Characteristics

Maternal Obstetric Characteristics		Numbers (n)	Percent (%)
Parity			
	<i>1</i>	108	33.6
	<i>2-3</i>	158	49.0
	<i>4-6</i>	54	16.8
	<i>7+</i>	2	0.5
	<i>Total</i>	322	100
Wanted Last Child			
	<i>Yes</i>	283	88.0
	<i>No</i>	39	12.0
	<i>Total</i>	322	100

4.2.3 Household Characteristics

Wealth Index Quintile, Religion and Ethnicity of the respondent illustrated household characteristics.

Wealth index quintile was categorized based on the possession of household assets in the household. It was classified into 5 sections from poorest, second, middle, fourth and richest. Nepal is falls under low-income countries. About 174 (54.2 percent) of women fall into poorest categories. 72 (22.2 percent), 33 (10.3 percent) and 29 (8.9 percent) falls under second, middle and fourth categories respectively. Least women i.e. 14 (4.3 percent) women were in richest categories.

Religion and culture also influence the health seeking behavior of people. Most of the people still follow the old traditional medicine. Large majority of the women studied follow the Hindu religion. About 288 (89.4 percent) were Hindu, 9 (2.8 percent) were Christian, 3 (1.0 percent) were Muslim, 1 (0.2 percent) were Buddhist and remaining 21 (6.6) follows other religions.

Ethnicity was classified into two advantaged and disadvantaged group. In Nepal there are 3 dominant ethnic groups. They are Chettri, Brahman and Newar. They were designated as advantaged group and remaining others as disadvantaged group. Advantaged group women were 144 (44.6 percent) and disadvantaged group women were 178 (55.4 percent). This clearly shows that more women are from disadvantaged group. They have less authority and exposure.

Table 6: Household Characteristics

Household Characteristics		Numbers (n)	Percent
Wealth Index Quintile			
	<i>Poorest</i>	174	54.2
	<i>Second</i>	72	22.2
	<i>Middle</i>	33	10.3
	<i>Fourth</i>	29	8.9
	<i>Richest</i>	14	4.3
	<i>Total</i>	322	100
Religion			
	<i>Hindu</i>	288	89.4
	<i>Buddhist</i>	1	0.2
	<i>Christian</i>	9	2.8
	<i>Muslim</i>	3	1.0

	<i>Others</i>	21	6.6
	<i>Total</i>	322	100
Ethnicity			
	<i>Disadvantaged</i>	178	55.4
	<i>Advantaged</i>	144	44.6
	<i>Total</i>	322	100

4.2.4 Media Exposure

Media is crucial for the dispersion of the health related issues and available services. It provides information to the people, which help them to take a required action. This study shows most of the women were away from exposure to media. The 3 main media examined in this research were reading newspaper, listening to radio and watching television, which is further categorized into 4 sections. Those are almost every day, at least once a week, less than once a week and not all.

Almost more than 50 percent women never exposed to media. About 164 (51.0 percent) never read newspaper, 191 (59.4 percent) never listened radio and 225 (70.0) never watched television.

Table 7: Media Exposure

MEDIA EXPOSURE	Almost Every day	At least Once a week	Less than once a week	Not at all
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	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<i>Newspaper</i>	5	1.5	28	8.6	40	12.5	164	51.0
<i>Radio</i>	49	15.1	33	10.3	49	15.2	191	59.4
<i>Television</i>	43	13.3	29	9.1	24	7.6	225	70.0

4.3 Association between the explanatory variables and the antenatal care utilization

Association of antenatal care utilization with multiple characteristics of the respondent was studied using Chi-Square test and p-value of the selected variables were also calculated. According to the result shown in Table 8,

- Maternal age,
- Educational status,
- Wanted last child
- Wealth index quintile, and
- Watching television was statistically significant (p-value < 0.05).

Maternal Age:

In this study, maternal age is significantly associated with antenatal care use (p-value < 0.001). The proportion of women who have ages between 15-24 years are more likely to visit four or more ANC clinic in comparison to other two groups.

Education status:

Education status as mention in Chapter 2 reflects that it has very strong association with the antenatal care utilization. Higher the education status, it is more

likely to visit complete antenatal care as revealed from in different studies. In this study it also reveals education and antenatal are strongly associated (p-value < 0.05).

Region:

Similarly, region in which respondent resides shows a strong association (p-value < 0.001). Women living in Terai region (which is mostly consist of plane land) 92 percent women attended ANC services. Women living in Mountain region are less likely to use ANC.

Husband's Education:

Regarding husband's education, there is no significant association between education and utilization of ANC. Higher education doesn't show any increase in the utilization of ANC. This result is different from the results shown in previous studies.

Parity:

The association between parity and utilization of ANC is not significant. It was found that women with parity 2-3 is most likely to use ANC.

Wanted Last Child:

Wanted last child and utilization of ANC is significantly associated (p-value < 0.001). The women who wanted last child are more likely to attend ANC that women who doesn't wanted to had her last child.

Wealth Index quintile:

Wealth index quintile has been recoded to poorest, middle and richest. Wealth index quintile shows strong association with antenatal care utilization. Women from poorest household were less likely to use ANC services. Women from the rich family are likely to use ANC services 97.7 percent.

Ethnicity:

In accordance with the ethnicity, this analysis exhibits; advantaged group is more likely to visit complete ANC than disadvantaged group. The association between ethnicity and utilization of ANC services are not strongly associated.

Media Exposure:

Listening to radio and watching television has strong association with utilization of ANC (p-value < 0.001 and p-value < 0.001) Women listening radio and watching television are 90.0 and 91.7 percent respectively more likely to attend ANC services.

4.4 Association between the explanatory variables and the complete (four or more visits) antenatal care utilization

In this result, some of the characteristics have significant association with complete utilization of ANC. According to the result shown in Table 8

- Educational status,
- Region,
- Wealth index quintile and
- Watching television was statistically significant (p-value < 0.05).

Maternal age, husband's education, parity, wanted last child, ethnicity, listening to radio and reading newspaper were not statistically significant.

Education status:

Education status as mention in Chapter 2 reflects that it has very strong association with the antenatal care utilization. Higher the education status, it is more likely to visit complete antenatal care as revealed from in different studies. In this study it also reveals education and antenatal are strongly associated (p < 0.05).

Region:

Similarly, region in which respondent resides shows a strong association (p-value < 0.001). Women living in Terai region (which is mostly consist of plane land) 80 percent women attended ANC services. Women living in Mountain region are less likely to use ANC.

Wealth Index quintile:

Wealth index quintile has been recoded to poorest, middle and richest. Wealth index quintile shows strong negative association with antenatal care utilization. Women from poorest household were more likely to use complete ANC services than women from richest family. 64 percent of women from the poor family were more likely to use complete ANC services.

Media Exposure:

Watching television has strong association with utilization of ANC (p-value < 0.05). In Women watching television 78 percent were more likely to attend ANC services.

Table 8: Association of antenatal care utilization

Characteristics	Complete Utilization			Utilization of ANC		
	Total	Incomplete Utilization	Complete Utilization	Total	Non Utilization	Utilization
Maternal age	(p=0.813)			(p=0.000)		
15-24	142	44 (30.8)	98 (69.2)	166	24 (14.5)	142 (85.5)
25-34	99	35 (34.7)	64 (65.3)	128	28 (21.5)	100 (78.7)
35-49	16	6 (33.3)	10 (66.7)	28	13 (48.1)	15 (51.90)
Education Status	(p=0.000)			(p=0.000)		
None	99	47 (47.5)	52 (52.5)	140	41 (29.8)	99 (70.2)
Primary	51	14 (27.5)	37 (72.5)	66	15 (22.7)	51 (77.3)
Secondary	72	14 (19.4)	58 (80.6)	78	6 (7.7)	72 (92.3)
Higher	35	7 (20.0)	28 (80.0)	38	2 (5.3)	36 (94.7)
Region	(p=0.004)			(p=0.000)		
Mountain	29	16 (55.2)	13 (44.8)	45	12 (30.2)	29 (69.8)

Hill	124	43 (34.7)	81 (65.3)	165	41 (25.3)	124 (74.4)
Terai	104	24 (23.1)	80 (76.9)	112	10 (8.0)	102 (92.0)
Husband's Education	(p=0.712)			(p=0.404)		
None	142	43 (30.3)	99 (69.7)	179	37 (20.7)	142 (79.3)
Primary	47	16 (34.0)	31 (66.0)	55	8 (14.5)	47 (85.5)
Secondary	24	10 (41.7)	14 (58.3)	34	10 (28.6)	25 (71.4)
Higher	43	13 (30.2)	30 (69.8)	54	10 (17.3)	43 (82.7)
Obstetric Characters						
Parity	(p=0.839)			(p=0.566)		
1	86	29 (33.7)	57 (66.3)	108	22 (20.4)	86 (79.6)
2-3	129	42 (32.6)	87 (67.4)	158	29 (18.4)	129 (81.6)
4+	42	12 (28.6)	30 (71.4)	56	14 (25.0)	42(75.0)
Wanted Last Child	(p=0.188)			(p=0.000)		
Yes	232	72 (31.0)	160 (69.0)	283	51 (18.0)	232 (82.0)
No	25	11 (44.0)	14 (56.0)	39	9 (26.5)	25 (73.5)
Household Characteristics						
Wealth Index	(p=0.000)			(p=0.000)		
Poorest	121	56 (46.7)	64 (53.3)	174	54 (31.0)	120 (69.0)
Middle	95	16 (16.8)	79 (83.2)	105	10 (9.5)	95 (90.5)
Richest	41	10 (26.2)	31 (73.8)	43	1 (2.3)	42 (97.7)
Ethnicity	(p=0.265)			(p=0.068)		

Disadvantaged	108	42 (36.1)	69 (63.9)	178	35 (24.5)	108(75.5)
Advantaged	149	44 (29.5)	105 (70.5)	144	29 (16.3)	149 (83.7)
Media Exposure						
Newspaper	(p=0.652)			(p=0.933)		
Sometimes	126	39 (31.0)	87 (66.4)	158	32 (19.7)	126 (80.3)
Not at all	131	44 (33.6)	87 (66.4)	164	33 (20.1)	131 (79.9)
Radio	(p=0.063)			(p=0.000)		
Sometimes	117	30 (26.3)	87(73.7)	131	14 (10.0)	117 (90.0)
Not at all	140	52(37.1)	88 (62.9)	191	51 (26.7)	140 (73.3)
Television	(p=0.008)			(p=0.001)		
Sometimes	88	19 (21.6)	69 (78.4)	97	9 (8.3)	88 (91.7)
Not at all	169	64 (37.9)	105 (62.1)	225	56 (24.9)	169 (75.1)

4.5 Binary logistics analysis of independent variables and dependent variable

Binary logistic analysis was used to explore the strength of associations between independent and dependent variables. In order to evaluate the relative contribution of multiple factors, adjusted odds ratio was calculated. The result differential is quite large when there are no covariates, but much less when there are covariates. For example, the 25-34 age group is 0.609 of the 15-24 age group when there are no covariates, but only slightly different (OR= 0.940) when there are statistical controls. That is, a large part

of the basic age differential is a reflection of the composition of the age groups on one or more of the covariates.

Table 9 and 10 shows the crude and adjusted odds ratio using binary logistic regression model applying independent variables to explore which variables are significantly associated with the dependent variable.

4.5.1 Binary logistic regression analysis of multiple independents and dependent variable utilization of ANC

The result shows (Table 9), after adjusting the odds ratio (OR) multiple independent variable that were statistically significant ($p\text{-value} \leq 0.05$) in unadjusted OR becomes statistically non-significant ($p\text{-value} > 0.05$). The variables like

- Maternal Age
- Education
- Wealth Index
- Listening Radio and
- Watching television was statistically significant when there was no covariates control. But shows less significant association when statistical controls were applied. After statistical control (adjusted OR), the variables like

Maternal age 35-49 years shows significant association in both unadjusted and adjusted OR. It shows a negative association with increasing age of a mother. With increasing age there was less likely to use ANC (Adjusted OR=0.302 CI: 0.102-0.899). In unadjusted OR, it shows a strong association with secondary education status of mother ($p\text{-value} \leq 0.001$). Mother receiving secondary education was 5 times more likely to use antenatal care than mothers without education at all. (Unadjusted OR=5.117; CI: 2.062-12.698)

Result shows mothers from Terai Sub- Region were more likely to use ANC than women from Mountain and Hill Sub- regions. Unadjusted odds ratio shows it was

4.1 times more likely to use than mothers from Mountain Sub-Region (Unadjusted OR=4.95; 95% CI: 1.961-12.698). Compared to the Mountain area, the Terai is nearly five times greater on ANC when there are no statistical controls, but only 47 percent greater when there are statistical controls.

Wealth index has strong relationship with ANC use. Increasing wealth of a women's household also increased the women getting ANC visits, as adjusted OR shows women in the richest quintile were 13 times more likely to visit ANC than women in the poorest quintile (aOR=13.335; 95% CI: 1.136-156.692).

Parity doesn't show any relation with ANC use. Women of higher parity had lower odds of receiving ANC visits. The status of husband's education increased the odds of receiving ANC visits.

Other variables such as Wanted last Child, Ethnicity, Sub Region was observed to have no significant effect on antenatal care usage. Ethnicity shows that women from advantaged group is less likely to use ANC (OR=0.64; 95% CI: 0.332-2.351)

In unadjusted OR it shows significant association of ANC use with listening to radio and watching television. In adjusted OR, it was observing that women exposed to media, listening radio was significantly associated with utilization of ANC (p-value < 0.05). Mother who listens to radio was 2.4 times more likely to utilize ANC (OR=2.4; 95% CI: 1.120-5.364).

Table 9: Relation of different variables with utilization of ANC

Study Variables	Unadjusted OR 95% CI)	p-value	Adjusted OR (95% CI)	p-value
Maternal Age				
15-24	1		1	
25-34	0.609 (0.332 -1.117)	0.109	0.940 (0.453-1.948)	.867
35-49	0.178 (0.075-0.420)	0.000	0.302 (0.102-0.899)	.031
Education				
None	1		1	

Primary	1.467 (0.741-2.904)	0.272	0.853 (0.361-2.016)	.717
Secondary	5.117 (2.062-12.698)	0.000	1.84 (0.626-5.413)	.268
Higher	7.889 (1.771-35.131)	0.007	2.397 (0.444-12.945)	.310
Sub-Region				
Mountain	1		1	
Hill	1.35 (0.648-2.813)	0.424	1.139 (0.482-2.692)	.766
Terai	4.951 (1.961-12.504)	0.001	1.47 (0.444-4.868)	.528
Parity				
1	1		1	
2-3	1.145 (0.617-2.126)	0.667	1.624 (0.795-3.317)	.183
4+	0.77 (0.358-1.658)	0.504	1.11 (0.434-2.841)	.827
Wanted last Child				
No	1		1	
Yes	0.617 (0.273-1.392)	0.244	0.876 (0.326-2.357)	.794
Wealth Index				
Poorest	1		1	
Middle	4.21 (2.037-8.699)	0.000	2.658 (0.979-7.220)	.550
Richest	20.898(2.507-174.202)	0.005	13.335 (1.136-156.69)	.039
Ethnicity				
Disadvantaged	1		1	
Advantaged	0.594 (0.343-1.028)	0.063	0.64 (0.332-1.232)	.182
Husband Education				
None	1		1	
Primary	1.507 (0.659-3.447)	0.331	1.366 (0.517-3.610)	.530
Secondary	0.647 (0.285-1.471)	0.299	0.884 (0.332-2.351)	.804
Highest	1.198 (0.543-2.642)	0.654	1.794 (0.720-4.471)	.210
Listening Radio				
Never	1		1	
Sometimes	3.214 (1.678-6.154)	0.000	2.451 (1.120-5.364)	.025
Watching Television				
Never	1		1	
Sometimes	3.564 (1.643-7.728)	0.001	0.919 (0.332-2.544)	.871
Newspaper				
Never	1		1	
Sometimes	1.751 (0.843-3.636)	0.133	1.046 (0.453-2.414)	0.916

4.5.2 Binary logistics analysis of multiple independent and dependent variable complete (four or more visits) utilization of ANC:

In this analysis (Table 10), adjusted and unadjusted OR gives different results. Unadjusted OR shows statistically significant relationship with variables like

- Mother's education secondary level,
- Terai Sub-Region,
- Middle and richest wealth index and
- Watching television.

Whereas in adjusted OR secondary education status of women and middle wealth index independent variables shows significant association with complete utilization of ANC.

Mother with a higher status of education was more likely to have four or more ANC visits. Data shows mother with secondary education are significantly associated with complete utilization of ANC. Pattern shows women higher education are 2.7 times more like to receive complete ANC than women with no education at all.

Mother living in Terai Sub Region was more likely to use ANC care than women from Mountains and Hill Sub- Region (OR=2.081; 95% CI: 0.681-6.367).

Wealth Index quintile shows negative association with the complete utilization of ANC. Mother with middle wealth index household were more likely to use ANC than mother with poorest and richest wealth index (OR=3.256; 95% CI: 1.396-7.598)

Parity was not significantly associated with ANC. The patter of use shows, with increasing number of children women were less likely to use complete ANC.

Wanted last child and Ethnicity were not significantly associated with complete utilization of ANC. Media exposure like were not significantly associated with complete utilization on ANC.

Table 10: Relation of different variables with complete (four or more visits) ANC utilization.

Study Variables	Unadjusted OR (95% CI)	p- Value	Adjusted OR (95% CI)	p- Value
Age				
15-24	1		1	
25-34	0.839 (0.487-1.446)	.528	1.396 (0.719-2.710)	.325
35-49	0.890 (0.281-2.822)	.843	2.071 (0.529-8.116)	.296
Education				
None	1		1	
Primary	2.392 (1.152-4.968)	.019	1.63 (0.690-3.890)	.264
Secondary	3.687 (1.830-7.434)	.000	2.652 (1.124-6.259)	.026
Higher	3.460 (1.141-8.490)	.007	2.71 (0.924-7.989)	.069
Sub-Region				
Mountain	1		1	
Hill	2.335 (1.035-5.730)	.041	1.603 (0.647-3.977)	.308
Terai	4.1827 (1.773-9.868)	.001	2.081 (0.681-6.367)	.198
Parity				
1	1		1	
2-3	1.062 (0.595-1.897)	.837	1.168 (0.610-2.238)	.638
4+	1.225 (0.549-2.733)	.619	1.421 (0.584-3.459)	.439
Wanted last Child				
No	1		1	
Yes	0.563 (0.246-1.293)	0.176	0.612 (0.238-1.576)	.309
Wealth Index				
Poorest	1		1	
Middle	4.459 (2.327-8.547)	.000	3.256 (1.396-7.598)	.006
Richest	2.426 (1.119-5.259)	.025	1.577 (0.497-5.002)	.439
Ethnicity				
Disadvantaged	1		1	
Advantaged	0.735 (0.434-1.246)	0.253	0.883 (0.473-1.647)	.696
Husband Education				
None	1		1	

Primary	0.820 (0.408-1.650)	.579	0.690 (0.313-1.521)	.357
Secondary	0.624 (0.259-1.506)	.295	0.676 (0.244-1.873)	.452
Highest	1.000 (0.478-2.094)	.999	1.253 (0.547-2.875)	.593
Listening Radio				
Never	1		1	
Sometimes	1.682 (0.985-2.874)	0.057	1.173 (0.616-2.236)	.626
Watching Television				
Never	1		1	
Sometimes	2.246 (1.238-4.077)	0.008	1.069 (0.461-2.478)	.876
Newspaper				
Never	1		1	
Sometimes	0.923 (0.505-1.692)	0.798	0.646 (0.317-1.317)	0.23



Chapter Five: Discussion, Conclusion and Recommendations

The main objective of the thesis was to assess the antenatal care utilization and to identify the influencing factors of antenatal care utilization and to determine the relationship of antenatal care with different variables in women of Mid-Western Development Region, Nepal. In the study 322 women who has given birth to a live baby in last two years was interviewed. The primary study took place from February 2014 to June 2014. This secondary study was conducted between August 2016 to October 2016. This chapter composed of the discussions, conclusions and recommendations regarding the research findings.

This Chapter is divided into following sections:

- Discussion on characteristics of study population and the key findings of the study
- Benefits from the study
- Conclusions
- Recommendations

5. Discussion

5.1 Utilization of ANC:

The result presented in the previous chapter shows that, out of 322 women, overall utilization of ANC was found in 257 women (79.8 percent.) and 65 women (20.9 percent) didn't attend ANC at all. ANC utilization was similar to the previous report presented by NDHS 2011 and DoHS 2011 of Nepal. 16 (6.3 percent) women visited antenatal care only once, 26 (10.1) women visited antenatal care twice, 41 (15.6 percent) women visited three times and 174 (67.6 percent) women visited recommended four or more ANC.

5.2 Complete Utilization of ANC:

In case of normal pregnancy, WHO recommended minimum of four antenatal care visits. In complication situations during pregnancy, number of visits to antenatal care clinic differs in accordance to cases. Antenatal care is known as one of the four pillars of the safe motherhood and new born to improve maternal and neonatal health. Women who took four or more ANC visits is regarded as complete ANC utilization.

In this study out of 257 women who attended antenatal care, 174 (54 percent) visited four or more antenatal care services. Remaining 83 (20.9 percent) women visited less than four ANC, which was incomplete utilization of antenatal care service.

In accordance with the global database provided by the UNICEF, 53 percent of women attended the recommended ANC visit i.e. at least 4 visits during normal pregnancy during the period of 2005 to 2010. In low-income countries scenario is different, only 36 percent of women visited four or more antenatal care. From 1990 to 2009, women visiting ANC at least once was increased from 64 percent to 81 percent. A study done by Lindsay Cristina in Brazil in 2012 found 92 percent of women utilized ANC at least once during pregnancy. In Laos PDR, Manithip C., et al. concluded about 51 percent of overall ANC utilization. Multiple studies show the trend of utilizing in ANC is going up. Establishment of new health center, providing flexible facilities, government being more conscious about reducing Maternal Mortality Rate, active role of Female Community Health Volunteer (FCHV) in each ward, implementation of safe motherhood program and enthusiastic involvement of NGO/INGO may have positive influence in the increasing utilization of antenatal care services overall.

5.3 Socio-Demographic Characteristics:

One of the most influential factors, which promote the utilization of health care services during pregnancy is socio-demographic character of women. Respondent's

age, education, sub-region, residence, marital status and husband's education were observed and analyzed by researcher to evaluate socio-economic status.

ANC utilization has statistically significant association with maternal age. But in case of complete and incomplete utilization maternal age is not significantly associated. In the study conducted in Ethiopia. Fekede B 2007 [38] , it is shown that maternal age 15-24 were more likely to attend than other age groups.

This study has shown strong association between women's education status and utilization of antenatal care. In similarity with this study, many previous studies have shown the utilization of antenatal care service is positively associated with mother's status of education. In Nepal (NDHS, 2011) it was shown that about 90 percent of women with secondary and higher level of education attended ANC clinic, compared with 43 percent of women with lower or no education at all.

Region (ecological zones) shows a strong association with utilization of ANC. However, there is no statistically significant association between region and complete utilization of antenatal care. The antenatal care utilization varies with region. Women from Terai region are more likely to use antenatal care. Study done in Bangladesh by Amin R., shows difficult in accessibility and under-utilization of modern health services are one of the main reasons behind poor health quality in developing countries.

In pregnancy, husband's role is very crucial and influential. In Nepal most of the economic condition of a household depends upon husband's income. Husband education is the crucial factor, which affects the utilization of overall health services by wife. Many studies have shown the effect of husband's education on wife's health and decision about her health. Another study done in Nepal by Simkhada B., education status of husband's showed effect on the receipt of four or more numbers of antenatal care visit. A randomized controlled trial on ANC in Nepal found that education women and their husband's together resulted in more utilization of antenatal care.

In this study, however there is no significant association found between husband's education and women's utilization of antenatal care services.

5.4 Obstetric Characters

To evaluate the obstetric characters Parity and Wanted last child was observed.

This study suggests, there were 33.6 percent women with their first parity. About 49.0 percent were 2-3 parity, 16.8 were with 4-6 parities and only 0.5 percent with 7 or more parities. In this study, there was no association between parity and utilization of ANC.

The result of this study is similar with the study done by Win in 2001 [39], which shows no association between parity and utilization of ANC. But in contrast, there were many studies, which shows positive association between parity and ANC utilization. The study conducted by Navaneetham 2001[24]. His study outlines higher parity with less utilization of ANC services. National Demography and Health Survey (NDHS, 2011) stated that young and low parity were more likely to use ANC service. Some women find it difficult to attend antenatal care due to the responsibilities of other children.

5.5 Household Characters

The observed characters were Wealth index quintile, Ethnicity and Religion. Wealth index quintile, try to shows the economic status of the respondent, which is also one of the most influencing factors in the utilization of the ANC.

This study demonstrated that pregnant women with high wealth index quintile were more likely to attend ANC than pregnant women with lower wealth index.

Multiple studies confirmed that people with poor economic status have poor understanding and utilization of preventive, promotive and curative aspects of health care services [40]. Most of women from higher index households had better odds of attending four or more antenatal care visits. The study from 2006 Nepal DHS also found that women from higher wealth index used antenatal care more frequently than those from lower wealth index households. In another study done in Pakistan by Nisar 2003

[41], echoes that wealth index of households had significant association with utilization of antenatal care. Women from rich wealth index quintile is twice more likely to use antenatal care services.

There is no any definite result, which shows ethnicity and religion play an important role in ANC utilization due to varied issues and proper instrument to measure the differences. In study done in Nepal by Neupane S. 2011 [28], shows disadvantaged group women had ANC visits compare to advantaged group women . This study supports our study, which shows high ANC utilization by advantage group women.

5.6 Media Exposure

Media exposure is the source of information and communication. Around the world, it is believed that people's exposure to media is the main source of getting health information. By providing information it is easy for people to be convinced and realize the importance of essential services. Newspaper, Radio and Television are considered as the mainstream media in Nepal.

In this study significant number of women were not exposed media. However, listening to radio and watching television has a statistical significance is utilization of antenatal care. Watching television has statistical significance in complete utilization of antenatal care. This finding is similar with the finding of Mondal S.K (2001) [42] done in Rajasthan India, in his study it was found that women more exposed to media was more likely to utilize antenatal care than not exposed women. Women from high wealth index household have more access to health information than women from low wealth index households. This may be another reason for high wealth index women utilizing complete antenatal care services.

5.7 Relationship with other variables

There is contrast in the association and relationship between non- utilization, incomplete utilization and complete utilization of antenatal care. Non-utilization and utilization of ANC shows strong association with maternal age, education status of women, sub-region, wanted last child, wealth index, listening to radio and watching television. It shows a strong relation with middle wealth index, wanted last child and listening to radio in multivariate analysis.

Whereas, incomplete and complete utilization of ANC shows association only with education status of women, wealth index and watching television.

5.8 Benefits of the Study

Barriers to utilization of maternal health care services during pregnancy in Nepal are varied. Several studies have highlighted that geographical difficulties; diverse culture and religion that affect the utilization of services. Women's low social status, lack of knowledge about illness and lack of awareness about obstetric/gynecological danger signs, lack of decision making power and inability to pay for services also play a significant role in the underutilization of existing maternal health service.

The outcome of this secondary data analysis will be useful to the policy makers, public health authorities and health personnel to maximize their knowledge on influencing factors on the utilization antenatal care among pregnant women in mid-western development region of Nepal.

Furthermore, the result of this study will be useful for formulating new strategies, to improve overall maternity health and to checked maternal mortality. In conclusion, I believe that findings of this study will be very beneficial to all related stakeholders in taking appropriate measure to improve maternal and child health.

5.9 Conclusions

The main objective of this study was to determine the influencing factors on the utilization of antenatal care in Mid- Western region of Nepal and to explore the

relationship between the socio-demographic characteristics, household characteristics, obstetrics characteristics and media exposure with antenatal care services utilization. A total of 322 women in the mid-western region were interviewed using a standard structured questionnaire. In accordance with the finding presented in chapter 4 and by discussion done in reference with multiple researches done before, following conclusion is made.

1. The study shows more number of women used ANC services. Overall ANC utilization was 79.8%.
2. Frequency of antenatal care visits is not satisfactory among women in this region. Out of 257 who received ANC care, only 54% women received complete ANC (four or more visits)
3. Parity, husband's education and residence had no effect on the utilization of antenatal care visits in this study. Women's age, education, wanted last child and wealth index had prominent effect on utilization of ANC service.
4. Finding of this study suggest that significant approach is needed to implement to close the gaps between rich and poor with specific focus on education, health information and media exposure.
5. Regarding the test of the relationship between utilization of ANC and variables of interest, there are some relationships determined. It shows a strong relation with middle wealth index, wanted last child and listening to radio in multivariate analysis (p-value < 0.05).
6. Regarding the test of the relationship between complete utilization of ANC and variables of interest, there are also some relationships determined. A statistically significant was observed with education status of women, wealth index and watching television (p-value < 0.05).

5.10 Recommendations

On the account of the study findings and discussions, I would like to make the following recommendations and suggestions in order to maximize the antenatal care

utilization services to achieved the desired decreased maternal mortality rate and to promote the maternal health care in respective Regional Department of Health and over all Maternal Health in Nepal.

Recommendations for Policy makers:

1. As the study has revealed, higher percentage of women doesn't receive any education at all, which is the prominent elements to improve maternal health. To promote the health education, it is comparatively easy to relay message in that community where people are educated. As the result of this studies also shows the positive relationship between education status of the respondent and utilization of the ANC services. I will recommend Policy makers to give much needed attention to promote education status and the use of social media mainly television and radio in the respective geographical area.
2. In our research significant number of women did attend the antenatal care service (79.8 %). Despite this situation maternal mortality rate is still high. One of the reasons behind is incomplete or less than four recommended utilization of ANC. Policy makers also should keep this issue in high priority while formulating a policy. Complete utilization (four or more in normal pregnancy) of ANC should be recommended.
3. Create a clear and fair healthcare policy that is up to date and communicate it.
4. . Though this is not in the hand of policy makers to uplift the economic status of the citizens. Improvement in a financial situation of the family generally shows the increase in utilization of health services. Which will eventually improve the utilization of ANC and overall development of newly born babies. Policy makers may need to give an equal focus on Health Economy and to allocate sufficient budget for maternal care in Nepal and to achieve its development goals.

Recommendations for maternal and child health program in Nepal:

1. To increase the focus on complete utilization of ANC services rather than just utilization of ANC
2. Implementation of the instructions provided by policy makers.
3. To increase the involvement of community female leaders to promote maternal health
4. To encourage all pregnant women in Nepal to use antenatal care services and to provide more information to citizen thorough mass media campaign.

Recommendations for the future research:

1. This study only interviewed women who gave live birth in last two years; hence it can't be generalized for all pregnant women. Future research should be tried to include women who have given birth irrespective of only live birth.
2. Second this study concentrated on the area easily approached by transportation. As Nepal has tough geographic terrain, we encouraged other to carried out further research including area not linked to main transportation system.

5.11 Limitations.

There are always some limitations in our study. However, we tried, we will not be able to represent the reality of the circumstances in the community. In this study, only 322 respondents are included. This sample is not sufficient to represent the situation of antenatal care utilization in whole region and a country. Working in secondary data is also another limitation of this research. Women who had given birth in the last two years were included in the study. There must be some recall bias in the information provided by the respondent.

There are multiple other variables, but the variables studied in this research are mostly seen stated in various literatures. Hence, the outcomes of this research don't represent the other variables, which may play a great influence in utilization of ANC.



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APPENDIX



จุฬาลงกรณ์มหาวิทยาลัย
CHULALONGKORN UNIVERSITY

Appendix A: Questionnaire



QUESTIONNAIRE FOR INDIVIDUAL

WOMEN

Name and year of survey



WOMAN'S INFORMATION PANEL		WM
WM1. Cluster number: _____	WM2. Household number: _____	
WM3. Woman's name and line number: NAME _____	WM4. Supervisor's name and number: NAME _____	
WM5. Interviewer's name and number: NAME _____	WM6. Day / Month / Year of interview: _____ / _____ / 2 0 1 _____	

<p>Check woman's age in HL6 in LIST OF HOUSEHOLD MEMBERS, HOUSEHOLD QUESTIONNAIRE: If age 15-17, verify in HH33 that adult consent for interview is obtained or not necessary (HL20=90). If consent is needed and not obtained, the interview must not commence and '06' should be recorded in WM17.</p>	WM7. Record the time:	
	<p>_____ : _____</p> <p>HOURS MINU</p> <p>TES</p> <p>_____ : _____</p>	
<p>WM8. Check completed questionnaires in this household: Have you or another member of your team interviewed this respondent for another questionnaire?</p>	<p>YES, INTERVIEWED ALREADY..... 1</p> <p>NO, FIRST INTERVIEW..... 2</p>	<p>1 ⇒ WM9B</p> <p>2 ⇒ WM9A</p>

<p>WM9A. Hello, my name is (<i>your name</i>). We are from <i>National Statistical Office</i>. We are conducting a survey about the situation of children, families and households. I would like to talk to you about your health and other topics. This interview usually takes about <i>number</i> minutes. We are also interviewing mothers about their children. All the information we obtain will remain strictly confidential and anonymous. If you wish not to answer a question or wish to stop the interview, please let me know. May I start now?</p>	<p>WM9B. Now I would like to talk to you about your health and other topics in more detail. This interview will take about <i>number</i> minutes. Again, all the information we obtain will remain strictly confidential and anonymous. If you wish not to answer a question or wish to stop the interview, please let me know. May I start now?</p>
<p>YES, PERMISSION IS GIVEN..... 1 NO, PERMISSION IS NOT GIVEN..... 2</p>	<p>1 ⇨ WOMAN'S BACKGROUND Module 2 ⇨ WM17</p>

<p>WM17. Result of woman's interview. Discuss any result not completed with Supervisor.</p>	<p>COMPLETED01 NOT AT HOME.....02 REFUSED03 PARTLY COMPLETED.....04 INCAPACITATED (<i>specify</i>)..... 05 NO ADULT CONSENT FOR RESPONDENT AGE 15-17.....06 OTHER (<i>specify</i>)..... 96</p>
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WOMAN'S BACKGROUND		WB
WB1. Check the respondent's line number (WM3) in WOMAN'S INFORMATION PANEL and the respondent to the HOUSEHOLD QUESTIONNAIRE (HH47):	WM3=HH471 WM3≠HH472	2 ⇨ WB3
WB2. Check ED5 in EDUCATION Module in the HOUSEHOLD QUESTIONNAIRE for this respondent: Highest level of school attended:	ED5=2, 3 OR 41 ED5=0, 1 OR 82	1 ⇨ WB15 2 ⇨ WB14
WB3. In what month and year were you born?	DATE OF BIRTH MONTH.....__ __ DK MONTH.....98 YEAR__ __ __ __ DK YEAR.....9998	
WB4. How old are you? <i>Probe: How old were you at your last birthday?</i> <i>If responses to WB3 and WB4 are inconsistent, probe further and correct. Age must be recorded.</i>	AGE (IN COMPLETED YEARS) ...__ __	
WB5. Have you ever attended school or any early childhood education programme?	YES.....1 NO2	2 ⇨ WB14

WB6. What is the highest level and grade or year of school you have attended?	EARLY CHILDHOOD EDUCATION000 PRIMARY 1__ __ LOWER SECONDARY 2__ __ UPPER SECONDARY 3__ __ HIGHER 4__ __	000 ⇨WB 14
WB7. Did you complete that (grade/year)?	YES.....1 NO2	
WB8. Check WB4: Age of respondent:	AGE 15-24.....1 AGE 25-49.....2	2 ⇨WB13
WB9. At any time during the current school year did you attend school?	YES.....1 NO2	2 ⇨WB11
WB10. During this current school year, which level and grade or year are you <u>attending</u> ?	PRIMARY 1__ __ LOWER SECONDARY 2__ __ UPPER SECONDARY 3__ __ HIGHER 4__ __	

WB11. At any time during the previous school year did you attend school?	YES.....1 NO2	2 ⇒WB13
WB12. During that previous school year, which level and grade or year did you <u>attend</u> ?	PRIMARY 1__ __ LOWER SECONDARY 2__ __ UPPER SECONDARY 3__ __ HIGHER 4__ __	
WB13. Check WB6: Highest level of school attended:	WB6=2, 3 OR 41 WB6=000 OR 12	1 ⇒WB15
WB14. Now I would like you to read this sentence to me. <i>Show sentence on the card to the respondent.</i> <i>If respondent cannot read whole sentence, probe: Can you read part of the sentence to me?</i>	CANNOT READ AT ALL.....1 ABLE TO READ ONLY PARTS OF SENTENCE.....2 ABLE TO READ WHOLE SENTENCE 3 NO SENTENCE IN REQUIRED LANGUAGE / BRAILLE (specify) _____ 6	
WB15. How long have you been continuously living in (<i>name of current city, town or village of residence</i>)? <i>If less than one year, record '00' years.</i>	YEARS__ __ ALWAYS / SINCE BIRTH.....95	95 ⇒WB1 8

<p>WB16. Just before you moved here, did you live in a city, in a town, or in a rural area?</p> <p><i>Probe to identify the type of place.</i></p> <p><u><i>If unable to determine whether the place is a city, a town or a rural area, write the name of the place and then temporarily record '9' until you learn the appropriate category for the response.</i></u></p> <p>_____</p> <p><i>(Name of place)</i></p>	<p>CITY.....1</p> <p>TOWN.....2</p> <p>RURAL AREA.....3</p>	
<p>WB17. Before you moved here, in which region did you live in?</p>	<p>REGION 101</p> <p>REGION 202</p> <p>REGION 303</p> <p>REGION 404</p> <p>REGION 505</p> <p>OUTSIDE OF COUNTRY (specify) _____ 96</p>	
<p>WB18. Are you covered by any health insurance?</p>	<p>YES.....1</p> <p>NO2</p>	2⇒End
<p>WB19. What type of health insurance are you covered by?</p> <p><i>Record all mentioned.</i></p>	<p>MUTUAL HEALTH ORGANIZATION / COMMUNITY-BASED HEALTH INSURANCEA</p> <p>HEALTH INSURANCE THROUGH EMPLOYER.....B</p> <p>SOCIAL SECURITYC</p> <p>OTHER PRIVATELY PURCHASED COMMERCIAL HEALTH INSURANCED</p> <p>OTHER (specify) _____X</p>	

MASS MEDIA AND ICT		MT
<p>MT1. Do you read a newspaper or magazine at least once a week, less than once a week or not at all?</p> <p><i>If 'At least once a week', probe:</i> Would you say this happens almost every day? <i>If 'Yes' record 3, if 'No' record 2.</i></p>	<p>NOT AT ALL.....0 LESS THAN ONCE A WEEK.....1 AT LEAST ONCE A WEEK2 ALMOST EVERY DAY3</p>	
<p>MT2. Do you listen to the radio at least once a week, less than once a week or not at all?</p> <p><i>If 'At least once a week', probe:</i> Would you say this happens almost every day? <i>If 'Yes' record 3, if 'No' record 2</i></p>	<p>NOT AT ALL.....0 LESS THAN ONCE A WEEK.....1 AT LEAST ONCE A WEEK2 ALMOST EVERY DAY3</p>	
<p>MT3. Do you watch television at least once a week, less than once a week or not at all?</p> <p><i>If 'At least once a week', probe:</i> Would you say this happens almost every day? <i>If 'Yes' record 3, if 'No'</i></p>	<p>NOT AT ALL.....0 LESS THAN ONCE A WEEK.....1 AT LEAST ONCE A WEEK2 ALMOST EVERY DAY3</p>	

<i>record 2</i>		
MT4. Have you ever used a computer or a tablet from any location?	YES..... 1 NO 2	2 ⇒ MT9
MT5. During the last 3 months, did you use a computer or a tablet at least once a week, less than once a week or not at all? <i>If 'At least once a week', probe: Would you say this happened almost every day? If 'Yes' record 3, if 'No' record 2</i>	NOT AT ALL..... 0 LESS THAN ONCE A WEEK..... 1 AT LEAST ONCE A WEEK 2 ALMOST EVERY DAY 3	0 ⇒ MT9
MT6. During the last 3 months, did you: [A] Copy or move a file or folder? [B] Use a copy and paste tool to duplicate or move information within a document? [C] Send e-mail with attached file, such as a document, picture or video? [D] Use a basic arithmetic formula in a spreadsheet? [E] Connect and install a new device, such as a modem, camera or printer? [F] Find, download, install and configure software?	YES N O COPY/MOVE FILE 1 2 USE COPY/PASTE IN DOCUMENT 1 2 SEND E-MAIL WITH ATTACHMENT 1 2 USE BASIC SPREADSHEET FORMULA . 1 2 CONNECT DEVICE..... 1 2 INSTALL SOFTWARE 1 2 CREATE PRESENTATION 1 2	

<p>[G] Create an electronic presentation with presentation software, including text, images, sound, video or charts?</p> <p>[H] Transfer a file between a computer and other device?</p> <p>[I] Write a computer program in any programming language?</p>	<p>TRANSFER FILE 1 2</p> <p>PROGRAMMING 1 2</p>	
<p>MT7. Check MT6[C]: Is 'Yes' recorded?</p>	<p>YES, MT6[C]=1 1</p> <p>NO, MT6[C]=2 2</p>	<p>1 ⇒ MT10</p>
<p>MT8. Check MT6[F]: Is 'Yes' recorded?</p>	<p>YES, MT6[F]=1 1</p> <p>NO, MT6[F]=2 2</p>	<p>1 ⇒ MT10</p>
<p>MT9. Have you ever used the internet from any location and any device?</p>	<p>YES 1</p> <p>NO 2</p>	<p>2 ⇒ MT11</p>
<p>MT10. During the last 3 months, did you use the internet at least once a week, less than once a week or not at all?</p> <p><i>If 'At least once a week', probe:</i> Would you say this happens almost every day? <i>If 'Yes' record 3, if 'No' record 2.</i></p>	<p>NOT AT ALL 0</p> <p>LESS THAN ONCE A WEEK 1</p> <p>AT LEAST ONCE A WEEK 2</p> <p>ALMOST EVERY DAY 3</p>	

MT11. Do you own a mobile phone?	YES.....1 NO2	
MT12. During the last 3 months, did you use a mobile telephone at least once a week, less than once a week or not at all? <i>Probe if necessary:</i> I mean have you communicated with someone using a mobile phone. <i>If 'At least once a week', probe:</i> Would you say this happens almost every day? <i>If 'Yes' record 3, if 'No' record 2.</i>	NOT AT ALL.....0 LESS THAN ONCE A WEEK.....1 AT LEAST ONCE A WEEK2 ALMOST EVERY DAY3	

DESIRE FOR LAST BIRTH		DB
<p>DB1. Check CM17: Was there a live birth in the last 2 years?</p> <p><i>Copy name of last birth listed in the birth history (CM18) to here and use where indicated:</i></p> <p>Name _____</p>	<p>YES, CM17=11</p> <p>NO, CM17=02</p>	2 ⇨ End
<p>DB2. When you got pregnant with (<i>name</i>), did you want to get pregnant at that time?</p>	<p>YES1</p> <p>NO2</p>	1 ⇨ End
<p>DB3. Check CM11: Number of births:</p>	<p>ONLY 1 BIRTH1</p> <p>2 OR MORE BIRTHS2</p>	1 ⇨ DB4 A 2 ⇨ DB4 B
<p>DB4A. Did you want to have a baby later on, or did you not want any children?</p> <p>DB4B. Did you want to have a baby later on, or did you not want any more children?</p>	<p>LATER1</p> <p>NO MORE2</p>	


MATERNAL AND NEWBORN HEALTH		MN
<p>MN1. Check CM17: Was there a live birth in the last 2 years?</p> <p><i>Copy name of last birth listed in the birth history (CM18) to here and use where indicated:</i></p> <p>Name _____</p>	YES, CM17=1 1 NO, CM17=0.....2	2 ⇒End
<p>MN2. Did you see anyone for antenatal care during your pregnancy with (<i>name</i>)?</p>	YES 1 NO2	2 ⇒MN7
<p>MN3. Whom did you see?</p> <p><i>Probe: Anyone else?</i></p> <p><i>Probe for the type of person seen and record all answers given.</i></p>	<p>HEALTH PROFESSIONAL</p> DOCTOR.....A NURSE / MIDWIFE B INSERT OTHER QUALIFIED..... C <p>OTHER PERSON</p> TRADITIONAL BIRTH ATTENDANT F COMMUNITY HEALTH WORKER G OTHER (<i>specify</i>) _____ X	
<p>MN4. How many weeks or months pregnant were you when you first received antenatal care for this pregnancy?</p> <p><i>Record the answer as stated by respondent. If "9 months" or later, record 9.</i></p>	WEEKS 1 _ _ MONTHS 2 <u>0</u> _ DK998	

<p>MN5. How many times did you receive antenatal care during this pregnancy?</p> <p><i>Probe to identify the number of times antenatal care was received. If a range is given, record the minimum number of times antenatal care received.</i></p>	<p>NUMBER OF TIMES.....__ __</p> <p>DK98</p>	
<p>MN6. As part of your antenatal care during this pregnancy, were any of the following done at least once:</p> <p>[A] Was your blood pressure measured?</p> <p>[B] Did you give a urine sample?</p> <p>[C] Did you give a blood sample?</p>	<p>YES</p> <p>NO</p> <p>BLOOD PRESSURE 12</p> <p>URINE SAMPLE 12</p> <p>BLOOD SAMPLE 12</p>	
<p>MN7. Do you have a card or other document with your own immunizations listed?</p> <p><i>If yes, ask: May I see it please?</i></p> <p><i>If a card is presented, use it to assist with answers to the following questions.</i></p>	<p>YES (CARD OR OTHER DOCUMENT SEEN).....1</p> <p>YES (CARD OR OTHER DOCUMENT NOT SEEN).....2</p> <p>NO3</p> <p>DK8</p>	

<p>MN8. When you were pregnant with (<i>name</i>), did you receive any injection in the arm or shoulder to prevent the baby from getting tetanus, that is, convulsions after birth?</p>	<p>YES1 NO2 DK8</p>	<p>2 ⇒ <i>MNI</i> 1 8 ⇒ <i>MNI</i> 1</p>
<p>MN9. How many times did you receive this tetanus injection during your pregnancy with (<i>name</i>)?</p>	<p>NUMBER OF TIMES DK8</p>	<p>8 ⇒ <i>MNI</i> 1</p>
<p>MN10. Check MN9: How many tetanus injections during last pregnancy were reported?</p>	<p>ONLY 1 INJECTION.....1 2 OR MORE INJECTIONS2</p>	<p>2 ⇒ <i>MNI</i> 5</p>
<p>MN11. At any time before your pregnancy with (<i>name</i>), did you receive any tetanus injection either to protect yourself or another baby?</p> <p><i>Include DPT (Tetanus) vaccinations received as a child if mentioned.</i></p>	<p>YES1 NO2 DK8</p>	<p>2 ⇒ <i>MNI</i> 5 8 ⇒ <i>MNI</i> 5</p>
<p>MN12. Before your pregnancy with (<i>name</i>), how many times did you receive a tetanus injection?</p> <p><i>If 7 or more times, record '7'. Include DPT (Tetanus) vaccinations received as a child if mentioned.</i></p>	<p>NUMBER OF TIMES DK8</p>	
<p>MN13. Check MN12: How many tetanus injections before last pregnancy were reported?</p>	<p>ONLY 1 INJECTION.....1 2 OR MORE INJECTIONS OR DK2</p>	<p>1 ⇒ <i>MNI</i> 4A 2 ⇒ <i>MNI</i> 4B</p>

<p>MN14A. How many years ago did you receive that tetanus injection</p> <p>MN14B. How many years ago did you receive the last of those tetanus injections?</p> <p><i>The reference is to the last injection received <u>prior</u> to this pregnancy, as recorded in MN12.</i></p> <p><i>If less than 1 year, record '00'.</i></p>	<p>YEARS AGO _ _</p> <p>DK98</p>	
<p>MN15. Check MN2: Was antenatal care received?</p>	<p>YES, MN2=1 1</p> <p>NO, MN2=2 2</p>	<p>2 ⇒ MN1 9</p>
<p>MN16. During the pregnancy with (<i>name</i>), did you take SP/Fansidar to keep <u>you</u> from getting malaria?</p>	<p>YES 1</p> <p>NO 2</p> <p>DK 8</p>	<p>2 ⇒ MN1 9</p> <p>8 ⇒ MN1 9</p>
<p>MN17. How many times did you take SP/Fansidar during your pregnancy with (<i>name</i>)?</p>	<p>NUMBER OF TIMES _ _</p> <p>DK98</p>	
<p>MN18. Did you get the SP/Fansidar during an antenatal care visit, during another visit to a health facility or at another source?</p>	<p>ANTENATAL VISIT A</p> <p>ANOTHER FACILITY VISIT B</p> <p>OTHER SOURCE (<i>specify</i>) X</p>	

<p>MN19. Who assisted with the delivery of <i>(name)</i>?</p> <p><i>Probe: Anyone else?</i></p> <p><i>Probe for the type of person assisting and record all answers given.</i></p>	<p>HEALTH PROFESSIONAL</p> <p>DOCTOR..... A</p> <p>NURSE / MIDWIFE B</p> <p>INSERT OTHER QUALIFIED..... C</p> <p>OTHER PERSON</p> <p>TRADITIONAL BIRTH</p> <p>ATTENDANT F</p> <p>COMMUNITY HEALTH WORKER G</p> <p>RELATIVE / FRIEND H</p> <p>OTHER (<i>specify</i>) _____ X</p> <p>NO ONE Y</p>	
<p>MN20. Where did you give birth to <i>(name)</i>?</p> <p><i>Probe to identify the type of place.</i></p> <p><i>If unable to determine whether public or private, write the name of the place and then temporarily record '96' until you learn the appropriate category for the response.</i></p> <p>_____</p> <p>(<i>Name of place</i>)</p>	<p>HOME</p> <p>RESPONDENT'S HOME 11</p> <p>OTHER HOME 12</p> <p>PUBLIC MEDICAL SECTOR</p> <p>GOVERNMENT HOSPITAL 21</p> <p>GOVERNMENT CLINIC /</p> <p>HEALTH CENTRE..... 22</p> <p>GOVERNMENT HEALTH POST 23</p> <p>OTHER PUBLIC (<i>specify</i>) _____ 26</p> <p>PRIVATE MEDICAL SECTOR</p> <p>PRIVATE HOSPITAL 31</p> <p>PRIVATE CLINIC 32</p> <p>PRIVATE MATERNITY HOME 33</p> <p>OTHER PRIVATE MEDICAL</p> <p>(<i>specify</i>) _____ 36</p> <p>OTHER (<i>specify</i>) _____ 96</p>	<p>11 ⇔ MN2</p> <p>3</p> <p>12 ⇔ MN2</p> <p>3</p> <p>96 ⇔ MN2</p> <p>3</p>
<p>MN21. Was <i>(name)</i> delivered by caesarean section? That is, did they cut your belly open to take the baby out?</p>	<p>YES 1</p> <p>NO 2</p>	<p>2 ⇔ MN2</p> <p>3</p>

<p>MN22. When was the decision made to have the caesarean section?</p> <p><i>Probe if necessary:</i> Was it before or after your labour pains started?</p>	<p>BEFORE LABOUR PAINS1 AFTER LABOUR PAINS.....2</p>	
<p>MN23. Immediately after the birth, was (<i>name</i>) put directly on the bare skin of your chest?</p> <p><i>If necessary, show the picture of skin-to-skin position.</i></p>  <p><small>Photo Credit: Joyce Godwin</small></p>	<p>YES1 NO2</p> <p>DK/ DON'T REMEMBER8</p>	<p>2 ⇒ MN2 5</p> <p>8 ⇒ MN2 5</p>
<p>MN24. Before being placed on the bare skin of your chest, was the baby wrapped up?</p>	<p>YES1 NO2</p> <p>DK/ DON'T REMEMBER8</p>	
<p>MN25. Was (<i>name</i>) dried or wiped soon after birth?</p>	<p>YES1 NO2</p> <p>DK/ DON'T REMEMBER8</p>	
<p>MN26. How long after the birth was (<i>name</i>) bathed for the first time?</p> <p><i>If less than 1 hour, record '00' hours.</i></p>	<p>IMMEDIATELY000</p> <p>HOURS1 __ __</p> <p>DK / DON'T REMEMBER998</p>	
<p>MN27. Check MN20: Was the child delivered in a health facility?</p>	<p>YES, MN20=21-36.....1 NO, MN20=11-12 or 96.....2</p>	<p>1 ⇒ MN3 0</p>

MN28. What was used to cut the cord?	NEW BLADE.....1 BLADE USED FOR OTHER PURPOSES2 SCISSORS.....3 OTHER (<i>specify</i>).....6 DK8	
MN29. Was the instrument used to cut the cord boiled or sterilised prior to use?	YES1 NO2 DK / DON'T REMEMBER8	
MN30. After the cord was cut and until it fell off, was anything applied to the cord?	YES1 NO2 DK / DON'T REMEMBER8	2 ⇒ MN3 2 8 ⇒ MN3 2
MN31. What was applied to the cord? <i>Probe:</i> Anything else?	CHLORHEXIDINE..... A OTHER ANTISEPTIC (ALCOHOL, SPIRIT, GENTIAN VIOLET)..... B MUSTARD OIL C ASH..... D ANIMAL DUNG..... E OTHER (<i>specify</i>) X DK / DON'T REMEMBER Y	
MN32. When (<i>name</i>) was born, was (he/she) very large, larger than average, average, smaller than average, or very small?	VERY LARGE1 LARGER THAN AVERAGE2 AVERAGE3 SMALLER THAN AVERAGE4 VERY SMALL.....5 DK8	

MN33. Was (<i>name</i>) weighed at birth?	YES1 NO2 DK8	2 ⇒MN3 5 8 ⇒MN3 5
MN34. How much did (<i>name</i>) weigh? <i>If a card is available, record weight from card.</i>	FROM CARD..... 1 (KG) __ . __ __ __ FROM RECALL 2 (KG) __ . __ __ __ DK99998	
MN35. Has your menstrual period returned since the birth of (<i>name</i>)?	YES1 NO2	
MN36. Did you ever breastfeed (<i>name</i>)?	YES1 NO2	2 ⇒MN3 9B
MN37. How long after birth did you first put (<i>name</i>) to the breast? <i>If less than 1 hour, record '00' hours.</i> <i>If less than 24 hours, record hours.</i> <i>Otherwise, record days.</i>	IMMEDIATELY000 HOURS 1 __ __ DAYS 2 __ __ DK / DON'T REMEMBER998	
MN38. In the first three days after delivery, was (<i>name</i>) given anything to drink other than breast milk?	YES1 NO2	1 ⇒MN3 9A 2 ⇒End

<p>MN39A. What was (<i>name</i>) given to drink?</p> <p><i>Probe: Anything else?</i></p> <p><i>'Not given anything to drink' is not a valid response and response category Y cannot be recorded.</i></p> <p>MN39B. In the first three days after delivery, what was (<i>name</i>) given to drink?</p> <p><i>Probe: Anything else?</i></p> <p><i>'Not given anything to drink' (category Y) can only be recorded if no other response category is recorded.</i></p>	<p>MILK (OTHER THAN BREAST MILK)..... A</p> <p>PLAIN WATER B</p> <p>SUGAR OR GLUCOSE WATER..... C</p> <p>GRIPE WATER D</p> <p>SUGAR-SALT-WATER SOLUTION.. E</p> <p>FRUIT JUICE..... F</p> <p>INFANT FORMULA G</p> <p>TEA / INFUSIONS / TRADITIONAL HERBAL PREPARATIONS..... H</p> <p>HONEY I</p> <p>PRESCRIBED MEDICINE J</p> <p>OTHER (<i>specify</i>) _____ X</p> <p>NOT GIVEN ANYTHING TO DRINK Y</p>	
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MATERNAL MORTALITY		MM
<p>MM1. 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.</p>		
How many children did your mother give birth to, including yourself?	NUMBER OF BIRTHS TO NATURAL MOTHER ____ ____	
MM2. Check <i>MM1</i> : How many births?	ONE BIRTH (RESPONDENT ONLY). 1 TWO OR MORE BIRTHS 2	1 ⇒ End
MM3. How many of these births did your mother have before you were born?	NUMBER OF PRECEDING BIRTHS ____ ____	

	[S1] OLDEST	[S2] 2 ND OLDEST	[S3] 3 RD OLDEST	[S4] 4 TH OLDEST
MM4. What name was given to your (<i>column title</i>) brother or sister?	_____	_____	_____	_____
MM5. Is (<i>name</i>) male or female?	MALE..... 1 FEMALE .. 2	MALE 1 FEMALE... 2	MALE1 FEMALE ...2	MALE1 FEMALE ...2
MM6. Is (<i>name</i>) still alive?	YES 1 NO 2 ☺ <i>MM8</i> DK 8 ☺ <i>MM16</i>	YES 1 NO 2 ☺ <i>MM8</i> DK 8 ☺ <i>MM16</i>	YES 1 NO 2 ☺ <i>MM8</i> DK 8 ☺ <i>MM16</i>	YES 1 NO 2 ☺ <i>MM8</i> DK 8 ☺ <i>MM16</i>
MM7. How old is (<i>name</i>)?	____ ____ ☺ <i>MM16</i>	____ ____ ☺ <i>MM16</i>	____ ____ ☺ <i>MM16</i>	____ ____ ☺ <i>MM16</i>
MM8. How many years ago did (<i>name</i>) die?	____ ____	____ ____	____ ____	____ ____
MM9. How old was (<i>name</i>) when (he/she) died?	____ ____	____ ____	____ ____	____ ____

MM10. Check MM5: Is the sibling male?	YES 1 ☺ MM16 NO 2	YES 1 ☺ MM16 NO 2	YES 1 ☺ MM16 NO 2	YES 1 ☺ MM16 NO 2
MM11. Check MM9: Did the sibling die before age 12?	YES 1 ☺ MM16 NO 2	YES 1 ☺ MM16 NO 2	YES 1 ☺ MM16 NO 2	YES 1 ☺ MM16 NO 2
MM12. Was (<i>name</i>) pregnant when she died?	YES 1 ☺ MM15 NO 2	YES 1 ☺ MM15 NO 2	YES 1 ☺ MM15 NO 2	YES 1 ☺ MM15 NO 2
MM13. Did (<i>name</i>) die during childbirth?	YES 1 ☺ MM15 NO 2	YES 1 ☺ MM15 NO 2	YES 1 ☺ MM15 NO 2	YES 1 ☺ MM15 NO 2
MM14. Did (<i>name</i>) 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
MM15. How many live born children did (<i>name</i>) give birth to during her lifetime?	_____	_____	_____	_____
MM16. Check MM4: Is there a younger sibling?	YES 1 ☺ [S2] NO 2 ☺ End	YES 1 ☺ [S3] NO 2 ☺ End	YES 1 ☺ [S4] NO 2 ☺ End	YES 1 ☺ [S5] NO 2 ☺ End

	[S5] 5 TH OLDEST	[S6] 6 TH OLDEST	[S7] 7 TH OLDEST	[S8] 8 TH OLDEST
MM4. What name was given to your (<i>column title</i>) brother or sister?	_____	_____	_____	_____
MM5. Is (<i>name</i>) male or female?	MALE 1 FEMALE .. 2	MALE 1 FEMALE ... 2	MALE 1 FEMALE ... 2	MALE 1 FEMALE ... 2

MM6. Is (<i>name</i>) still alive?	YES 1 NO 2 ☺ MM8 DK 8 ☺ MM16	YES 1 NO 2 ☺ MM8 DK 8 ☺ MM16	YES 1 NO 2 ☺ MM8 DK 8 ☺ MM16	YES 1 NO 2 ☺ MM8 DK 8 ☺ MM16
MM7. How old is (<i>name</i>)?	— — ☺ MM16	— — ☺ MM16	— — ☺ MM16	— — ☺ MM16
MM8. How many years ago did (<i>name</i>) die?	— —	— —	— —	— —
MM9. How old was (<i>name</i>) when (he/she) died?	— —	— —	— —	— —
MM10. Check MM5: Is the sibling male?	YES 1 ☺ MM16 NO 2	YES 1 ☺ MM16 NO 2	YES 1 ☺ MM16 NO 2	YES 1 ☺ MM16 NO 2
MM11. Check MM9: Did the sibling die before age 12?	YES 1 ☺ MM16 NO 2	YES 1 ☺ MM16 NO 2	YES 1 ☺ MM16 NO 2	YES 1 ☺ MM16 NO 2
MM12. Was (<i>name</i>) pregnant when she died?	YES 1 ☺ MM15 NO 2	YES 1 ☺ MM15 NO 2	YES 1 ☺ MM15 NO 2	YES 1 ☺ MM15 NO 2
MM13. Did (<i>name</i>) die during childbirth?	YES 1 ☺ MM15 NO 2	YES 1 ☺ MM15 NO 2	YES 1 ☺ MM15 NO 2	YES 1 ☺ MM15 NO 2
MM14. Did (<i>name</i>) 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

MM15. How many live born children did (<i>name</i>) give birth to during her lifetime?	_____	_____	_____	_____
MM16. Check MM4: Is there a younger sibling?	YES 1 ☺ [S6]	YES 1 ☺ [S7]	YES 1 ☺ [S8]	YES 1 ☺ [S9]
	NO 2 ☺ End	NO 2 ☺ End	NO 2 ☺ End	NO 2 ☺ End
				Tick here if additional questionnaire Used:..... <input type="checkbox"/>



HOUSEHOLD ENERGY USE		EU
EU1. In your household, what type of cookstove is <u>mainly</u> used for <u>cooking</u> ?	ELECTRIC STOVE01	01 ⇨EU5
	SOLAR COOKER..... 02	02 ⇨EU5
	LIQUEFIED PETROLEUM GAS (LPG)/ COOKING GAS STOVE03	03 ⇨EU5
	PIPED NATURAL GAS STOVE.....04	04 ⇨EU5
	BIOGAS STOVE05	05 ⇨EU5
		06 ⇨EU4
	LIQUID FUEL STOVE06	
	MANUFACTURED SOLID FUEL STOVE.....07	09 ⇨EU4
	TRADITIONAL SOLID FUEL STOVE.....08	96 ⇨EU4
	THREE STONE STOVE / OPEN FIRE	97 ⇨EU6
	OTHER (<i>specify</i>) _____ 96	
	NO FOOD COOKED IN HOUSEHOLD 97	
EU2. Does it have a chimney?	YES 1	
	NO2	
	DK8	
EU3. Does it have a fan?	YES 1	
	NO2	
	DK8	

<p>EU4. What type of fuel or energy source is used in this cookstove?</p> <p><i>If more than one, record the main energy source for this cookstove.</i></p>	<p>ALCOHOL / ETHANOL.....01</p> <p>GASOLINE / DIESEL02</p> <p>KEROSENE / PARAFFIN.....03</p> <p>COAL / LIGNITE04</p> <p>CHARCOAL05</p> <p>WOOD.....06</p> <p>CROP RESIDUE / GRASS / STRAW / SHRUBS07</p> <p>ANIMAL DUNG / WASTE.....08</p> <p>PROCESSED BIOMASS (PELLETS) OR WOODCHIPS 09</p> <p>GARBAGE / PLASTIC 10</p> <p>SAWDUST 11</p> <p>OTHER (<i>specify</i>) _____ 96</p>	
<p>EU5. Is the cooking usually done in the house, in a separate building, or outdoors?</p> <p><i>If in main house, probe to determine if cooking is done in a separate room.</i></p> <p><i>If outdoors, probe to determine if cooking is done on veranda, covered porch, or open air.</i></p>	<p>IN MAIN HOUSE</p> <p>NO SEPARATE ROOM.....1</p> <p>IN A SEPARATE ROOM2</p> <p>IN A SEPARATE BUILDING3</p> <p>OUTDOORS</p> <p>OPEN AIR4</p> <p>ON VERANDA OR COVERED PORCH5</p> <p>OTHER (<i>specify</i>) _____ 6</p>	

EU6. What does your household <u>mainly</u> use for <u>space heating</u> when needed?	CENTRAL HEATING.....01 MANUFACTURED SPACE HEATER 02 TRADITIONAL SPACE HEATER.....03 MANUFACTURED COOKSTOVE04 TRADITIONAL COOKSTOVE.....05 THREE STONE STOVE / OPEN FIRE 06 OTHER (<i>specify</i>)_____ 96 NO SPACE HEATING IN HOUSEHOLD 97	01 ⇒EU8 06 ⇒EU8 96 ⇒EU8 97 ⇒EU9
EU7. Does it have a chimney?	YES1 NO2 DK8	

<p>EU8. What type of fuel and energy source is used in this heater?</p> <p><i>If more than one, record the main energy source for this heater.</i></p>	<p>SOLAR AIR HEATER01</p> <p>ELECTRICITY02</p> <p>PIPED NATURAL GAS03</p> <p>LIQUEFIED PETROLEUM GAS (LPG)/ COOKING GAS04</p> <p>BIOGAS05</p> <p>ALCOHOL / ETHANOL06</p> <p>GASOLINE / DIESEL07</p> <p>KEROSENE / PARAFFIN08</p> <p>COAL / LIGNITE09</p> <p>CHARCOAL10</p> <p>WOOD11</p> <p>CROP RESIDUE / GRASS / STRAW / SHRUBS12</p> <p>ANIMAL DUNG / WASTE13</p> <p>PROCESSED BIOMASS (PELLETS) OR WOODCHIPS 14</p> <p>GARBAGE / PLASTIC 15</p> <p>SAWDUST 16</p> <p>OTHER (<i>specify</i>)96</p>	
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<p>EU9. At night, what does your household <u>mainly</u> use to <u>light</u> the household?</p>	<p>ELECTRICITY01</p> <p>SOLAR LANTERN02</p> <p>RECHARGEABLE FLASHLIGHT, TORCH OR LANTERN03</p> <p>BATTERY POWERED FLASHLIGHT, TORCH OR LANTERN 04</p> <p>BIOGAS LAMP 05</p> <p>GASOLINE LAMP 06</p> <p>KEROSENE OR PARAFFIN LAMP 07</p> <p>CHARCOAL..... 08</p> <p>WOOD 09</p> <p>CROP RESIDUE / GRASS / STRAW / SHRUBS10</p> <p>ANIMAL DUNG / WASTE.....11</p> <p>OIL LAMP..... 12</p> <p>CANDLE.....13</p> <p>OTHER (<i>specify</i>) _____ 96</p> <p>NO LIGHTING IN HOUSEHOLD 97</p>	
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Appendix B: Sample Design

The major features of the sample design are described in this appendix. Sample design features include the target sample size, sample allocation, sampling frame and listing, choice of domains, sampling stages, stratification and the calculation of sample weights.

The primary objective of the sample design for the BiH Multiple Indicator Cluster Survey was to produce statistically reliable estimates of most indicators at the BiH, F BiH and RS level and for urban and rural areas.⁵⁰

A two stage stratified sampling approach was used for the selection of the cluster sample.

Sample Universe

The official population estimate for BiH is 3.8 million inhabitants living in about one million households.⁵¹ However, some sampling frame exercises conducted due to the lack of an official Census since 1991 estimate this number at approximately 3.3 million.

As stated previously, BiH is composed of three administrative units: two entities, the F BiH and RS and a third administrative unit, BD. The F BiH covers approximately 51 per cent of the territory of BiH and 62 per cent of the population. RS covers approximately 49 per cent of the territory and about 36 per cent of the population and BD covers less than 1 per cent of the territory and approximately 2 per cent of the population.

Sample Size and Sample Allocation

The target sample size was 6,800⁵² households, which was determined based on lessons learned through the previous round of MICS as well as by budgetary limitations. The standard sample design used in most of the countries participating in the MICS program needed to be adapted for BiH due to the low birth rate; therefore, it was necessary to target (oversample) households with children under 5 and members aged 5-24.

Accordingly, the sample was stratified by households with children under 5 (type 1), households with children aged 5-24 (type 2) and all other households (type 3). In addition, the size of the three strata could not jeopardize the indicator estimates for the other target populations, such as the indicators that referred to fertile women.

As the sample size was defined as 6,800 households it was necessary to calculate the size of stratum 1 and stratum 2. The size of stratum 3 was obtained as the difference between the total sample size and the sum of the size of strata 1 and 2.

In the calculation of the sample size for stratum 1 the key indicator used was immunization coverage by all vaccines amongst children aged 18-29 months. In the calculation for the sample size for stratum 2 the key indicator used was the net secondary school attendance ratio. The below formula was used to estimate the required sample size for this indicator.

$$n = \frac{[4(r)(1-r)(f)(1.1)]}{[(0.12r)^2(p)(\bar{n})]}$$

Wherein:

- - n is the required sample size, expressed as number of households
- - 4 is a factor to achieve the 95 percent level of confidence
- - r is the predicted or anticipated value of the indicator, expressed in the form of a proportion

- - $deff$ is the design effect for the indicator, estimated from a previous survey or using a default value of 1.5
- - $0.12r$ is the margin of error to be tolerated at the 95 percent level of confidence, defined as 12 percent of r (relative margin of error of r)
- - pb is the proportion of the total population upon which the indicator, r , is based
- - $AveSize$ is the average household size (number of persons per household)
- - RR is the predicted response rate

In the calculation of the sample size of stratum 1, needed for a stratified sample design, ' r ' (children immunized by all vaccines) was assumed to be 61.2 per cent. The value of $deff$ (design effect) was taken as 3, based on the estimate from the previous survey, ' p ' (percentage of children under 5 years in the total population of households with children under 5) was taken as 5.1 per cent, \bar{n} (average size of households with children under 5) was taken as 4.6 members and the response rate assumed to be 90 per cent.

The indicator for children (aged 18-29 months) immunized by all vaccines required 2,494 households with children under 5, which was very close to the available 2,441 households. Using a non-stratified design, the same indicator would have required 10,236 households, which was much further from the available 6,800 households.

In the calculation of the sample size of stratum 2, needed for a stratified sample design, ' r ' (net secondary school attendance ratio) was assumed to be 79.3 per cent. The value

of *deff* (design effect) was taken as 1.53 based on the estimate from the previous survey, while '*p*' (percentage of children aged 5-24 years in the total population of households with members aged 5-24 years) was taken as 2.2 per cent; \bar{n} (average size of households with children aged 5-24 years) was taken as 3.4 members and the response rate was assumed to be 90 per cent.

The sample was selected at the level of BiH and the main geographic domains (administrative units: the FBiH, RS and BD) were not equally represented in the sample.

Table SD.1 presents the allocation of clusters (enumeration areas (EAs)) for the sampling domains.

Table SD.1: Allocation of clusters (primary selection units) by stratum

Administrative unit	Number of households ¹	Number of EAs	Number of clusters in the MICS4 Master Sample Frame
	(2009 Master Sample)	(2009 Master Sample)	(2010)
FBiH	48,853	840	263
RS	26,994	587	212
BD	4,222	72	25
Total	80,069	1,499	500

¹ Households that are considered to be present in BiH

Sampling Frame and Selection of Clusters

Since the last census in BiH was conducted in 1991 the selection of primary sampling units (PSUs) required the development of a relevant master sample frame. Census 1991 EAs were defined as PSUs and the Master Sample was used for this purpose. The

Master Sample was updated in 2009 and consisted of 1,449 EAs that were selected systematically with equal probability from about 20,000 census 1991 EAs, covering the entire territory of BiH.

Lessons learned from the previous MICS rounds were that there is a need to oversample the population in RS and BD. The master sample frame of EAs was stratified by the administrative units in BiH, namely the F BiH, RS and BD. Oversampling of the population in RS and BD was conducted during the selection of the EAs for the master sample frame. Five-hundred EAs were systematically selected with equal probability from the Master Sample. EAs represent clusters in the survey. Table SD.2 compares the distribution of households in BiH with the distribution of sampled EAs.

Table SD.2: Percentage of selected EAs within the sampling frame

Administrative unit	Percentage of selected EAs	Percentage of households in BiH
F BiH	52.7	61.8
RS	42.1	36.3
BD	5.2	1.8
Total	100.0	100.0

Listing Activities

Since the most recent Master Sample for BiH was prepared in 2009 it was necessary to update the list of households in the selected EAs prior to the selection of households. The Agency for Statistics of BiH, the Federal Office of Statistics and the Republic of Srpska Institute of Statistics conducted the listing activities in December 2010. Listing was conducted in 484 EAs out of the 500 sampled census 1991 EAs, because 10 EAs were inaccessible due to flooding and six were discarded because of the poor quality of

data collection (see Table SD.3).

Table SD.3: Allocation of selected EAs, updated EAs and EAs in the sample by administrative unit in BiH

Administrative unit	Number of sampled EAs	Number of sampled EAs in which listing was conducted ⁵⁴	Number of EAs where the MICS4 survey was actually implemented
FBiH	263	255	250
RS	212	204	199
BD	25	25	25
Total	500	484	474

In 484 EAs in the master sample frame, 22,619 households were listed.⁵⁵ Following the listing, it was determined that there is a large variability in the number of households by EA.

Selection of Households

Following the listing in 484 EAs, the households were divided into three second stage strata.⁵⁶

(1) Households with children under 5 (2,441 households)

(2) Households with members aged 5-24, (8,265 households)

(3) All of the remaining households without children (11,913 households)

The list of households for each second stage stratum was combined across all sample EAs, ordered by entity/district, cantons (in the FBiH), municipalities and urban/rural area so as to provide implicit stratification. The sample households within each second stage stratum were selected systematically with equal probability from the combined listing (see Table SD.4). During the selection procedure, 10 EAs with only 1 household were not selected.

Table SD.4: Sample allocation by administrative unit and second stage strata in BiH

Administrative unit	Households with children under 5	Households with members aged 5-24	All remaining households	Total
FBiH	1,526	1,125	1,439	4,090
RS	797	592	998	2,387
BD	118	71	134	323
Total	2,441	1,788	2,571	6,800

Due to the large variability in the number of listed households by sample EA the number of households selected in each EA (cluster) in all three second stage strata varied considerably by cluster, based on these sampling procedures. However, this sampling strategy reduced the variability in the weights of the sample households within each of the combined first and second stage strata (9 groups). In order to reduce the variability in the number of sample households per EA it would have been necessary to select the households separately for each second stage stratum within each sample EA instead of combining the listing across all sample EAs; however, this would have increased the variability in the weights considerably.

The main consequence of the first stage selection of the sample EAs, with equal probability within each stratum and the large variability in the size of the EAs, was that

the design effects and sampling errors for the estimates of survey indicators were expected to be relatively high. The first stage component of the variance was large because of the variability in the size of the EAs. The large number of households selected in some sample clusters also contributed to a higher design effect due to clustering. However, even if the sampling strategy had been changed to select a more constant number of sample households per cluster it would not have decreased this first stage component of the variance. The inefficiency of the BiH sample design came from the first sampling stage, which could not be changed. This illustrates the importance of having a new census and sampling frame for BiH.

Calculation of Sample Weights

The BiH Multiple Indicator Cluster Survey sample is not self-weighting. Essentially, by allocating households in all three strata different sampling fractions were obtained by strata due to the variability in size of strata. The weights calculated were used in the subsequent analyses of the survey data.

Since the PSUs were selected with equal probability in each stratum during the first stage and that all listed households in each second stage stratum were combined across sampled clusters the weights were calculated using a combination of the first and second stage strata (for a total of 9 groups).

In order to calculate first stage selection probabilities, the number of sampled EAs (PSUs) in each stratum was divided by the total number of EAs from the 2009 Master Sample.⁵⁷ The second stage selection probability was obtained by dividing the number of valid households (secondary sampling units (SSUs)) selected in each second stage stratum by the total number of households listed in the stratum. Table SD.5 shows the first stage selection probabilities of PSUs by stratum and the second stage probability of SSUs in each stratum.

Weights were calculated for the 9 strata groups using the following formula:

$$\omega_j^{i,k} = \frac{1}{\pi_j^{i,k}}$$

wherein:

- z is the weight
- ω is the selection probability
- π_k is the administrative unit (FB and BD)
- i is the stratum
- j stratum

A second component in the calculation of sample weights took into account the level of non-response for the household and individual interviews. The adjustment for household non-response is equal to the inverse value of:

$RR_h = \text{Number of interviewed households in stratum } h / \text{Number of occupied households listed in stratum } h$

After the completion of the fieldwork response rates were calculated for each sampling stratum. These were then used to adjust the sample weights calculated for each cluster. Response rates in the BiH Multiple Indicator Cluster Survey are shown in Table HH.1 in this report.

Similarly, the adjustment for non-response at the individual level (women, men and under-5 children) for each stratum is equal to the inverse value of:

Completed women's (or under-5's or men's) questionnaires in stratum h

$$RR_h = \frac{\text{Completed women's (or under-5's or men's) questionnaires in stratum } h}{\text{Eligible women (or under-5's or men) in stratum } h}$$

The non-response adjustment factors for women's, men's and under-5's questionnaires were applied to the adjusted household weights. Numbers of eligible women, men and under-5 children were obtained from the roster of household members in the Household Questionnaire for households where interviews were completed.

The design weights for the households were calculated by multiplying the above factors in each stratum. These weights were then standardised (or normalised), one purpose of which was to make the weighted sum of the interviewed sample units equal the total sample size at the level of BiH.

Normalisation was achieved by dividing the full sample weights (adjusted for non-response) by the average of these weights across all households at the level of BiH. This was performed by multiplying the sample weights by a constant factor equal to the unweighted number of households at the level of BiH divided by the weighted total number of households (using the full sample weights adjusted for non-response). A similar standardisation procedure was followed in obtaining standardised weights for the women's, men's and under-5's questionnaires. Adjusted (normalised) weights varied between 0.133556 and 6.154462 in the 474 sample EAs (clusters).

Appendix C: Time Schedule

Activities	Months of Year					
	JUN	July	Aug	Sep	Oct	Nov
Literature Review						
Writing Thesis Proposal						
Submission for Proposal Exam						
Proposal Exam						
Proposal Revision						
Data Analysis						
Thesis and Article Writing						
Final Thesis Exam						
Submission of article for publication						
Submission of thesis						

Appendix D: Budget

Item	Quantity	Unit Cost	Amount (Thai Bhat)
Stationary			5000
Photocopy	2000	1	2000
Printing	1000	5	5000
Binding Proposal	10	100	1000
Communication	100 minutes	5	500
Binding Thesis	10	100	1000
Article Publication	8 pages	1000	8000
Transport	80	60	4800
Total			27300

VITA

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Work Experience

1. Organization: Nepal Medical College, Kathmandu, Nepal.

Duration: from 1st Sep 2009 to 31st Aug 2010 as an Intern Doctor.

2. Organization: Fishtail Hospital and Research Centre, Pokhara.

Duration: from 1st Oct. 2010 to 31st Jan 2013 as a Medical Officer

Major Responsibilities

1. Vice-President of NMCTH Red Cross Youth Circle
2. Student link coordinator of Health Partnership Nepal (INGO)
3. Member of Student Welfare Committee in NMCTH.

Languages:

-Nepali, English and Hindi

Computer Knowledge:

-Microsoft office and other general applications

Extra-Curricular Activities

-Cycling, Swimming, Trekking