REGIONAL DIFFERENCES IN THE UTILIZATIONS OF SKILLED DELIVERY CARE IN ETHIOPIA

UNIVERSITY OF GRONINGEN
FACULTY OF SPATIAL SCIENCE
POPULATION RESEARCH CENTER
MASTER OF POPULATION STUDIES

By: Zebene Ayele Bezabhi
ID no: s2451298
Email: z.a.bezabhi@student.rug.nl
Advisor: Dr. Shirish Darak

August, 2014

Groningen, the Netherlands

Acknowledgments

First of all I would like to thank my almighty God. Secondly, my deepest gratitude goes to my advisor Dr. Shirish Darak, for his invaluable support and comment in completing my thesis.

I also like to extend my appreciation to NFP and Department of Demography who granted me a scholarship. My warmest gratitude goes to all lecturers and program coordinator for their invaluable input and support throughout the program.

Finally, I would like to thank all my friends in Groningen for their support and making my stay memorable.

Abstract

Introduction: The utilization of skilled delivery care services has been stressed due to its effectiveness in reducing maternal & infant mortality. Taking in to account the national and regional interest in improving the utilization of skilled delivery care, determining the factors affecting the use of skilled delivery care is an important step. Several studies have looked at different factors contributing to women's behavior to seek for skilled delivery care services. Nonetheless, no studies were conducted to assess the regional variation. This study aims to assess differences among regions of Ethiopia in the utilization of skilled delivery care services.

Methods: In this study, information on the last birth recorded in the last five years preceding EDHS, 2011 were taken from ever-married women aged 15-49. Univariate, bivariate and multivariate logistic regression analyses were adapted to assess the regional differences in utilizations of skilled delivery care.

Results: 6,756 ever-married women were included in this study. The mean age of women who were participated in this study was 29.2 years, and their average parity was 4 children per woman. Statistically significant differences were observed in utilizations of skilled delivery care services across regions. The results showed that the effects of socio-demographic factors in utilization of skilled delivery care services differ across regions. Moreover, utilization of ANC has statistically significant contribution in the utilization of skilled delivery care services in all regions except in Tigray and Dire dawa regions.

Conclusions: Unequally distributed utilization of skilled deliver care services across regions was observed. It was identified that each region has different socio-demographic factors that influence the use of skilled delivery care. Though the determinants are the same in some regions; the strength of their effect may differ. Utilization of ANC is the most significant predictor which influences the use of skilled delivery care services almost in all regions of Ethiopia.

Key words*: Socio-demographic factors, Birth, Skilled delivery care services, ANC, Region, Ethiopia.*

Table of contents

Contents	**page**
Abstract	ii
Chapter One Introduction	1
1.1 Background	1
1.2 Ethiopian Context	3
1.3 Problem Statement	4
1.4 Objective of the Study	5
1.5 Research Questions	5
1.6 Significance of the Study	5
1.7 Structure of the thesis	5
Chapter Two Theory and Review of related Literature	6
2.1 Components of skilled delivery care services	6
2.1.1 Place of delivery	6
2.1.2 Assistance during delivery	7
2.2 Andersen's behavioral model	7
2.3 Conceptual framework	10
2.4 Factors influencing the utilization of skilled delivery care services	12
2.4.1 Socio-demographic characteristics	12
2.4.2 Economic Factors	15
2.5 Hypothesis	16
Chapter Three Methodology and Study Design	17
3.1 Type of Research	17
3.2 Definition of concepts	17
3.3 Study Area	17
3.4 Source of Data and Sampling Design	18
3.5 Data Set	19
3.6 Missing Data	20
3.7 Variables in the Study	20
3.8 Method of Data Analysis	23
3.9 Ethical considerations	23

Chapter Four Results and Discussions 24
4.1 Socio-demographic characteristics of each region 24
4.2 Patterns of skilled delivery care service utilization across regions 32
4.3 Results of Binary Logistic Regression Analysis 33
4.4 Results of Multiple Logistic Regression Analysis 39
4.5 Discussions 44
Chapter Five Conclusion and Recommendation 48
5.1 Conclusion 48
5.2 Recommendations 49
References 50

List of Tables

Table 1: Population distribution, literacy and health infrastructure by regions 3
Table 2: Summery of missing cases 20
Table 3 : Definitions and categories of independent variables used in the study 21
Table 4: Regional differences in the socio-demographic characteristics of women 27
Table 5 : Skilled delivery care utilizations across regions 32
Table 6 : Univariate logistic regression analysis on women's characteristics and its associate with utilization of SBAs across regions 37
Table 7:Multiple logistic regression on women's characteristics and its association with utilization of SBAs across regions 42

List of figures

Figure 1: Behavioral model of health services use 9
Figure 2: Conceptual framework adopted from behavioral model of health services use 11
Figure 3: Percentage distributions of women with primary and higher education across regions 29
Figure 4 : Percentage distributions of women who had high autonomy across regions 30
Figure 5: Percentage distributions of husbands with primary and higher education across regions 31

Acronyms

ANC	Antenatal Care
CI	Confidence Interval
EDHS	Ethiopian Demographic Health Survey
HEW	Health Extension Worker
MDG	Millennium Development Goal
MoH	Ministry of Health
SBA	Skilled Birth Attendante
UNFPA	United Nations Population Fund

Chapter One

Introduction

1.1 Background

The findings of different research support that all pregnant women need to have timely treatment to prevent complications during pregnancy and childbirth (Soroptimist International, 2011).

Access to and utilization of skilled delivery care services is one of the important interventions to prevent those complications during childbirth. In developing countries, only about 58% of births are attended by skilled health care workers (UNFPA, 2013). Increasing the utilization of skilled health worker services, providing properly functioning health care facilities and increasing women's access to these facilities have shown to reduces the risk of dying from complications (Soroptimist International, 2011).

The majority of the complications during delivery which are attributable to potentially fatal condition are unpredictable, and almost all of them are treatable (UNFPA, 2013). Now a day, approximately 350, 000 women die every year due to delivery-related problems (Soroptimist International, 2011). They die since they do not use skilled birth attendants. The absence of properly functioning health facilities is another factor contributing to this death. (Soroptimist International, 2011).

According to WHO, worldwide an estimated 289,000 maternal deaths occurred in 2013 though all most all of these deaths are preventable (WHO, 2014). Nearly all (99%) of these deaths occurred in developing regions (WHO, 2014). For instance, Sub-Saharan Africa alone accounts for more than half (62%) of the global maternal deaths (WHO, 2014). In this region, the MMR is 510 per 100,000 live births, which is contrary to the developed regions where the figure is only 16 deaths per 100,000 live births (WHO, 2014). The estimated lifetime risk of maternal death in developing countries is 1 in 52 while the figure is 1 in 3400 in developed countries (WHO, 2014). This problem could be due to lack of access and availability of health care services, transportation problem, lack of awareness etc.

As shown from experiences of different countries, the availability and utilization of skilled workers during labour and delivery and a referral mechanism for emergency care for managing complications, or the use of basic essential emergency care facilities for all deliveries would reduce maternal mortality (Koblinsky M.A. *et al.*, 1999 cited in Peter O Ouma *et al.*, 2010). The majority of births in developing countries occur without the utilization of skilled delivery care services (midwife, nurse trained as midwife or a doctor) (Abou Zahr C. , & Wardlaw T. , 2001 cited in Peter O Ouma *et al*. ,2010).

According to Ethiopian demographic health survey (EDHS), 2011 report, only 10% of births in Ethiopia were delivered with the assistance of skilled birth attendants. Around 1% of births were assisted by a health extension worker (HEW), 57% of births were assisted by relatives, or some other persons. 28% of births were assisted by traditional birth attendants, while 4% of births were unattended.

Similarly, according to EDHS, 2011 report, 34% of pregnant mothers in Ethiopia received antenatal care from a skilled provider. Urban women are almost three times more likely than rural women to receive antenatal care (ANC) from a skilled provider (EDHS, 2011).76% of women residing in urban areas received ANC services from a skilled provider for their last birth compared with 26% of women in rural areas (EDHS,2011). This low percentage utilization of skilled care services in the country could be due to lack of education, unavailability of hospitals, increasing number of population size, etc. Cultural and traditional practice also might have an effect on these problems.

Besides, out of 10% of births were delivered by skilled providers, different regions of Ethiopia share different proportion of skilled attendance. This brings a collaborative effort of government and nongovernmental agencies for reducing maternal and new born morbidity and mortality in order to achieve Millennium Development Goal (MDG5) by year 2015.

1.2 Ethiopian Context

Ethiopia is one of the countries with ancient civilization, located in eastern part of Africa. It is a country with a large number of ethnic groups and a wide variety of religious practice. The most predominant religions are Muslim and Christianity (CSA, 2012). It was reported that the country has as many as 80 nationalities speaking 80 languages (CSA, 2012). The country has nine regional states and two city administrations- Addis Ababa, Affar, Amhara, Benshangul-Gumz, Dire dawa, Gambela, Harari, Oromiya, SNNP, Somali and Tigray. According to 2007 Ethiopian Census, the population size varies between regions. As shown in table 1 below, these regions were distinctly different when compared with different certain demographic characteristics such as population size, adult literacy and number of health facilities.

It was reported that Addis Ababa records the highest proportion of men (94%) and women (80%) who are literate while, Somali region accounts for the smallest proportion of men (22%) and women (10%), compared to the other regions. Moreover, variations also exist in urban population size across regions of the country. It was reported that the maximum urban population size is found in the city of Addis Ababa, and the minimum is in the region of SNNP. According to MoH, Addis Ababa has a large number of hospitals (31 hospitals). Contrary to this, in Gambela region only 1 hospital was accounted compared to other regions of the country. These variations could have a contribution to the differences recorded in the utilization of skilled delivery care services among different regions of the country.

Table 1: Population distribution, literacy and health infrastructure by regions

Regions	Population size			Urban Population (%)	Average Persons per Household	Adult literacy (%)		Hospitals (Health centers)	Health post
	Total	Men (%)	Women (%)			Men	women		
Addis Ababa	2,739,551	48	52	100	4	94	80	33(28)	35
Afar	1,390,273	56	44	13	6	27	16	2(14)	112
Amhara	17,221,976	50	50	12	4	54	25	20(182)	2664
Benishangul-Gumuz	784,345	51	49	14	5	47	23	2(17)	166
Dire Dawa	341,834	50	50	68	5	77	53	3(6)	39
Gambela	307,096	52	48	25	5	58	23	1(9)	51
Harari	183,415	50	50	54	4	78	55	4(3)	23
Oromiya	27,158,471	50	50	11	5	62	30	31(242)	3758
Somali	4,445,219	56	44	14	7	22	10	8(21)	290
SNNPR	14,929,548	50	50	10	5	57	22	20(181)	3729
Tigray	4,316,988	49	51	20	4	68	34	15(123)	614

Source: Ethiopian census, 2007 and Ethiopian MoH

1.3 Problem Statement

Utilization of skilled delivery care services at birth has been stressed due to its effectiveness to reduce maternal and infant mortality and morbidity. It has been reported that the utilization of skilled delivery care services would reduce maternal mortality rate by a range of 13% to 33% (Adegoke & Van Den Broek, 2009). Moreover, the use of skilled delivery care services is considered as a cost saving intervention not only related to number of deaths averted but also reducing incidence of morbidity (Adegoke & van den Broek, 2009). This picture tells us how much the utilization of skilled delivery care services is important during delivery for all women.

However, the attendances at antenatal clinic at the health facilities in Ethiopia have increased but with no correspondent increase in the delivery attendance at the facilities (EDHS, 2011). Moreover, remarkable regional variations exist in the utilization of skilled delivery care services (EDHS, 2011). This demands the study to find out the factors contributing to these regional differences in the utilization of skilled delivery care services.

In Ethiopia, several underlying factors operate in women's delivery care services seeking behavior. These are Socio-economic and demographic characteristics of mothers, ability of women to manage resources and make independent decisions about their reproductive health. Lack of education and poor knowledge about maternal health care can also contribute to delays in seeking care during pregnancy and child birth. In addition, factors such as gender of the household head, religion, husband's education and occupation, wealth index and exposure to media have been identified to have a significant impact on the utilization of skilled delivery care services at national level. Nonetheless, no studies were conducted to assess the regional variation due to difference in the impacts of these important factors in the utilization of skilled delivery care services.

Thus, based on positivism approach, this study aims to look at the importance of these factors in the utilization of skilled delivery care services using EDHS, 2011 data among regions of Ethiopia.

1.4 Objective of the Study

To assess differences in utilization of skilled assistance during delivery among regions of Ethiopia.

1.5 Research Questions

1. What are the regional differences in utilization of skilled delivery care services?
2. Dose the impact of socio-economic and demographic characteristics on access to skilled delivery care services differ among regions of Ethiopia?
3. Does antenatal care attendance influence the use of skilled delivery care in all regions of Ethiopia?

1.6 Significance of the Study

Safe skilled care during delivery should be universally accessible and affordable to all mothers to prevent adverse pregnancy outcome and to safeguard their own health. Thus, this study provides information about regional differences in the utilization of skilled delivery care services and about relevant socio-economic and demographic factors influencing the utilization of skilled delivery care services in each regions of Ethiopia. The outcome of the study will be used as a guide to promote the utilization of skilled delivery care services at the national and regional levels so as to solve the problems of maternal and infant mortality and morbidity.

In addition, the analysis of these factors which influence the skilled delivery care seeking behaviors of women proved us how these factors influences utilization of skilled assistance during delivery in each regions and how much these influences differ between regions.

1.7 Structure of the thesis

This thesis contains five chapters. The first chapter presents the introduction of the thesis. The second chapter emphasizes on the theory and review of related literature including the conceptual framework of the study. The third chapter presents types of data and statistical methods used in the study. The fourth chapter focuses on the results and discussions part of the study. Finally, the last chapter presents conclusions and recommendations of the main findings of the study.

Chapter Two

Theory and Review of related Literature

This chapter provides some of the conceptual frameworks used in explaining the determinants of utilization of skilled delivery in the developing world. First, components of skilled delivery care services, theory and conceptual frameworks will be presented. Second, socio-demographic determinants such as woman's age, parity, place of residence, women's education and occupation, women's employment status, women's autonomy and women's exposure to media etc. will be reviewed. Finally, Economic factors will be discussed.

2.1 Components of skilled delivery care services

The following two components are parts of skilled delivery care services which are used to clarify the idea of skilled delivery care services.

2.1.1 Place of delivery

Place of delivery along with effective health care facilities has been found an important tool to reduce maternal mortality (Thaddeus & Maine, 1994). Two conditions should fulfill at the place of delivery in order to provide effective services during delivery: 1) Skilled assistance should supervise the delivery. 2) Additional facilities should be ready for emergency purpose (Thaddeus & Maine, 1994).

In addition, transportation system should be easily accessible in order to access the health facility whenever necessary and to make the service efficient during labor and delivery (Griffiths & Stephenson, 2001). However, in different parts of developing world, there are additional factors such as cleanness of the facilities, carelessness of the health workers etc that can lead to inefficient care during delivery (Griffiths & Stephenson, 2001).

2.1.2 Assistance during delivery

Usually doctors, midwifes or nurses with the skills to manage a normal labour and delivery, recognize complications early on and perform any essential interventions, start treatment and supervise the referral of mother and baby to the next level of care if necessary are considered as skilled delivery care services providers (UNFPA , 2004).

All complications during delivery that need referral to emergency obstetric can easily be recognized by skilled birth attendants at delivery (UNFPA, 2004). The utilization of skilled birth attendants during delivery could reduce an estimated 16% to 33% of deaths due to complications related to delivery (UNFPA, 2004).

2.2 Andersen's behavioral model

The behavioral model by Anderson (1995) provides a framework for understanding the potential influences on an individual's decision to make use of the available health services and facilities. The model tells us that the utilization of health care services is a function of the predisposition to use the services, factors that enable or delay the use and need for the service. The purpose of the model is to discover the conditions that either facilitate or impede the utilization of a service. The model is depicted in Figure 1, and it consists of four main model components.

The first component consists of the health care system including national health policy and the resources and their organization in the health care system. It also pays attention to the external environment which includes the physical, political and economic elements. The second component consists of three major elements; predisposing, enabling and need factors.

Predisposing Characteristics

Predisposing factors mainly includes demographic & social characteristics and health beliefs. Demographic characteristics influence the tendency of the individual to use services, which include: age, gender, size of the family, parity and marital status. Social structure such as education, occupational status, religion and ethnicity measures the coping ability of the individual with the problem and with the lack of availability of the resources. Health beliefs are the perception about health and health care system such as attitudes towards disease and medical care.

Enabling Resources

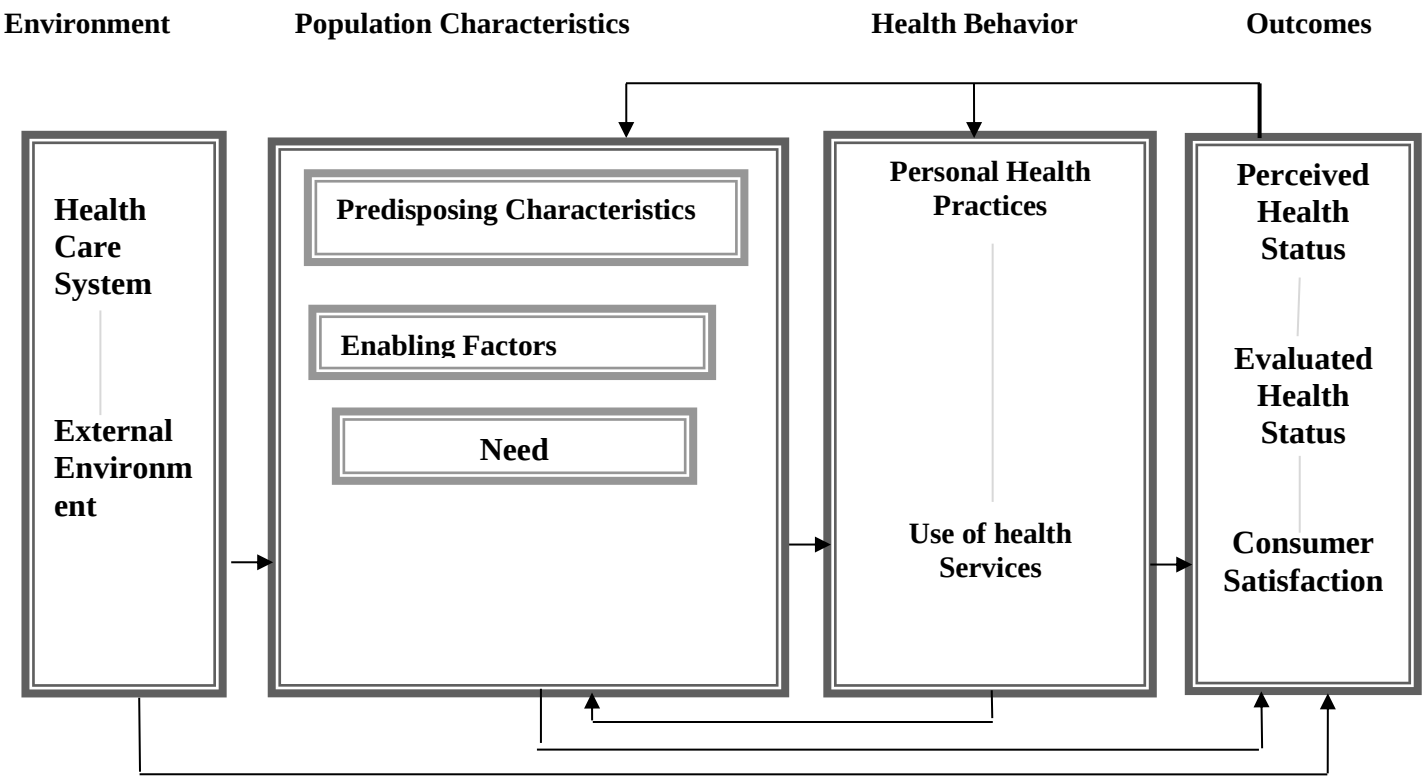
Enabling resources are factors that enable the individual to obtain health care services, such as income, insurance, travel time, waiting time, and availability of health care providers. People must have the means and knowledge of getting to those services and makes use of them.

Need

The need for the services is an important prime determinant of use of a health service. Any comprehensive effort to model health service use must consider how women view their own general health and functional state, and how they experience symptoms of illness, pain and worries about their health. The perceived needs in the model represent primarily some measure of pathology or disease that may cause someone to seek and use a health service.

Evaluated need represents professional judgment about women's health status and their need for medical care after delivery. According to Anderson (1995), the evaluated needs vary with the changing state of art and science of medicine. Moreover, it varies according to the training and competency of the professional expert doing the assessment.

Figure 1: Behavioral model of health services use



Source: Anderson, R.M (1995)

The third component comprises personal health practices such as different forms of self-care. It also takes into account the use of health services: type, place, aim and time interval. The last component is related to health outcomes. It has three entities which include perceived health status of the consumer, evaluated health status which represents the professional judgment about people's health status and the consumer satisfaction.

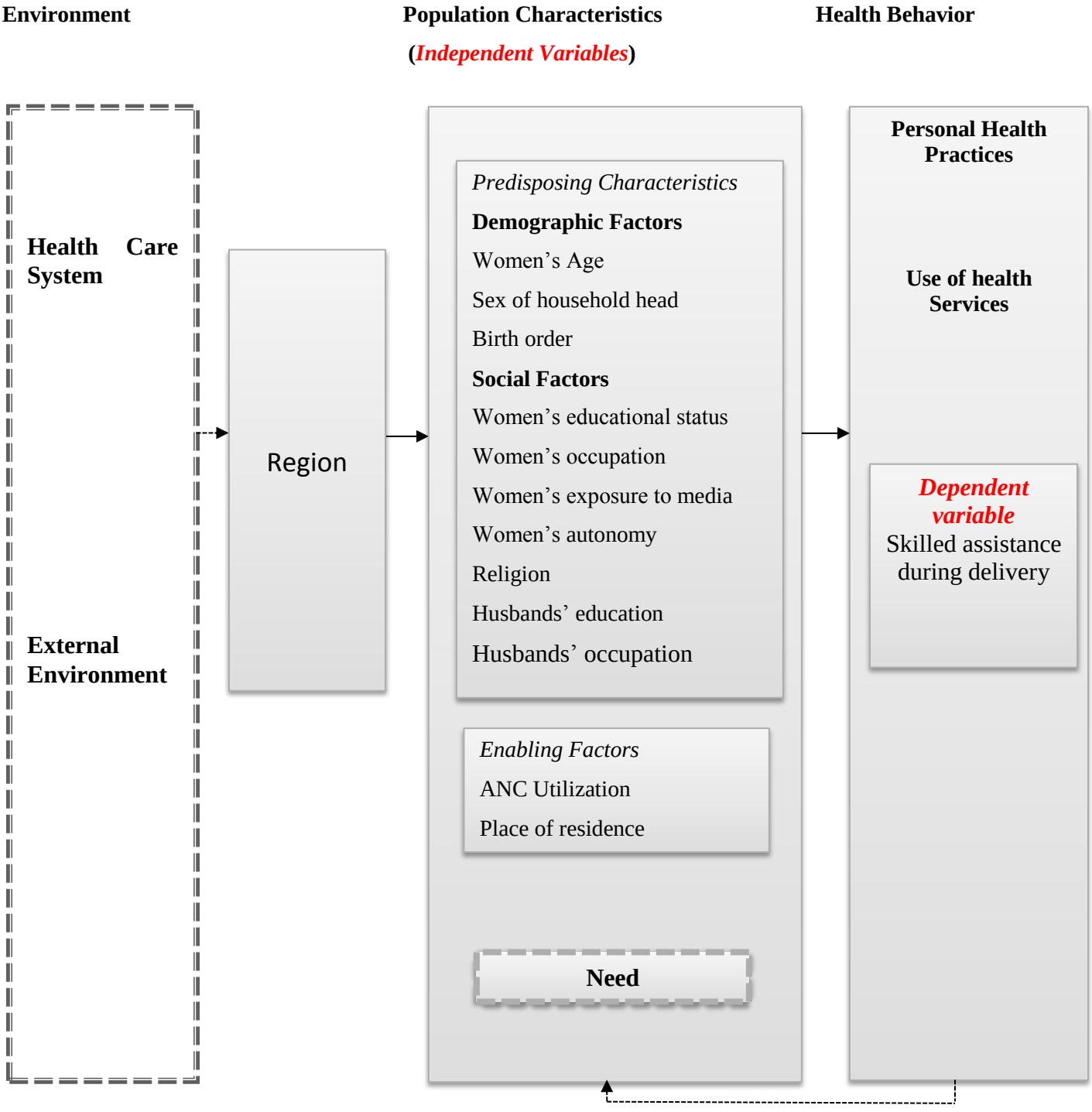
The components are linked through several connecting lines, representing for instance feedback loops from outcome to predisposing factors and perceived need as well as health behavior. It is, for instance, conceivable that women who live in rural areas where the environment is often difficult and resources are limited follow different norms regarding health care delivery, compared to urban women. Women from rural areas have also different standards of consumer satisfaction. Thus, environmental factors influence outcomes, represented by a connecting line between the first and last model component.

The rational expectations of the model are, that the perceived need will help us to better understand care-seeking and adherence to a medical regimen, while evaluated need will be more closely related to the kind and the amount of treatment that will be provided after a patient has presented to a medical care provider.

2.3 Conceptual framework

The behavioral model which is adopted from Anderson (1995) provides a framework for understanding the potential influences on an individual's decision to make use of the available health services. Since we mainly focus on assessing regional difference in the utilization of skilled delivery care services which is one of the health services, we could adopt the behavioral model of Anderson. Here in the conceptual framework we take predisposing characteristics, enabling factors, use of health services and region as the main parts of this study. As one can see from the conceptual framework, predisposing and enabling factors such as demographic factors, social factors etc. considered as independent variables, and the use of health services - skilled assistance during delivery is taken as a dependent variable. We were looking at the relationship between the dependent and the independent variables across regions.

Figure 2: Conceptual framework adopted from behavioral model of health services use



Source: Anderson (1995)
Note: Doted boxes and lines are not the focus of this study.

2.4 Factors influencing the utilization of skilled delivery care services

2.4.1 Socio-demographic characteristics

The Ethiopian DHS, 2011 report, has indicated that urban-rural residence, economic status (wealth index), parity, maternal education, exposure to media and age are important and relevant socio-demographic characteristics associated with the use of skilled delivery care services in several communities. This section reviews different literatures related to these factors.

Age of women

Chowdhury et al. (2007) analyzed the Bangladesh DHS data of 1999-2000, and they found that younger mothers were significantly less likely to utilize skilled assistance during delivery although several other studies reported contrary findings. Bell et al. (2003) examined the DHS data of Bolivia, Malawi, Bangladesh and the Philippines noticed contrary trends which indicate that women's age at delivery matters in their choice of delivery suite. According to the report, women who are 35 years or more tend to use skilled delivery care services lesser than younger women- especially those below 19 years. A study conducted in Ethiopia showed that women in the younger age group had the highest proportion of institutional delivery use (54%) followed by the middle age group, 30–39 years (39%) (Tsegay et al., 2013).

Parity

Parity is one of the demographic determinants which has important influence on women's health seeking behavior. A number of studies have shown women with less number of children are more consistent in utilizing skilled delivery services than women with higher number of birth order. Trends from the Ethiopian DHS, 2001-2011 show quite consistent patterns with Bell et al.'s (2003) analysis of trends in Bolivia, Indonesia, Malawi, Bangladesh and the Philippines. Higher parity women, greater responsibilities within the household and child rearing have been proposed as predictor factors for their tendency to use services less frequently (Mekonnen et al., 2003).

Women's Education

Women's level of education has been found to be a strong determinant of giving birth at health institutions. For instance, EDHS 2011 report showed that 69.6% of births to women with a secondary school education occurred in a health facility and with skilled assistance compared to 4.3% of births to women with no education. It is also indicated that maternal education is the most important factor in determining women's delivery care seeking behavior (Margaret et al., 2012). Another study in north Gondar Zone identified that the use of skilled birth attendants was significantly influenced by the level of education. Women with higher level of education (secondary and above) were 10.6 times more likely to use safe delivery services than those with lower education levels (Nigussie et al., 2004).

Husbands' Education

Husbands' education also affects preferences for health-care utilization. The husbands' attitudes towards modern care could, for example, influence the wives' decision to seek modern health-care services. In a study conducted in Ethiopia, women with partners who had a secondary or higher education had two times higher odds of delivering with professional assistance when compared to those with partners who had no education (Dagne , 2010).

Religion

A study by Mulumebet et al. (2002) on safe delivery service utilization in Arsi zone, south-east Ethiopia reported that religion has a significant association with the utilization of skilled delivery care services. Orthodox and Muslim follower were less likely to utilize the service as compared to other Christians (as protestant, Catholic, Jehovah witness). Another study in India also revealed that religion is a strong predictor of the utilization of skilled delivery care services (Navaneetham et al., 2002).

Women's Exposure to Mass Media

Some researches on health outcomes in developing countries have shown the important role of the media in disseminating information on health related issues. The main sources of information frequently used are: radio, television and newspapers and magazines. A study conducted in India revealed that women's exposure to information through radio, television and newspaper significantly increased the utilization rates of skilled delivery services (Shariff & Singh, 2002). Similarly, in a study conducted in Ethiopia by Mehari (2013) indicated that women who frequently watch TV were more likely to receive skilled assistance during delivery.

Women's Decision making

The influence of women's autonomy on the use of health care is important than other known determinants such as education. The dimensions of autonomy such as freedom of movement, decision making power and control over finance can exert a strong influence on service use and service choice (Bloom et. al., 1998 cited in Kausar et al., 1999). On a study conducted in Arsi zone, south-east Ethiopia, it was observed that women with higher decision making power were more likely to use delivery care services than those women with less decision making power (Mulumebet et al., 2002).

Women's Employment Status

Empowering women with more economic participation and control in their households and communities might be the key to achieve control over their own reproductive health. Employment can increase women's economic autonomy and reproductive health status because it creates awareness and provides opportunities through interaction with other people outside the home and community (Sharma et al., 2007). Contrary to these findings, Mehari (2013), analyzed EDHS 2000 and 2005 data and observed that women engaged in some kind of activities were less likely to use skilled delivery care services compared to those women who are not working.

Husband's Occupation

Difference on the utilization of health services by husband's occupational status also depicts occupation as one of the influential factor of service utilization. An empirical research by Paul and Rumsey (2002) in rural Bangladesh showed that fathers who are employed in non-farm occupations chose trained personnel for delivery more frequently than husbands who were farmers or other professionals. Furthermore, another study in Bangladesh reported that women whose husbands were working in business or services are more likely to be the users of professional health care services (Chakraborty et al., 2002).

2.4.2 Economic Factors

Wealth Quintile

Large disparities are prevalent across household wealth quintiles in developing countries. Women in the wealthiest households are almost three times more likely than women in the poorest households to have a skilled birth attendant at delivery (85% versus 31%). For instance, EDHS 2011 showed that 45% of women in the highest wealth quintile used assistance from skilled birth attendants (SBAs) compared with 2% of women in the lowest wealth quintile. Another study in Ethiopia revealed that the strong association between wealth index and utilization of skilled delivery care services (Mehari, 2013).

Place of Residence (rural- urban)

Several studies have revealed the presence of positive association between the utilization of skilled delivery care services and residence; those who live in urban areas and closer to health facilities tend to utilize skilled delivery care services more than rural dwellers (Mihret, 2008). Moreover, all the previous EDHS in Ethiopia consistently showed that births in urban areas were more likely to be delivered with the assistance of SBAs compared to births in rural areas.

According to EDHS, 2011, 49.8% of the urban residences deliver at health centers while only 4.1% of the rural residents deliver at health facilities. Bell et al. (2003) observed similar trends in Bolivia, Malawi, Indonesia, Bangladesh and the Philippines in the analysis of data from their Demographic health surveys.

Antenatal Care Utilization (ANC)

Several studies revealed the strong association of ANC utilization and skilled delivery care service utilization. A study conducted in Bangladesh was indicated that women who had more than four ANC visits were more likely to utilize skilled delivery care services than those with fewer visits (Bell et al., 2003). Similar trends were also observed in study conducted in Ethiopia (Tsegay et al., 2013).

2.5 Hypothesis

According to Anderson (1995), the use of skilled delivery care services depends up on predisposing characteristics, enabling factors, need, and health care system. The predisposing, enabling, need factors directly affect the use of skilled delivery care services. However, the effect of health care system on the use of skilled delivery care services is mainly through the predisposing, enabling and need factors (Andersen, 1995). Thus, in this section, according to the previous researches and theories the following hypotheses will be explored. This will indicate which factors are more associated with the use of skilled delivery care services in each region of Ethiopia and seek plausible answers for the research questions.

Hypotheses

1. Utilization of skilled assistance during delivery is expected to be different among regions of Ethiopia.
2. The effect of socio-demographic factors in utilization of skilled assistance during delivery is expected to be different among regions of Ethiopia.
3. The impact of ANC in utilization of skilled assistance during delivery is expected to be different among regions of Ethiopia.

Chapter Three

Methodology and Study Design

This chapter mainly focuses on the methodology and study designs that are used in this study. It presents the kind of data set used in the study along with the type of dependent and independent variables. In addition, it will summarize the missing cases observed on some of independent variables.

3.1 Type of Research

This study is an explanatory research which identifies regional differences in the utilization of skilled delivery care services and describes the underlying factors on the utilization of skilled delivery care services in each region. It mainly employs quantitative analysis based on cross-sectional data obtained from EDHS, 2011.

3.2 Definition of concepts

In this study we used predisposing characteristics, enabling factors, personal health practices and uses of health service as the main concepts adopted from Andersen behavioral model of health care service use. These concepts are already defined in the sub-topic 2.2.

3.3 Study Area

Since the study used secondary data which are taken from EDHS, 2011, the study area of this research covers all regions of Ethiopia. As described before, the country has nine Regional States, with two city administrations including several zones & woredas (CSA, 2012). Similarly, these regions and weredas were also categorized as urban and rural areas. According to Central Statistical Agency report, urban areas are generally defined as an area with 2000 or more residents. They include all administrative capitals (regional capitals, zonal capitals and wereda capitals), areas with Urban Dweller's Association (UDAs) and all areas which have a population of 1000 or more persons, and whose residents are mainly involved in non-agricultural activities. Conversely, rural areas include all areas which are not included in the urban definitions (CSA, 2006).

Ethiopia is the second most populated nation in Africa next to Nigeria. The population of the country in the previous censuses of 1984 and 1994 was 40 and 53 million respectively.

The census results also showed that the population of Ethiopia grew at an average annual rate of 2.6% between 1994 and 2007. The majority of the population was under 15yrs (45%) and those who are 65+ were only 3.2%.

The third census conducted in 2007 has revealed that the country has a total population of 74 million. Of these, 50.5% were males and 49.5% were females, and a large proportion of women (24%) are in the reproductive age (15-49 years).

Ethiopia is one of the least developed countries with prevalent socio-economic problems. Education has a serious implication on the health of the population. It has an impact on the spread of diseases, the awareness of health practices and on the utilization of modern health services. The gross enrollment rate for secondary school (grades 9–10) was 39.1% in 2009/2010. Educational quality, as measured by grade five completion rates, has also improved from 65% in 2006/2007 to 83% in 2009/2010, and it has remained a major focus of the government and the concerned body (World Bank, 2011).

3.4 Source of Data and Sampling Design

This study used across-sectional secondary data from EDHS, 2011. The survey was carried out by the Central Statistical Agency (CSA) under the guidance of the Ministry of Health (MoH). The survey is part of the worldwide Demographic and Health Survey (DHS) program, which is designed to provide information on population, family planning, and health. The 2011 EDHS is the third demographic and health survey conducted in Ethiopia since 2001.

The 2011 EDHS used three main questionnaires: the woman's questionnaire, the men's questionnaire and the household questionnaire. These questionnaires were taken from model survey instruments which are developed for the MEASURE DHS project to reflect the population and health issues relevant to Ethiopia. Along with English, the questionnaires were translated into three main languages— Oromiffa , Amharic and Tigrigna.

The women's questionnaire collected information about their background characteristics (marital status, education, media exposure, etc), reproductive history and fertility, ANC, delivery and postnatal care attendance, sibling mortality, including maternal mortality, etc. Questions about woman's work and husband's background characteristics are also included. Pilot survey was conducted in a similar population in a neighboring district to test the appropriateness of the questions after which the tool was revised and finalized for use.

Maternal health care components covered in the survey include antenatal care, delivery and postnatal care. Women aged 15– 49 who gave birth within the last five years preceding the survey were asked information about the utilization of skilled delivery care services. If a woman had more than one child in the last five years preceding the survey, information on the utilization of skilled delivery care services was collected for the last birth. During the study, the data was coded and unnecessary information was filtered out.

The sampling technique they were used during the survey is briefly described on the EDHS, 2011 final report.

3.5 Data Set

For this study only ever-married women who had at least one child in the last five years preceding the survey were considered corresponding with their socio-demographic characteristics. The required data set was obtained from EDHS, 2011. The survey was collected information from representative sample of 16,515 women. Of these only 12,102 women were ever-married. And 7,698 women had at least one child in the last five years preceding the survey. Finally, after take out those women who were visitors during the survey and cleaning, removing unnecessary cases and variables for this analysis we obtained a sample of 6,756 ever-married women who had at least one child in the last five years preceding the survey. This final dataset contains information which was extracted from women's questionnaire which relates the utilization of skilled delivery care services for each region based on different predictor variables in the study.

3.6 Missing Data

As presented in table 3, only the predictor variables such as partners' education level, partners' occupation, and respondents' /women's occupation have shown small amounts (not more than 1%) of missing cases. Since the percentage of missing cases was very much small and we thought that their effects in the analysis are not that much significant, then in this study, we used data reduction technique to handle the issue of missing cases.

Table 2: Summery of missing cases

Variable	N	Missing	
		count	Percent
Partner's education level	6,756	6	0.09
Partner's occupation	6,756	50	0.74
Respondent's /woman occupation	6,756	72	1.07

3.7 Variables in the Study

Dependent variable

Assistance during delivery: In the 2011 EDHS, the respondents (ever-married women age 15-49) were asked, question regarding their last birth which occurred in the last five years prior to the survey. Based on this question- "Who assisted with the delivery?", a binary variable was created for this study. It was coded as 1 if the woman received assistance at delivery from SBAs including qualified Doctor, Nurse or Midwife, and 0 otherwise.

Independent variables

Based on the Anderson's (1995) behavioral model of the use of health services, thirteen independent variables included in this study. Ten variables from predisposing factors, two from enabling factors and one variable from personal health practices (ANC utilization) included in this study (see table 3).

Table 3 : Definitions and categories of independent variables used in the study

Characteristics	Description
Predisposing factors:	
Women's age	In the 2011 EDHS, women's age was ranging from 15-49 and categorized into 5-year age groups. In this study, each age category was coded as 1, 2, 3 and 4 for the age groups of 15-24, 25-29, 30-34 and 35-49, respectively.
Birth order	In this study, birth orders was categorized into 6 categories including 1^{st} , 2^{nd} , 3^{rd} , 4^{th} , 5^{th} and 6^{th} and more births and they were coded as 1, 2, 3, 4, 5 and 6 respectively.
Women's education	Women's education categorized into two categories. It is coded as 1 and 2 for the level of education which includes no education and primary or higher education, respectively.
Husband's education	Similar to the level of education of women.
Women's occupation	Women's occupation was categorized as unskilled worker coded as 1 and skilled worker coded as 2.
Husband's occupation	Similar to the occupation of women.
Religion	In the EDHS 2011 survey, religions of women were categorized in to six categories. In this study, they are classified into two categories as Christian (orthodox, protestant and catholic) coded as 1, Muslim/Others coded as 2.
Gender of household head	This variable is taken directly from EDHS, 2011. In this study, male and female household head were coded as 1 and 2 respectively.

Table 3 continued

Characteristics	Description
Exposure to media	This variable was created from data on frequency of reading newspaper, listening radio and watching TV. The scores of each of these three categories are summed and individuals are ranked according to the total score. Thus, if individuals have a total score of 2 or less, then they are ranked as low, or if they have a total score of 3 or more, then they are ranked as high. This variable is coded as 0 for low and 1 for high exposure to media.
Women's autonomy	This variable was created from data on decision making power of the woman on her health care, on money husband earns and decision on purchasing of household items. The scores of each of these three categories are summed and individuals are scored according to the total score. Thus, if individuals have a total score of 1 or less, then they are ranked as low, if they have a total score of 2 and 3, then they are ranked as medium and if they have a total score of 4 or more, then they are ranked as high. This variable is coded as 1 for low, 2 for medium and 3 for high autonomy.
Enabling resources:	
Place of residence	This variable was based on where the respondent was interviewed: either urban or rural. In this study, the women's place of residence was coded as 1 for rural and 2 for urban.
ANC utilization	This variable was based on the information on the number of times the respondent was attending ANC. Accordingly, a woman who has been attending at least once is classified as Yes and coded as 2 and if she never attended ANC as No and coded as 1.
Region	This variable is taken directly from EDHS, 2011. Accordingly, those 9 regions and two city administrations were coded as by whole number from 1-11.

3.8 Method of Data Analysis

For the purpose of this study, information on the last births which is recorded in the last five years preceding the survey is analyzed to determine the pattern of availability and the utilization of skilled delivery care services according to socio-economic and demographic characteristic of respondents for each region. In order to examine the relationship between the independent and dependent variables and to identify the contributing factors on regional differences in the utilization of skilled delivery care services univariate, bivariate and multivariate analysis was adopted. Univariate analysis was carried out to describe women's demographic and socio-economic characteristic in each region. Bivariate analysis was carried out by taking each independent variables and by calculating the proportions and odds of the utilization of skilled delivery care services for each region. Furthermore, because of the complexity of the relationships between the dependent and independent variables, multivariate analysis is also employed using binary logistic regression.

Since the dependent variable is dichotomous, logistic regression analysis was developed for the independent variables against the outcome variable- assistance during delivery. To estimate the effect of the predictor variables on the outcome variable for each region, odds ratio (OR) and 95% confidence interval (CI) were computed.

Data cleaning and data management were carried out using STATA, Version 12. Variables were re-coded to meet the desired classification. Descriptive statistics (frequencies and percentages) were carried out on SPSS 16 to describe the data and to estimate the patterns of the use of skilled delivery care services according to respondents' background characteristics for each region.

3.9 Ethical considerations

This study used secondary data from EDHS, 2011 to find out the underling factors which contribute to the differences in the utilization of skilled delivery care services among regions. This study doesn't want to identify and disclose individuals' information. As a researcher, all the data were organized and coded without changing the originality. The finding of this study doesn't potentially harm any kind of subjects, institutions and country. Its purpose is only to give societal awareness and help policy makers. Besides, we assure you that all positive and negative results of the study are reported and conclusions are made free from personal biases and opinions.

Chapter Four

Results and Discussions

This chapter presents some selected background characteristics of the respondents and describes the association between women's skilled delivery care service utilization with regions, using Chi-square test. It also presents the regional differences in the utilization of skilled delivery care services. In addition, the chapter provides results of logistic regression analysis so as to identify the determinants of the utilization of skilled delivery care services in each region.

4.1 Socio-demographic characteristics of each region

As described in the previous chapter, the total sample size taken in the EDHS, 2011 survey was 16,515 women. Of this, 6,756 ever-married women who had at least one birth in the last five years preceding the survey were selected for this study. Table 4 presents the main socio-demographic characteristics of women who are included in this study across each region. The majority of women (84%) who are included in this study were rural residents. More than half (52%) of them were Christians. Out of the total sample included in this study, the highest proportion (30%) of women was in the age group, 25-29 years compared to the other age category. The mean age of women who were participated in this study was 29.2 years. Their average parity was 4 children per woman. Similarly, around 28% of women included in the total sample had 6 or more children. Moreover, out of the total sample included, 62% of women were not educated. Furthermore, more than 76% of them were participated in unskilled work. Only 16% of women had high exposure to mass media. Of the overall sample, around 12% of women had high decision making power in the household. In addition, only 45% of women received antenatal care services at least once during their pregnancy.

The study also showed that women aged 25-29 had the highest number of births across all regions except in Tigray and Somali regions where the highest number of births were occurred after age 35. Similarly, it is observed that Hararri and Addis Ababa regions have the smallest proportion of women aged 35-49 who had births compared to other regions.

Around 44%, 23% and 19% of women were observed to have birth order one in Addis Ababa, Hararri and Dire Dawa regions, respectively. Besides, a small proportion of women (4%) were observed to have birth order six and more in Addis Ababa region compared to the other regions.

Regarding education, a large proportion of women (around 82%, 86% and 90%) were not educated in Amhara, Somali and afar regions, respectively compared to other regions. The proportion of women attended primary or higher education were largest (80%) in Addis Ababa region. As described above, a large proportion (76%) of women were engaged in unskilled work in all over regions compared to skilled participants. However, these proportions were very much large in Afar (91%), Amhara (87%), Somali (86%) and Tigray (80%) regions, compared to other regions. Addis Ababa had the largest proportion (42%) of women participated in skilled work, while Afar region had the smallest (9%).

The study also noted that the majority of the women in all regions were lived in rural areas except in Addis Ababa region where all women are considered as urban residents. As described in table 4, the populations of Tigray, Amhara, SNNP, Gambela and Addis Ababa regions were predominantly Christian. Whereas in Afar, Somali, Hararri, Dire dawa, Benshangul-gumuz and Oromiya regions a large proportion (96%, 98%, 83%, 84%, 60% and 57%) of populations who followed Muslim or Other religions was observed, respectively. It is also observed that, the proportion of male household head were large in all regions. However, Afar, Somali and Gambela regions had a large proportion (31%, 24% and 23%) of female household head respectively, compared to other regions.

A large difference was observed on decision making power of women across regions. For instance , Harari , addis Ababa and Dire dawa regions had a large proportion (22%, 30% and 20%) of women who had high decision making power in the household compared to other regions. Whereas, Benshangul-gumuz had a small proportion (5%) of women who had high decision making power in the household compared to the other regions. As one can see, Afar region has the highest proportion (31%) of household headed by female but it has a small proportion (10%) of women who had autonomy compared to the other regions. This could be due to their cultural & traditional practices and their living style.

In addition, it was observed that a large proportion of women had a low exposure to media in all regions of the country. However, Somali, Benshangul-gumz and Gambela regions had the smallest proportion of women (around 6%) who had high exposure to media relative to other regions.

Notable variations in ANC utilization between regions were observed. Accordingly, a large proportion (64%, 58%, 96.8%, 56%) of women in Tigray, Hararri, Addis Ababa and Dire Dawa regions respectively were received ANC compared to other regions.

To study the relationship between these socio-demographic characteristics described above and regions in detail, bivariate analysis was implemented. The results of the bivariate analysis shown in the last column of table 4 presented that the differences observed on the distributions of all socio-demographic characteristics across regions are all statistically significant (P-value <0.01).

Table 4: Regional differences in the socio-demographic characteristics of women

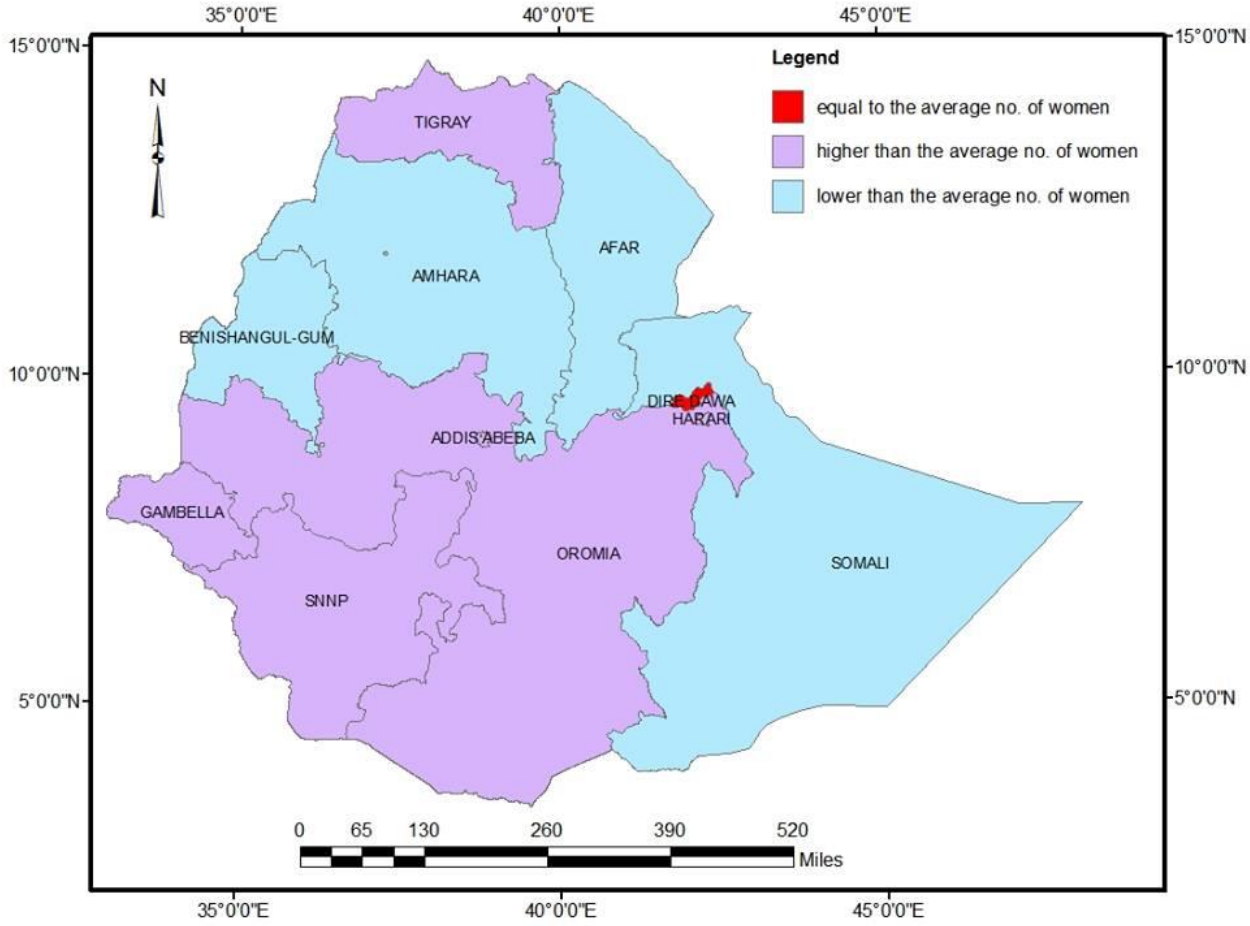
Characteristics	Regions											Total	p- value and level of significance
	Tigray (n=672)	Affar (n=642)	Amhara (n=793)	Oromiya (n=980)	Somali (n=480)	Benishangul (n=599)	SNNP (n=948)	Gambela (n=467)	Hararri (n=394)	Addis Ababa (n=285)	Dire dawa (n=385)		
Women's age													0.00*
15-24	182 (27)	180 (28)	201 (25)	258 (26)	108 (23)	174 (29)	172 (18.)	130 (28)	110 (28)	65 (23)	86 (22)	1666 (25)	
25-29	163 (24)	197 (31)	203 (26)	326 (33)	132 (27)	183 (31)	285 (30.)	138 (30)	140 (36)	102 (36)	127 (33)	1996 (30)	
30-34	129 (19)	111 (17)	159 (20)	176 (18)	97 (20)	108 (18)	213 (23)	95 (20)	73 (18)	75 (26)	85 (22)	1321 (20)	
35-49	198 (30)	154 (24)	230 (29)	220 (23)	143 (30)	134 (22)	278 (29)	104 (22)	71 (18)	43 (15)	87 (23)	1662 (25)	
Birth order													0.00*
1	110 (16)	100 (16)	115 (15)	148 (15)	43 (9)	102 (17)	131 (14)	95 (20)	91 (23)	125 (44)	74 (19)	1134 (17)	
2	106 (16)	114 (18)	139 (17)	166 (17)	54 (11)	90 (15)	134 (14)	79 (17)	78 (20)	79 (28)	81 (21)	1120 (17)	
3	94 (14)	94 (14)	111 (14)	138 (14)	60 (12)	88 (15)	126 (13)	77 (17)	63 (16)	34 (12)	61 (16)	946 (14)	
4	82 (12)	82 (13)	109 (14)	132 (13)	66 (14)	73 (12)	127 (13)	66 (14)	44 (11)	24 (8)	52 (13)	857 (13)	
5	75 (11)	58 (9)	82 (10)	104 (11)	61 (13)	83 (14)	110 (12)	55 (12)	35 (9)	11 (4)	34 (9)	708 (11)	
>=6	205 (31)	194 (30)	237 (30)	292 (30)	196 (41)	163 (27)	320 (34)	95 (20)	83 (21)	12 (4)	83 (22)	1880 (28)	
Women's education													0.00*
no education	445 (66)	577 (90)	649 (82)	628 (64)	411 (86)	437 (73)	600 (63)	225 (48)	219 (56)	57 (20)	263 (68)	4511 (68)	
primary and higher education	227 (34)	65 (10)	144 (18)	352 (36)	69 (14)	162 (27)	348 (37)	242 (52)	175 (44)	228 (80)	122 (32)	2134 (32)	
Husbands' education													0.00*
no education	346 (52)	502 (78)	576 (73)	438 (45)	326 (68)	328 (55)	341 (36)	149 (32)	140 (36)	29 (10)	178 (46)	3353 (51)	
primary and higher education	326 (48)	140 (22)	217 (27)	542 (55)	154 (32)	271 (45)	607 (64)	318 (68)	254 (64)	256 (90)	207 (54)	3292 (49)	
Women's occupation													0.00*
Unskilled	535 (80)	584 (91)	693 (87)	728 (74)	415 (86)	454 (76)	630 (66)	334 (71)	251 (64)	164 (57)	278 (72)	5066 (76)	
Skilled	137 (20)	58 (9)	100 (13)	252 (26)	65 (14)	145 (24)	318 (34)	133 (29)	143 (36)	121 (43)	107 (28)	1579 (24)	
Husbands' occupation													0.00*
Unskilled	528 (79)	449 (70)	714 (90)	827 (84)	318 (66)	520 (87)	770 (81)	306 (65)	246 (62)	34 (12)	216 (56)	4928 (74)	
Skilled	144 (21)	193 (30)	79 (10)	153 (16)	162 (34)	79 (13)	178 (19)	161 (35)	148 (38)	251 (88)	169 (44)	1717 (26)	
Place of residence													0.00*
rural	580 (86)	558 (87)	733 (92)	874 (89)	368 (77)	541 (90)	890 (94)	402 (86)	243 (62)	NA	221 (57)	5410 (81)	
urban	92 (14)	84 (13)	60 (8)	106 (11)	112 (23)	58 (10)	58 (6)	65 (14)	151 (38)	285 (100)	164 (43)	1235 (19)	

Table 4 Continued

Characteristics	Regions											Total	p- value and level of significance
	Tigray (n=672)	Affar (n=642)	Amhara (n=793)	Oromiya (n=980)	Somali (n=480)	Benishangul (599)	SNNP (n=948)	Gambela (n=467)	Hararri (n=394)	Addis Ababa (n=285)	Dire dawa (n=385)		
Religion													
christian	634 (94)	27 (4)	656 (83)	420 (3)	10 (2)	237 (40)	735 (77)	403 (86)	67 (17)	213 (75)	61 (16)	3463 (52)	0.00*
muslim/others	38 (6)	615 (96)	137 (17)	560 (57)	470 (98)	362 (60)	213 (23)	64 (14)	327 (83)	72 (25)	324 (84)	3182 (48)	
Sex of household head													0.00*
male	614 (91)	446 (69)	748 (94)	896 (91)	364 (76)	538 (90)	816 (86)	360 (77)	354 (90)	223 (78)	339 (88)	5698 (86)	
female	58 (9)	196 (31)	45 (6)	84 (9)	116 (24)	61 (10)	132 (14)	107 (23)	40 (10)	62 (22)	46 (12)	947 (14)	
Women's autonomy													0.00*
low	85 (13)	208 (32)	173 (22)	247 (25)	234 (49)	195 (33)	299 (32)	143 (31)	84 (21)	12 (4)	73 (19)	1753 (26)	
medium	519 (77)	370 (58)	555 (70)	645 (66)	178 (37)	372 (62)	585(62)	248 (53)	224 (57)	189 (66)	234 (61)	4119 (62)	
High	68 (10)	64 (10)	65 (8)	88 (9)	68 (14)	32 (5)	64 (7)	76 (16)	86 (22)	84 (30)	78 (20)	773 (12)	
Exposure to media													0.00*
low frequency	563 (84)	590 (92)	716 (90)	806 (82)	453 (94)	563 (94)	815 (86)	441 (94)	256 (65)	92 (32)	301 (78)	5596 (84)	
high Frequency	109 (16)	52 (8)	77 (10)	174 (18)	27 (6)	36 (6)	133 (14)	26 (6)	138 (35)	193 (68)	84 (22)	1049 (16)	
Antenatal care attendance													0.00*
no	240 (36)	464 (72)	489 (62)	587 (60)	362 (75)	366 (61)	561 (59)	256 (55)	165 (42)	9 (3)	169 (44)	3668 (55)	
yes	432 (64)	178 (28)	304 (38)	393 (40)	118 (25)	233 (39)	387 (41)	211 (45)	229 (58)	276 (97)	216 (56)	2977 (45)	
Total	672 (10)	642 (10)	793 (12)	980 (15)	480 (7)	599 (9)	948 (14)	467 (7)	394 (6)	285 (4)	385 (6)	6645 (100)	

Note: numbers in the bracket represent percentage distribution of women
*: significant covariate at 5% level of significance
NA: not applicable

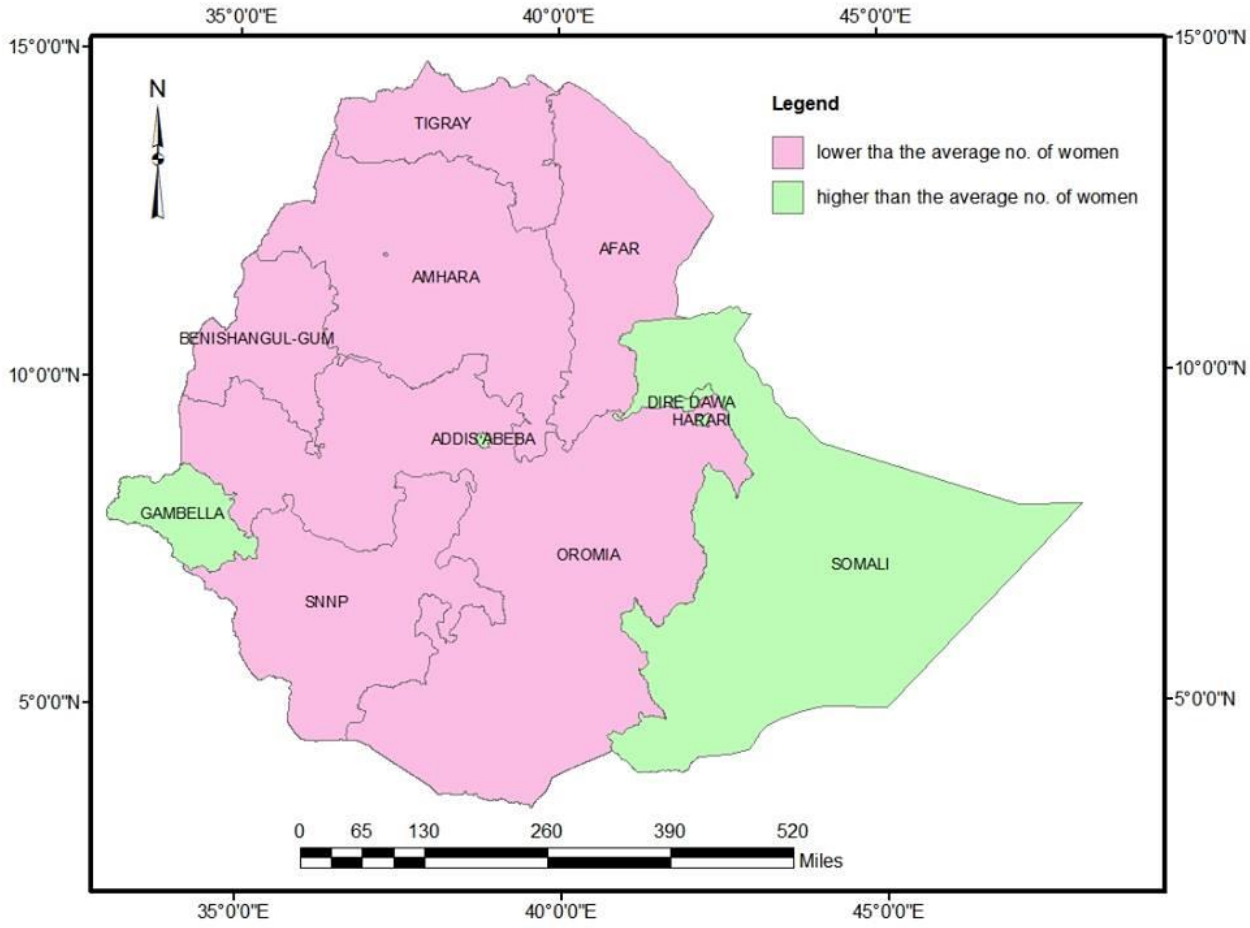
Figure 3 : Percentage distributions of women with primary and higher education across regions



Source: based on EDHS,2011 data

Figure 3 presents the percentage distribution of women who are attended primary and higher education across regions. As one can see from the figure, Addis Ababa, Harari, Tigray, Oromiya ,SNNP and Gambela regions had more than country average number of women who attended primary and higher education . Similarly, Afara, Amhara, Somali and Benshangul regions had lower than the country average number of women who attended their primary and higher education. The proportion of women who lived in Dere dawa region and who attended their primary and higher education is equal to the country average.

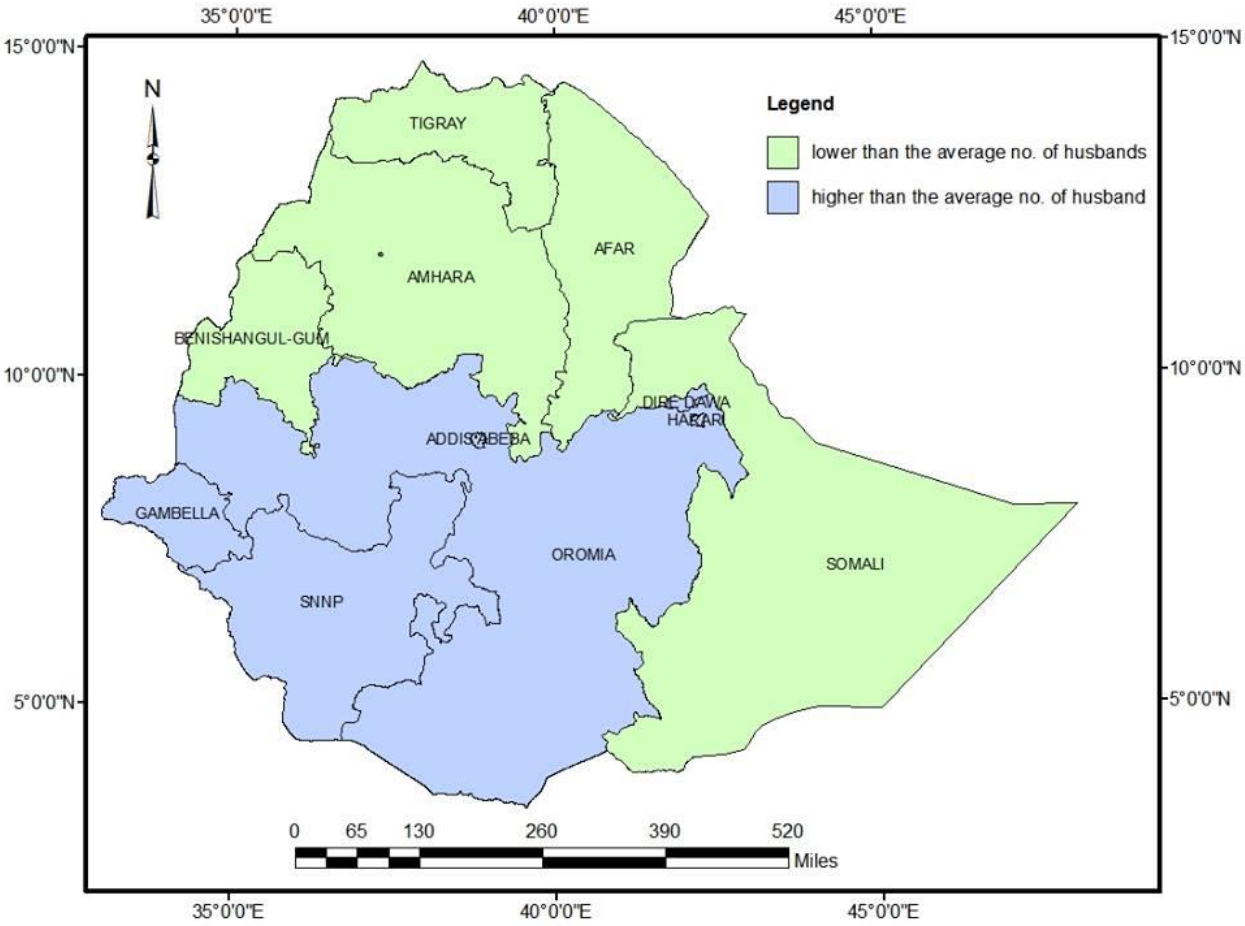
Figure 4 : Percentage distributions of women who had high autonomy across regions



Source: based on EDHS,2011 data

Figure 4 presents the percentage distribution of women who had high autonomy across regions relative to the country average. As one can see from the figure, Addis Ababa, Harari, Dire dawa ,Somali and Gambela regions had more than country average number of women who had high decision making power. Similarly, Tigray, Afara, Amhara, Oromiya , SNNP and Benshangul regions had lower than the country average number of women who had high autonomy.

Figure 5: Percentage distributions of husbands with primary and higher education across regions



Source: based on EDHS,2011 data

Figure 5 presents the percentage distribution of husbands who are attended primary and higher education across regions. As one can see from the figure, Addis Ababa, Dire dawa, Harari, Oromiya ,SNNP and Gambela regions had more than country average number of husbands who attended primary and higher education. Similarly, Afara, Amhara, Somali, Tigray and Benshangul regions had lower than the country average number of husbands who attended their primary and higher education.

4.2 Patterns of skilled delivery care service utilization across regions

The utilization of skilled delivery care services is a major proximate determinant of infant and maternal mortality. However, as shown in table 5, the level of utilizing this service differs significantly across regions of Ethiopia. Table 5 presents the patterns of skilled delivery care cervices utilization across regions.

As indicated in table 5, there were unequal proportions of skilled delivery care users across all regions. As one can see, the largest proportion (87%) of skilled delivery care users were observed in Addis Ababa region. whereas, skilled delivery care users were very low (around 6%) in Afar and SNNP regions.

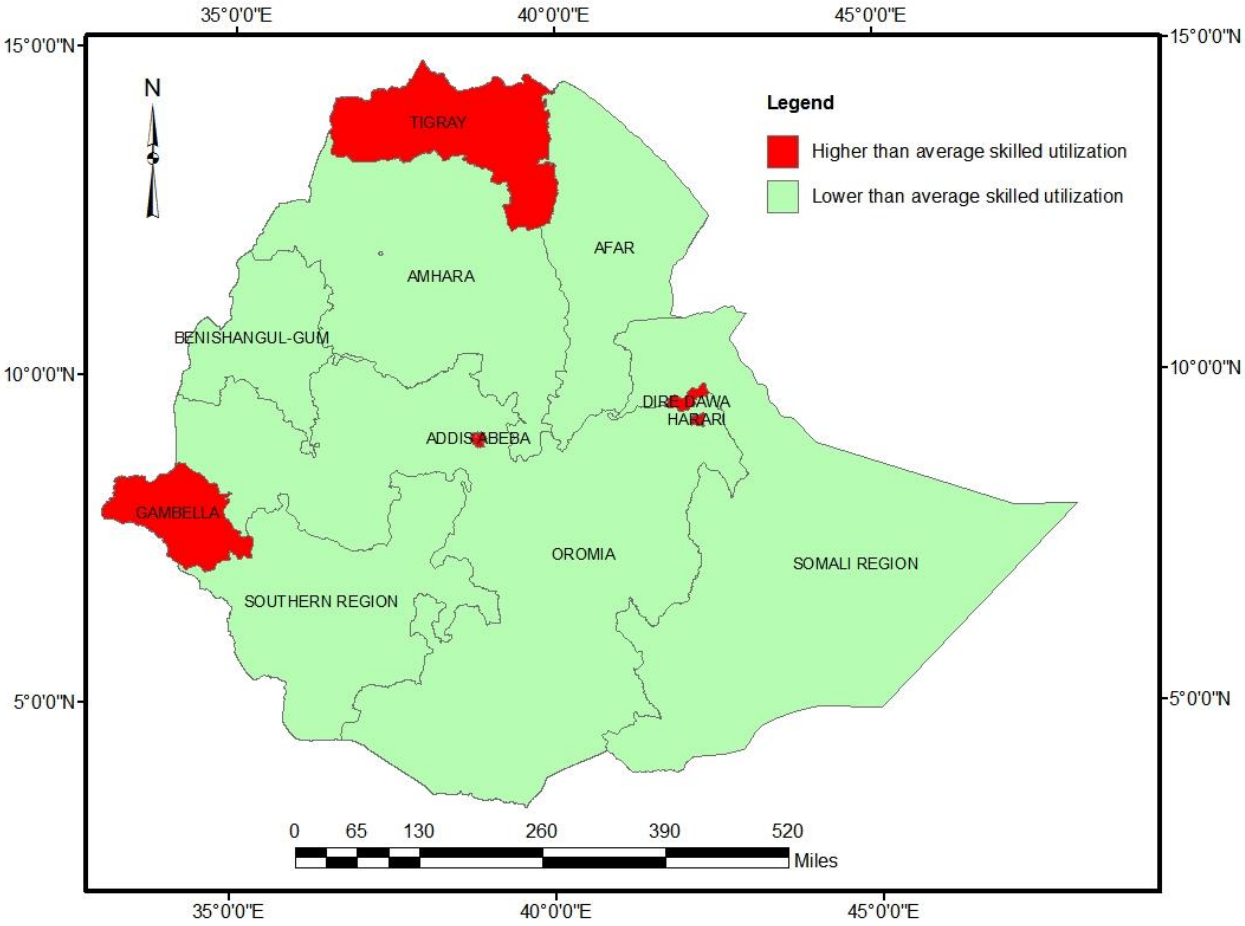
The study also found a statistically significant relationship between regions and skilled delivery care crevices utilization (x^2=1659.75, df=10, p-value<0.01). Women who lived in Hararri, Adiss Ababa and Dire-Dawa regions were more likely to use skilled delivery care compared to the other regions.

In general, the differences observed in the utilization of skilled delivery care services across regions were statistically significant. However, these differences are very much small between Afar, SNNP, Amhara, Oromiya, Somali and Benshangul-Gumuz regions.

Table 5 : Skilled delivery care utilizations across regions

	Assistance Utilized		
Regions	**Unskilled n (%)**	**Skilled n (%)**	**Total**
Tigray	596 (89)	76 (11)	672 (100)
Afar	605 (94)	37 (6)	642 (100)
Amhara	731 (92)	62 (8)	793 (100)
Oromiya	888 (91)	92 (9)	980 (100)
Somali	442 (92.1)	38 (8)	480 (100)
Benishangul-gumuz	554 (92)	45 (8)	599 (100)
SNNP	892 (94)	56 (6)	948 (100)
Gambela	383 (82)	84 (18)	467 (100)
Hararri	249 (63)	145 (37)	394 (100)
Addis Ababa	37 (13)	248 (87)	285 (100)
Dire dawa	229 (60)	156 (40)	385 (100)
Total	**5606 (84)**	**1039 (16)**	**6645 (100)**

Figure 6: Percentage distributions of skilled delivery care utilizations across regions of Ethiopia



Source: based on EDHS,2011 data

4.3 Results of Binary Logistic Regression Analysis

In this study, binary logistic regression is adopted for each region to identify the predictors of the utilization of skilled delivery car services among ever-married women aged 15-49 who had at least one birth in the last five years preceding the 2011 EDHS.

Since the dependent variable has two levels, binary logistic regression analysis is the appropriate model to estimate the effect of the predictor variables on the dependent variable, skilled assistance during delivery. This section presents the relationship between the use of SBAs and socioeconomic and demographic characteristics of women for each region.

Predisposing factors

Women's age and birth order

This study revealed that the age of the women was not statistically significant in Addis Ababa, Dire Dawa, Somali, Hararri , Benishangul and SNNP regions, but it had a significant contribution in the utilization of skilled delivery care services on women who lived in the other regions of Ethiopia. For instance, women who lived in Tigray region and who are within age group of 30-34 had 0.41 (95% CI: 0.19-0.87) times lower odds of utilizing skilled delivery care services than women who lived in the same region with age group of 15-24 but there is no significant difference between women aged 15-24 and 25-29 in the utilization of skilled delivery care services in this region (see table 6).

Regarding birth order of women, a significant negative association was observed with the utilization of skilled delivery care service in all regions except in Addis Ababa and Somali regions. As shown in table 6, women with 1st birth order have a higher chance of utilizing skilled delivery care services than those women who had higher birth orders in all regions of Ethiopia where this predictor had significant contribution in the utilization of skilled delivery care service. For instance, women who lived in Tigray region with 5th birth order had 0.21 (95% CI: 0.08-0.57) times lower odds of utilizing skilled delivery care service than those women with 1st birth order (see table 6).

Women's and husbands' education

The study showed that women's and husbands' educational status has a significant contribution on women's behavior to seek skilled delivery care services in all regions of Ethiopia. As shown in table 6, those women who lived in all regions and who attended primary or higher education had a higher probability of utilizing skilled delivery care service during delivery than women with no education. As illustrated, women who lived in Somali region and who followed primary and higher education had 6.9 (95% CI: 3.43-13.90) times higher odds of utilizing skilled delivery care service than non-educated women. Similarly, having husband with primary and higher educational status had a higher probability of utilizing skilled delivery care in all regions. For instance, women who lived in Amhara region and whose husbands' followed primary or higher education had 4.53 (95% CI: 2.65-7.73) times higher odds of utilizing skilled delivery care services than women with non-educated husbands (see table 6).

Women's and Husbands' occupation

Like education, women's and husbands' occupation had statistically a significant contribution in the utilization of skilled delivery care service in all regions of the country. As shown in table 6, women who engaged in skilled work had a higher chance of utilizing skilled delivery care service in all parts of the country. For instance, women who lived in Benishangul-gumuz region and who were engaged in skilled work had 2.24 (95% CI: 1.20-4.20) times higher odds of utilizing skilled delivery care service than women who engaged in unskilled work. Similarly, having husband with skilled work had a significant contribution on women's behavior to seek skilled delivery care service. For instance, women who lived in Benishangul-gumuz region and whose husbands were engaged in skilled work had 6.71 (95% CI: 3.51-12.82) times higher odds of utilizing skilled delivery care than women whose husbands engaged in unskilled work (see table 6).

Women's exposure to media and women's autonomy

The results of this study showed that women's exposure to media has statistically a significant contribution on women's behavior to seek skilled delivery care service in all regions of the country. For instance, women who lived in Oromia region and who had higher exposure to media had 6.60 (95% CI: 4.21-10.35) times higher odds of utilizing skilled delivery care than those women with less exposure to media. Moreover, decision making power of women in the household had a significant contribution to their utilization of skilled delivery care service in all regions except in Addis Ababa region. However, the strength of its contribution is different among regions. For instance, women who lived in Tigray region with high autonomy had 7.85 (95% CI: 2.52-24.43) times higher odds of utilizing skilled delivery care services than those women who lived in the same region with low autonomy. Whereas in Amhara region they had 3.81 (95% CI: 1.36-10.71) times higher odds of utilizing skilled delivery care services than those women with low autonomy (see table 6).

Gender of household head and religion

Regarding religion, statistically a significant association was observed between religion and utilization of skilled delivery care service only in Harari, Dire dawa, Benshangul-Gumuz , Somali, Oromiya and Afar regions. As shown in table 6, christian women had a higher chance of utilizing skilled delivery care than women with muslim or other religions. For instance, women who lived in Afar region with muslim or other religions had 0.08 (95% CI : 0.03-0.19) times lower odds of utilizing skilled delivery care than christian women who lived in the same region (see table 6).

Moreover, women who were the heads of the household had higher chance of utilizing skilled delivery care services in some regions of the country. For instance, women who lived in Gambela region and who were the heads of the household had 5.73 (95% CI: 2.81-11.70) times higher odds of utilizing skilled delivery care services than other women who were household heads in the same region (see table 6).

Enabling Factors

Place of residence

This study found that women's place of residence had a significant association with the utilization of skilled delivery care service in all regions of the country. However, its strength is different across regions. For instance, women who lived in urban parts of Somali region had 7.85 (95% CI: 3.86-15.96) times higher odds of utilizing skilled delivery care than those women lived in the rural part of the region (see table 6).

Antenatal care attendance

The finding also indicated that antenatal care attendance had a strong positive association with the utilization of skilled delivery care services in all regions of the country. However, its strength varies across regions. For example, women who lived in Gambela region and who were attended ANC had 10.53 (95% CI: 5.52-20.09) times higher odds of utilizing skilled delivery care services than women who did not attend ANC. However, this figure is higher in Addis Ababa region (see table 6).

Table 6 : Univariate logistic regression analysis on women's characteristics and its associate with utilization of SBAs across regions (OR (95% CI))

	Regions					
Characteristics	**Tigray (n=672)**	**Affar(n=642)**	**Amhara (793)**	**Oromiya (n=980)**	**Somali (n=480)**	**Benishangul (n=599)**
Women's age					*	*
15-24@	1	1	1	1	1	1
25-29	0.84 (0.47-1.50)	1.92 (0.87-4.22)	1.52 (0.79-2.91)	0.67 (0.41-1.11)	1.41 (0.59-3.36)	0.64 (0.31-1.31)
30-34	***0.41 (0.19-0.87)***	0.47 (0.13-1.76)	0.73 (0.32-1.63)	***0.40 (0.20-0.80)***	0.73 (0.25-2.12)	0.22 (0.06-0.76)
35-49	***0.29 (0.14-0.59)***	0.45 (0.14-1.48)	0.49 (0.22-1.10)	***0.31 (0.16-0.63)***	0.65 (0.24-1.75)	0.49 (0.21-1.15)
Birth order					*	
1@	1	1	1	1	1	1
2	0.90 (0.49-1.68)	1.42 (0.63-3.19)	0.51 (0.23-1.11)	0.61 (0.34-1.10)	0.77 (0.25-2.38)	0.63 (0.27-145)
3	***0.27 (0.12-0.63)***	0.36 (0.11-1.17)	0.78 (0.37-1.65)	***0.50 (0.26-0.95)***	0.47 (0.14-1.59)	***0.30 (0.11-0.85)***
4	***0.11 (0.03-0.38)***	***0.1 (0.01-0.79)***	***0.26 (0.09-0.73)***	***0.24 (0.11-0.55)***	0.42 (0.13-1.43)	***0.29 (0.09-0.90)***
5	***0.21 (0.08-0.57)***	0.14 (0.02-1.13)	***0.28 (0.09-0.85)***	***0.15 (0.05-0.44)***	0.36 (0.10-1.32)	***0.12 (0.03-0.55)***
>=6	***0.10 (0.04-0.25)***	***0.13 (0.04-0.47)***	***0.21 (0.09-0.49)***	***0.13 (0.06-0.28)***	***0.28 (0.10-0.77)***	***0.22 (0.09-0.56)***
Women's education						
no education@	1	1	1	1	1	1
Primary and higher	***14.17 (7.45-26.93)***	***57.30 (24.44-134.34)***	***6.86 (4.00-11.76)***	***6.03 (3.71-9.80)***	***6.9 (3.43-13.90)***	***4.66 (2.49-8.72)***
Husbands' education						
no education@	1	1	1	1	1	1
Primary and higher	***7.58 (3.92-14.66)***	***23.51 (9.57-57.74)***	***4.53 (2.65-7.73)***	***4.67 (2.64-8.25)***	***4.11 (2.06-8.20)***	***6.33 (2.89-13.83)***
Women's occupation						
unskilled@	1	1	1	1	1	1
skilled	***2.79 (1.68-4.63)***	***11.69 (5.69-24.02)***	***5.91 (3.37-10.36)***	***2.45 (1.58-3.81)***	***2.93 (1.37-6.24)***	***2.24 (1.20-4.20)***
Husbands' occupation						
unskilled@	1	1	1	1	1	1
skilled	***17.55 (9.96-30.94)***	***49.50 (11.77-208.22)***	***14.23 (7.99-25.35)***	***13.44 (8.39-21.52)***	***7.49 (3.45-16.25)***	***6.71 (3.51-12.82)***
Religion	*		*			
chrstian@	1	1	1	1	1	1
muslim or others	1.51 (0.61-3.74)	***0.08 (0.03-0.19)***	0.69 (0.32-1.49)	***0.20 (0.12-0.34)***	***0.02 (0.00-0.08)***	***0.33 (0.18-0.63)***
Place of residence						
rural@	1	1	1	1	1	1
urban	***25.37 (14.37-44.78)***	***53.81 (21.48-134.82)***	***19.84 (10.73-36.71)***	***20.08 (12.23-32.96)***	***7.85 (3.86-15.96)***	***15.50 (7.88-30.52)***
Gender of household head		*			*	*
Male@	1	1	1	1	1	1
Female	***4.76 (2.58-8.78)***	0.83 (0.40-1.76)	***2.78 (1.23-6.26)***	***2.78 (1.55-4.97)***	1.31 (0.63-2.73)	0.85 (0.29-2.46)
Women's autonomy						
low@	1	1	1	1	1	1
medium	2.30 (0.81-6.54)	***3.22 (1.10-9.49)***	2.14 (0.95-4.84)	***3.18 (1.50-6.74)***	1.91 (0.83-4.41)	***3.27 (1.35-7.92)***
high	***7.85 (2.52-24.43)***	***10.59 (3.24-34.57)***	***3.81 (1.36-10.71)***	***9.96 (4.24-23.39)***	***5.81 (2.45-13.78)***	***4.50 (1.20-16.95)***
Exposure to media						
low frequency@	1	1	1	1	1	1
high frequency	***16.21 (9.45-27.83)***	***28.11 (13.25-59.63)***	***6.17 (3.41-11.16)***	***6.60 (4.21-10.35)***	***13.14 (5.58-30.93)***	***6.85 (3.11-15.08)***
Antenatal care attendance						
no@	1	1	1	1	1	1
yes	***7.54 (3.22-17.64)***	***36.28 (10.98-119.88)***	***6.36 (3.44-11.76)***	***8.56 (4.91-14.92)***	***12.78 (5.84-27.97)***	***6.29 (3.05-12.98)***

*: not significant at 5% significance level

@: Reference category

Table 6 continued

	Regions				
Characteristics	**SNNP (n=948)**	**Gambela (n=467)**	**Harari (n=394)**	**Addis Ababa (n=285)**	**Dire Dawa (n=385)**
Women's age	*		*	*	*
15-24[@]	1	1	1	1	1
25-29	0.50 (0.24-1.06)	0.78 (0.44-1.38)	0.80 (0.48-1.33)	1.25 (0.51-3.03)	0.84 (0.48-1.45)
30-34	0.58 (0.27-1.27)	***0.35 (0.16-0.74)***	0.97 (0.53-1.77)	1.33 (0.51-3.51)	0.60 (0.32-1.11)
35-49	0.52 (0.25-1.09)	***0.38 (0.19-0.79)***	0.47 (0.25-0.91)	1.38 (0.44-4.37)	0.58 (0.31-1.07)
Birth order				*	
1[@]	1	1	1	1	1
2	***0.192 (0.07-0.52)***	0.54 (0.28-1.05)	***0.47 (0.25-0.88)***	0.67 (0.27-1.65)	0.53 (0.27-1.05)
3	***0.38 (0.17-0.86)***	***0.29 (0.13-0.61)***	***0.16 (0.08-0.34)***	0.56 (0.18-1.74)	***0.13 (0.06-0.29)***
4	***0.20 (0.07-0.56)***	***0.05 (0.01-0.23)***	***0.19 (0.09-0.41)***	0.68 (0.17-2.63)	***0.08 (0.04-0.20)***
5	***0.19 (0.06-0.56)***	***0.38 (0.17-0.85)***	***0.09 (0.03-0.25)***	0.26 (0.06-1.11)	***0.14 (0.06-0.36)***
>=6	***0.18 (0.08-0.38)***	***0.14 (0.06-0.33)***	***0.04 (0.01-0.09)***	***0.14 (0.04-0.50)***	***0.08 (0.04-0.17)***
Women's education					
no education[@]	1	1	1	1	1
Primary and higher	***5.75 (3.09-10.68***)	***3.69 (2.15-6.33)***	***8.40 (5.25-13.44)***	***3.85 (1.85-8.00)***	***13.42 (7.92-22.71)***
Husbands' education					
no education[@]	1	1	1	1	1
Primary and higher	***3.57 (1.67-7.65)***	***3.74 (1.92-7.29)***	***5.40 (3.20-9.14)***	***3.66 (1.52-8.83)***	***9.25 (5.63-15.2)***
Women's occupation				*	
unskilled[@]	1	1	1	1	1
skilled	***2.61 (1.52-4.51)***	1.61 (0.98-2.65)	***2.15 (1.41-3.28)***	1.25 (0.61-2.54)	***1.96 (1.24-3.07)***
Husbands' occupation					
unskilled[@]	1	1	1	1	1
skilled	***13.66 (7.44-25.08)***	***4.64 (2.82-7.65)***	***25.09 (14.57-43.22)***	***3.46 (1.49-8.00)***	***26.34 (15.17-45.72)***
Religion	*	*		*	
chrstian[@]	1	1	1	1	1
muslim or others	1.05 (0.55-1.98)	0.62 (0.28-1.34)	0.02 (0.01-0.06)	0.58 (0.28-1.20)	0.01 (0.00-0.05)
Place of residence				NA	
rural[@]	1	1	1		1
urban	***35.60 (18.66-67.94)***	***15.65 (8.59-28.54)***	***40.24 (22.3-72.61)***		***84.19 (42.45-166.99)***
Gender of household head		*		*	
Male[@]	1	1	1	1	1
Female	***2.68 (1.45-4.93)***	1.34 (0.78-2.30)	***4.73 (2.32-9.63)***	1.22 (0.51-2.93)	***5.73 (2.81-11.70)***
Women's autonomy				*	
low[@]	1	1	1	1	1
medium	***2.90 (1.28-6.57)***	***2.33 (1.24-4.38)***	1.60 (0.91-2.82)	0.48 (0.06-3.87)	1.27 (0.72-2.25)
High	***8.66 (3.21-23.34)***	***3.29 (1.55-6.98)***	***3.45 (1.80-6.61)***	1.18 (0.13-10.76)	***4.38 (2.21-8.68)***
Exposure to media					
low frequency[@]	1	1	1	1	1
high frequency	***8.14 (4.64-14.29)***	***5.21 (2.32-11.71)***	***9.66 (5.99-15.57)***	***2.53 (1.26-5.10)***	***30.91 (13.68-69.85)***
Antenatal care attendance					
no[@]	1	1	1	1	1
yes	***11.47 (5.14-25.62)***	***10.53 (5.52-20.09)***	***9.4 (5.45-16.2)***	***15.81 (3.76-66.41)***	***10.17 (6.06-17.08)***

*: not significant at 5% significance level
@: Reference category
NA: not applicable

4.4 Results of Multiple Logistic Regression Analysis

In this study multiple logistic regression models was also analyzed for each region. In this analysis, we considered only significant covariates which are obtained from simple binary logistic model in each region. Results of the multiple logistic regression analysis are presented in table 7.

The study found that each region's model significantly predicts the utilization of skilled delivery care. This section presents the relationship between the use of skilled delivery care services and socioeconomic and demographic characteristics of women based on multiple logistic regression analysis.

Predisposing factors

Women's age and birth order

The study showed that in all regions where age was significant based on binary logistic regression terns to be insignificant in the multiple logistic regressions. As sown in table 7, women aged 25-29 who lived in Afar region had 6.8 (95% CI: 1.63-28.27) times higher odds of utilizing skilled delivery care service than women aged 15-24. Nevertheless, a non-significant difference was observed among women aged 35-49 and 15-24 in the utilization of skilled delivery care service in this region. Similarly, birth order stays significant only in Gambela, Harari and Dire dawa regions. Women with highest birth order had a smallest probability of utilizing skilled delivery care than women with 1st birth order in Gambela, Hararri, and Dire dawa regions (see table7).

Women's and husbands' education

Women's education was found to be a strong significant predictor of the utilization of skilled delivery care service in Tigray, Afar and Amhara regions. This implies that women with higher level of education had higher probability of utilizing skilled delivery care services in these regions. For instance, women who lived in Afar region with primary and higher education had 6.03 (95% CI: 1.33-27.29) times higher odds of utilizing skilled delivery care services than non-educated women. Similarly, the multiple logistic regression analysis also showed a significant effect of husbands' education on women's utilization of skilled delivery care services in Benshangul-gumuz region (see table 7).

Women's and Husbands' occupation

The results of multiple logistic regression analysis found that women's occupation was not significant predictor of the utilization of skilled delivery care service in all regions of Ethiopia. While husbands' occupation was a significant predictor of women's utilization of skilled delivery care services only in Tigray, Oromiya, Benshangul-gumuz, SNNP, Addis Ababa and Afar regions. For instance, women who lived in Tigray region and whose husbands' were engaged in skilled work had 2.39 (95% CI: 1.02-5.58) times higher odds of utilizing skilled delivery care services than women whose husbands' were engaged in unskilled work (see table7).

Women's exposure to media and women's autonomy

This analysis also noted that women's exposure to media had a significant effect on the utilization of skilled delivery care services in Tigray and Somali regions. As one can see in table 7, women who lived in Somali region and who had high media exposure had 4.34 (95% CI: 1.42-13.24) times higher odds of utilizing skilled delivery care services than women with low media exposure. Women autonomy remains significant predictor of utilization of skilled delivery care services only in Oromiya and Gambela regions (see table 7).

Gender of household head and religion

The gender of household head was a significant predictor of the utilization of skilled delivery care only in Oromia region. For instance, women who lived in Oromiya region and who were household head had 3.47 (95% CI: 1.45-8.31) times higher odds of utilizing skilled delivery care services than those women who were not household head. Similarly, it is found that religion of women were a significant predictor of the utilization of skilled delivery care services only in Oromiya and Somali regions, but its effect was small in both regions. For instance, women who lived in Somali region with Muslim or other religions had 0.06 (95% CI: 0.01-0.42) times lower odds of utilizing skilled delivery care than Christian women (see table 7).

Enabling factors

Place of residence

Place of residence remains a strong significant predictor of the utilization of skilled delivery care in all regions were considered in multiple logistic regression analysis except in Somali and Afar regions. This implies that urban women had a higher probability of utilizing skilled delivery care services in all regions except in Somali and Afar regions. For instance, urban women who were living in the region of Amhara had 5.43 (95% CI: 2.14-13.76) times higher odds of utilizing skilled delivery care than rural women in the same region (see table7).

Antenatal care attendance

The finding also indicated that antenatal care attendance remains a strong significant predictor of the utilizations of skilled delivery care in all regions except in Tigray and Dire dawa regions. But the strength of the association is different across regions. As shown in table 7, women who lived in Amhara and Benshangul-gumuz regions and who had at least one antenatal care attendance had 3.15 (95% CI: 1.54-6.42) and 2.74 (95% CI: 1.18-6.37) times higher odds of utilizing skilled delivery care than women without antenatal care attendance, respectively (see table 7).

All in all, from the logistic regression analysis we could easily see how the effects of socio-economic and demographic factors in utilization of skilled delivery care services differ across regions. We also observed a strong influence of antenatal care attendance and place of residence in the use of skilled delivery care services in all regions of Ethiopia.

Table 7: Multiple logistic regression on women's characteristics and its association with utilization of SBAs across regions-Adjusted OR (95% CI)

	Regions					
Characteristics	**Tigray**	**Afar**	**Amhara**	**Oromiya**	**Somali**	**Benishangul-gumuz**
Women's age						
15-24@	1	1	1	1		
25-29	1.12 (0.46-2.73)	6.80 (1.63-28.27)	1.22 (0.48-3.12)	0.90 (0.42-1.95)		
30-34	1.78 (0.45-7.04)	10.05 (1.03-98.67)	1.08 (0.30-3.88)	0.65 (0.21-1.99)		
35-49	1.93 (0.44-8.52)	7.27(0.40-132.78)	0.55 (0.13-2.44)	0.40 (0.12-1.36)		
Birth order						
1@	1	1	1	1		1
2	1.09 (0.43-2.75)	0.85 (0.20-3.55)	0.44 (0.16-1.19)	0.55 (0.23-1.31)		0.44 (0.15-1.30)
3	0.35 (0.10-1.25)	0.24 (0.04-1.62)	0.65 (0.21-2.02)	0.85 (0.32-2.23)		0.49 (0.14-1.70)
4	0.15 (0.0.03-0.89)	0.04 (0.02-0.63)	0.55 (0.13-2.24)	0.48 (0.15-1.53)		0.44 (0.11-1.77)
5	0.38 (0.07-1.99)	0.15 (0.02-9.99)	0.45 (0.09-2.24)	0.36 (0.09-1.50)		0.28 (0.05-1.50)
>=6	0.28 (0.05-1.49)	0.07 (0.05-0.99)	0.59 (0.13-2.75)	0.87 (0.24-3.23)		0.88 (0.26-3.02)
Women's education	**	**	**			
no education@	1	1	1	1	1	1
primary and higher	3.21(1.38-7.44)	6.03 (1.33-27.29)	3.43 (1.62-7.26)	1.26 (0.63-2.54)	1.92 (0.72-5.16)	1.48 (0.61-3.60)
Husbands' education						**
no education@	1	1	1	1	1	1
Primary and higher	1.66 (0.71-3.91)	1.75 (0.44-6.87)	1.08(0.51-2.29)	1.14 (0.55-2.35)	0.95 (0.37-2.46)	3.38(1.40-8.18)
Women's occupation						
unskilled@	1	1	1	1	1	1
skilled	0.86(0.41-1.78)	2.65 (0.77-9.08)	1.66 (0.74-3.75)	1.31 (0.73-2.36)	0.33 (0.98-1.13)	1.31 (0.60-2.84)
Husbands' occupation	**			**		**
unskilled@	1	1	1	1	1	1
skilled	2.39 (1.02-5.58)	6.80 (0.95-48.52)	2.35 (0.95-5.84)	2.13 (1.03-4.42)	1.88 (0.66-5.38)	2.69 (1.08-6.74)
Religion				**	**	
chrstian@		1		1	1	1
muslim or others		1.06 (0.26-4.30)		0.37 (0.20-0.68)	0.06 (0.01-0.42)	0.64 (0.29-1.46)
Place of residence	**		**	**		**
rural@	1	1	1	1	1	1
urban	4.84 (2.16-10.83)	3.03 (0.66-13.86)	5.43 (2.14-13.76)	5.47 (2.64-11.34)	1.81 (0.66-4.95)	5.49 (2.22-13.60)
Gender of household head				**		
Male@	1		1	1		1
Female	1.65 (0.64-4.25)		0.61 (0.19-1.99)	3.47 (1.45-8.31)		0.75 (0.20-2.79)
Women's autonomy				**		
low@	1	1	1	1	1	1
medium	1.80 (0.54-6.06)	0.43 (0.08-2.45)	1.15 (0.46-2.87)	1.86(0.79-4.37)	0.85 (0.30-2.39)	1.88 (0.66-5.39)
high	1.30 (0.31-5.55)	1.67 (0.24-11.83)	1.57 (0.45-5.49)	3.93 (1.35-11.46)	2.01 (0.67-6.04)	1.63 (0.34-7.88)
Exposure to media	**				**	
low frequency@	1	1	1	1	1	
high frequency	2.82 (1.35-5.91)	0.98 (0.24-3.99)	0.83 (0.35-1.98)	1.85(0.98-3.49)	4.34 (1.42-13.24)	
Antenatal care attendance		**	**	**	**	**
no@	1	1	1	1	1	1
yes	1.75 (0.65-4.72)	10.55(1.84-60.59)	3.15 (1.54-6.42)	3.28 (1.69 -6.37)	6.85 (2.79-16.82)	2.74 (1.18-6.37)

**: significant at 5% significance level

@ : Reference category

Table 7 continued

Characteristics	Regions				
	SNNP	Gambela	Harari	Addis Ababa	Dire Dawa
Women's age					
15-24@		1			
25-29		1.60 (0.69-3.72)			
30-34		1.81 (0.48-6.80)			
35-49		2.86 (0.76-10.78)			
Birth order		**	**		**
1@	1	1	1		1
2	0.37 (0.11-1.27)	0.70 (0.29-1.68)	0.24 (0.09-0.64)		0.20 (0.05-0.80)
3	1.10 (0.35-3.48)	0.21 (0.08-0.61)	0.32 (0.11-0.96)		0.05 (0.01-0.24)
4	0.31 (0.09-1.12)	0.04 (0.01-0.27)	0.29 (0.08-0.99)		0.10 (0.02-0.46)
5	0.24 (0.06-1.00)	0.28 (0.07-1.08)	0.09 (0.02-0.40)		0.32 (0.06-1.63)
>=6	0.56 (0.20-1.53)	0.11 (0.26-0.43)	0.16 (0.05-0.54)		0.35 (0.09-1.43)
Women's education					
no education@	1	1	1	1	1
primary and higher	1.32 (0.56-3.14)	1.13 (0.53-2.43)	1.73 (0.82-3.64)	2.13 (0.90-5.01)	2.43 (0.89-6.63)
Husbands' education					
no education@	1	1	1	1	1
primary and higher	1.08 (0.43-2.67)	1.54 (0.65-3.66)	1.03 (0.45-2.33)	1.56 (0.54-4.46)	2.06 (0.87-4.86)
Women's occupation					
unskilled@	1	1			1
skilled	1.93 (0.94-3.97)	1.34 (0.96-2.61)			1.50 (0.61-3.71)
Husbands' occupation	**			**	
unskilled@	1	1	1	1	
skilled	3.19 (1.41-7.24)	1.78 (0.85-3.73)	2.24 (0.82-6.11)	2.60 (1.05-6.46)	
Religion					
chrstian@			1		1
muslim or others			0.38 (0.11-1.30)		0.26 (0.03-2.24)
Place of residence	**	**	**		**
rural@	1	1	1		1
urban	8.17 (3.04-21.99)	7.79 (3.46-17.55)	9.58 (3.35-27.37)		51.15 (18.60-140.65)
Gender of household head					
Male@	1		1		
Female	2.04 (0.87-4.79)		0.79 (0.26-2.38)		
Women's autonomy		**			
low@	1	1	1		1
medium	1.69 (0.63-4.53)	2.81 (1.23-6.44)	0.68 (0.29-1.63)		0.52 (0.19-1.41)
high	4.81 (1.32-17.52)	3.29 (1.21-8.95)	0.55 (0.19-1.59)		0.60 (0.15-2.32)
Exposure to media					
low frequency@	1		1	1	1
high frequency	1.73 (0.71-4.22)		2.02 (0.97-4.22)	1.55 (0.71-3.37)	2.47 (0.68-9.05)
Antenatal care attendance	**	**	**	**	
no@	1	1	1	1	1
yes	7.09 (2.90-17.32)	5.20 (2.50-10.80)	3.09 (1.37-6.95)	8.70 (1.85-40.88)	2.22 (0.94-5.22)

**: significant at 5% significance level

@ : Reference category

4.5 Discussions

This study analyzed a representative women's data was taken from EDHS, 2011. For the purpose of this study, we selected 6,756 ever-married women who had at least one child in the last five years preceding the survey.

The aim of this study was assessing regional differences in the utilization of skilled delivery care services in Ethiopia. As a result, the study analyzed selected socio-economic and demographic factors of women at regional levels in order to identify the contributing factors in the utilization of skilled delivery care services in each region of Ethiopia. This is because Ethiopia has different ethnic groups which are classified into different regions. Differences in ethnicity would lead in to different cultural and traditional practice which could have an influence on the utilization of skilled delivery care services differently.

The results of the study showed the differences and determinants of the skilled delivery care service utilization in each region of Ethiopia. It was observed that each region had differences in the utilization of skilled delivery care services. This could be due to differences in transport facilities, quality of services and access to the health facility across each region. These differences which are observed across regions were statistically significant.

Results of the multiple binary logistic regression analysis showed that different socio-economic and demographic factors are strongly associated with women's utilization of skilled delivery care services in each region. Results showed that the contributing factors on women's utilizations of skilled delivery care services in one region might not be the case in the other regions. For instance, women's education had a significant effect on the utilization of skilled delivery care services in Tigray, Afar and Amhara regions but this is not the case in the other regions. This could be due to the differences in cultural and traditional practices and living style of people across regions.

Similarly, the results showed that attendance of ANC has strong significant effect on women's behavior to seek skilled delivery care services in each region, but the strength of this effect might be different across regions.

It was observed that women's education had a significant contribution in the utilization of skilled delivery care services in Tigray, Afar and Amhara regions. Many literatures revealed that women's education is a major factor influencing maternal health service utilization (Dagne, 2010; Nigussie *et al.*, 2004). Education serves as proxy for information and knowledge of available health care services (Babalola *et al.*, 2009). Education also serves as proxy for women's higher socio-economic status which improves the ability of educated women to afford the cost of health care services (Chakraborty *et al*., 2003). Moreover, it is likely that education enhances the level of autonomy and increases females' decision-making power that results in an improved freedom to make decisions including maternal health care services (Acharya *et al*., 2010). Moreover, educated women are considered to have better knowledge and information on modern health care services (Babalola *et al.*, 2009). These factors, therefore, enable women to seek for safer delivery places.

The study also revealed that husbands' education was not a significant predictor of the utilization of skilled delivery care services in all regions of the country except in Benshangul-Gumuz region. It was observed that husbands' education had a strong significant contribution in the utilization of skilled delivery care services in Benshangul-gumuz region. This finding conforms to some other previous studies (Thind *et al.*, 2008; Paul *et al.*, 2002). It is likely that educated partners will have a better understanding and knowledge of modern health care services. Education also leads to better awareness of available services (Thind *et al*., 2008).

It also found a significant negative association between birth order and the use of skilled delivery care services in Gambela, Harari and Dire dawa regions. These finding is similar with several other studies that came up with negative association between birth order and the use of skilled delivery assistance (Thind *et al., 2008*; Mekonen *et al.*, 2003). This association could be explained in terms of fear of complication or lack of confidence in women who experience first birth. Thus, they are more likely to use skilled delivery care services than women with higher birth order (Mekonnen *et al.*, 2003; Chakraborty *et al*., 2003). Similarly, women with more children believe that they are more experienced to safely give birth; therefore, they are less likely to use skilled delivery care services (Mekonnen *et al.*, 2003).

The low use of skilled delivery care services among women with higher number of children could also be due to the resource constraints in the family as there are many demands in the family (Mekonnen *et al.*, 2003).

Additionally, women's occupation was found to be statistically not a significant predictor of the utilization of skilled delivery care services in all regions. Nevertheless, women who lived in Afar, Oromia and Addis Ababa regions whose husbands were participated in skilled work were more likely to utilize skilled delivery care services compared to those women whose husbands were involved in unskilled work. This finding is consistent with a study conducted in Ethiopia and Bangladesh which indicated that husbands' occupation is a significant predictor of the utilization of skilled delivery care services (Tsegay *et al.*, 2013; Chakraborty *et al.*, 2002). Husbands' occupation also has a direct impact on the household economic status. As a result, as the household economic status increases, the women's tendency to utilize skilled delivery care services also increases.

In this study, religion was observed as a non-significant predictor of the utilization of skilled delivery care services in all regions of the country except in Oromiya and Somali regions where majority of residents were Muslim. The finding was consistent with study conducted by Mehari (2013) who analyzed the EDHS 2000 and 2005. Contrary to this finding, other studies in Ethiopia and in other countries found a significant association between religion and skilled delivery care service utilization (Addai, 1998 ; Mekonnen & Mekonnen, 2002). Thus, in order to know how religion influences skilled delivery care service utilization, we need to have further studies.

With the exception of women who lived in Afar and Somali regions, place of residence was a significant influential factor of delivery service utilization among women. The findings of this study showed that the utilization of skilled delivery care services greatly varied between urban and rural residents in all regions except in Afar and Somali regions. This result is consistent with a number of other studies (Binyam, 2005; Mihret, 2008; Babalola *et al.*, 2009). One possible reason for this gap is the inequitable access to health care services. For instance, most of the health care services are concentrated in the urban areas. Several studies have also revealed the role of distance to health facilities in the utilization of health care services. In most rural areas, there is no means of transportation to health centers, which makes maternal health services more difficult (Babalola *et al*., 2009).

The study also indicated that exposure to media was a significant predictor of the utilization of skilled delivery care services in Tigray and Somali regions. Contrary to the findings of a study conducted by Mulumebet et al. (2002), this study showed that women's autonomy is not a significant predictor of utilization of skilled delivery care services in all regions of the country except in Oromiya and Gambela regions.

Finally, this study revealed that ANC attendance is a strong predictor of the utilization of skilled delivery care services in all regions of Ethiopia except in Tigray and Dire dawa regions. This is also consistent with other study (Latamo *et al*., 2003).

Chapter Five

Conclusion and Recommendation

5.1 Conclusion

The distribution of the use of skilled delivery care services was found to be very low and unequally distributed across regions of Ethiopia. It was observed that the utilization of skilled delivery care services is higher in Addis Ababa, Diredawa and Harari regions compared to other regions of the country. However, there was a similarity in utilization of skilled delivery care services between Amhara, Somali & Benshangul-gumuz regions and also between of Afar and SNNP regions. This difference which is observed across regions was statistically significant.

The results of this study showed that the effects of socio-demographic factors in the utilization of skilled delivery care services were different across regions. The finding of this study also identified a number of important factors that influence the use of skilled delivery care services in each region. Though the determinants are the same in some regions; the strength of its effect may differ.

Place of residence was observed as a significant predictor which influences the use of skilled delivery care services almost in all regions of Ethiopia. For instance, urban women's tendency towards the utilization of skilled delivery care services was higher compared to their rural counterparts. This gap could be mainly due to the disparities of the quality of services between urban and rural parts of the regions.

Higher birth order appeared as a strong predictor in the utilization of skilled delivery care services in Gambela, Harari and Diredawa regions. It was observed that the utilization of skilled delivery care services consistently decreases as birth order of the women increases. With regard to husbands' education, it was observed that women who lived in SNNP and Benshangul-gumuz regions whose husbands are uneducated were less likely to utilize skilled delivery care services. Whereas women who lived in Afar, Oromiya and Addis Ababa regions whose husbands were engaged in unskilled work was less likely to utilize skilled delivery care services.

Conversely, husbands' occupation and education remained to be a non-significant predictor of the utilization of skilled delivery care services in the other regions of Ethiopia. Likewise, the study revealed woman's decision making and religion are non-significant predictors of the utilization of skilled delivery care services almost in all regions of the country except in Somali and Gambela regions, respectively.

Finally, the findings of this study showed that the utilization of ANC is the most significant predictor which influences the use of skilled delivery care services almost in all regions of Ethiopia. However, its strength was different across regions. Accordingly, it was observed that women who had at least one ANC attendance tend to utilize skilled delivery care services.

5.2 Recommendations

Based on the results of this study, this section provides some recommendations that the government and other concerned bodies should consider to improve the utilization of skilled delivery care services in the country.

- Special attention should be taken during intervention in improving the utilizations of skilled delivery care services for all regions except Addis Ababa, Dire dawa and Hararri.
- The concerned bodies should take an intervention based on specific regional factors.
- Cultural and traditional barriers towards the utilizations of skilled delivery care services should be controlled in each region.
- The quality and accessibility of antenatal care services should be given appropriate attention with a major focus on providing appropriate advice on safe delivery.
- Further studies should be conduct on women's autonomy, religion and women's occupation at regional level.

References

Abou Zahr, C. & Wardlaw, T. (2001). Maternal mortality at the end of a decade: signs of progress? *Bull World Health Organization* 79,561-568.

Acharya, D.R., Bell, J.S., Simkhada, P., Van Teijlingen, E.R. & Regmi, P.R. (2010). Women's autonomy in household decision-making: a demographic study in Nepal. *Reproductive health* 7(15).

Addai, I. (1998). Demographic and socio-cultural factors influencing use of maternal health services in Ghana. *African Journal of Reproductive Health* 2(1), 73-80.

Adegoke, A. & van den Broek N. (2009). Skilled birth attendance-lessons learnt. *International journal of Obstetrics and Gynaecology* 116(1), 33–40.

Andersen, R. (1995). Revisiting the Behavioral Model and Access to Medical Care: Does it Matter?. *Journal of Health and Social Behavior* 36(1), 1-10.

Babalola, S. & Fatusi, A. (2009). Determinants of use of maternal health services in Nigeria--looking beyond individual and household factors. *BMC Pregnancy Childbirth* 9(1), 43.

Bell, J., Curtis, S.L. & Alayon, S. (2003). *Trends in delivery care in six countries: DHS Analytical Studies.* ORC Macro and International Research Partnership for Skilled Attendance for Everyone, Calverton, Maryland, 7.

Binyam, A. (2005). *What factors determine delivery practices of pregnant women?* MSc thesis, Jimma: Ethiopia.

Bloom, S., Wypij, D. & Das Gupta, M. (1998). "Dimensions of Women's Autonomy and the influence on maternal health care utilization in a North Indian City." *Carolina Population Centre*, 98-02.

Central Statistical Agency (CSA) (2012). *Demographic and Health Survey 2011, Final report*. Calverton, Maryland, USA.

Central Statistical Agency (CSA) (2012). *2007 population and housing census of Ethiopia. Administrative report.* Addis Ababa, Ethiopia.

Chakraborty, N., Islam, MA., Chowdhury, R.I. & Bari, W. (2002). Utilization of postnatal care in Bangladesh: evidence from a longitudinal study. *Health and Social Care in the Community* 10(6), 492-502.

Chakraborty, N., Islam, M.A., Chowdhury, R.I., Wasimul Bari, W. & Akhter H.H. (2003). Determinants of the use of maternal health services in rural Bangladesh. *Health Promotion International* 18 (4), 327-337.

Chowdhury, R., Islam, M.A., Gulshan,J. & Chakraborty,N. (2007). Delivery complications and healthcare-seeking behavior: the Bangladesh Demographic Health Survey, 1999-2000. *Health and Social Care in the Community* 15(3), 254-64.

Dagne E. (2010). *Role of socio-demographic factors on utilization of maternal health care services in Ethiopia*, MSc. Thesis, Umeå University.

Griffiths, P. & Stephenson, R. (2001). Understanding users' perspectives of barriers to maternal health care use in Maharashtra, India. *Journal of Biosocial Science* 33(3), 339-359.

Kausar, F., Griffiths, P. & Matthews, Z. (1999) *Poverty and Maternal Healthcare Utilization in Maharashtra: Associated Influences on Infant Mortality and Morbidity,* University of Southampton, UK.

Koblinsky M. A., Campbell O. & Heichelheim, J. (1999). Organizing delivery care: what works for safe motherhood? *Bull World Health Organization* 77,399-406.

Letamo, G. & Rakgoasi, S.D. (2003). Factors associated with non-use of maternal health services in Botswana. *Journal of Health Population Nutrition* 21(1), 40-47.

Margaret, E., Paczkowski, M., Tegegn, A., Tessema, E., Hadley, C., Asefa, M. & Gelela, S. (2012). Women's preference for obstetric care in rural Ethiopia. *Journal of Epidemiology and Community Health* 64, 984–988.

Mehari, A. (2013). *Levels and Determinants of Use of Institutional Delivery Care Services among Women of Childbearing Age in Ethiopia: Analysis of EDHS 2000 and 2005 Data*. ICF International Calverton, Maryland, USA.

Mekonnen, Y. & Mekonen, A. (2002). *Utilization of Maternal Health Care Services in Ethiopia*. Calverton, Maryland, USA: ORC Macro.

Mekonnen, Y. & Mekonnen, A. (2003). Factors influencing the use of maternal healthcare services in Ethiopia. *Journal of Health Population and Nutrition* 21, 374-382.

Mihret, H. & Mesganaw, F. (2008). Birth preparedness and complication readiness among women in Adigrat town, northern Ethiopia. *Ethiopian Journal of Health Development* 22(1), 14–20.

Mulumebet , A., Abebe, G. & Tefera, B. (2002). Predictors of safe delivery service Utilization in Arsi zone, South-east Ethiopia. *Ethiopian Journal of Health Science* 21, *Special Issue*,111-112.

Navaneetham, K. & Dharmalingam, A. (2002). Utilization of maternal health care services in Southern India. *Social Science and Medicine* 55(10), 1849 – 1869.

Nigussie, M., Haile Mariam, D. & Mitike, G. (2004). Assessment of safe delivery service utilization among women of childbearing age in north Gondar Zone. *Ethiopian Journal of Health Development* 18(3), 14-152.

Paul, B.K. & Rumsey, D.J. (2002). Utilization of health facilities and trained attendants for childbirth in rural Bangladesh: an empirical study. *Social Science and Medicine* 54(12), 1755- 1765.

Peter O., Anna, M., Mary, J., Evallyne, S., Frank, O. & John,G. (2010). Antenatal and delivery care in rural western Kenya: the effect of training health care workers to provide "focused antenatal care". *Reproductive Health* 7(1).

Shariff, A. & Singh, G. (2002). Determinants of maternal health care utilization in India: Evidence from a recent household survey, *NCAER*, New Delhi.

Sharma, S.K., Sawangdee, Y. & Sirirassamee, B. (2007). Access to health: women's status and utilization of maternal health services in Nepal. *Journal of Biosocial Science* 39, 671-692.

Soroptimist international (2011). *Monthly focus file: The impact of skilled birth attendants.* Retrievedfrom:http://www.soroptimistinternational.org/assets/media/December%20monthly%20focus%20the%20importance%20of%20skilled%20birth%20attendants.pd.

Thaddeus, S. & Maine, D. (1994). Too far to walk: maternal mortality in context. *Social science and medicine* 38(8), 1091-1110.

Thind, A., Mohani, A., Banerjee, K. & Hagigi, F. (2008). Where to deliver? Analysis of choice of delivery location from a national survey in India. *Bio Med Central Public Health* 8(29).

Tsegay,Y.,Gebrehiwot, T., Goicolea, I., Edin, K., lema, H. & Sebastian, M. (2013). Determinants of antenatal and delivery care utilization in Tigray region, Ethiopia: a cross-sectional study. *International Journal for Equity in Health* 12(30).

UNFPA (2004). *State of the World's Population 2004: Maternal Health*, NY.

UNFPA(2013). *Skilled Attendance at Birth*. Retrieved from: http://www.unfpa.org/public/home/mothers/pid/4383

World Bank Ethiopia (2011). *A Country Status Report on Health and Poverty*. Retrieved from:http://www.crdaethiopia.org/PolicyDocuments/CSR%20on%20Health%20and%20Povertypdf.

WHO (2014).*Trends in maternal mortality*: *1990 to 2013*. Estimates by WHO, UNICEF, UNFPA, The World Bank and the United Nations Population Division. Retrieved from: http://apps.who.int/iris/bitstream/10665/112682/2/9789241507226_eng.pdf?ua=1.Geneva : World health Organization.