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Regional Differences in the Utilizations of Skilled Delivery Care in Ethiopia (MSc Thesis)

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Abstract

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. In this study, information on the last birth recorded in the last five years preceding of 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.

The results shows that 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. Unequally distributed utilization of skilled deliver care services across regions was observed.

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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.

Keywords: Socio-demographic factors; Birth; Skilled delivery care services; ANC; Region; Ethiopia.

1. Introduction

The findings of different research support that all pregnant women need to have timely treatment to prevent complications during pregnancy and childbirth [22]. 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 [25]. 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 reduce the risk of dying from complications [22]. The majority of the complications during delivery which are attributable to potentially fatal conditions are unpredictable, and almost all of them are treatable [25]. Now a day, approximately 350,000 women die every year due to delivery-related problems [22]. They die since they do not use skilled birth attendants. The absence of properly functioning health facilities is another factor contributing to this death [22]. According to WHO, worldwide an estimated 289,000 maternal deaths occurred in 2013 though almost all of these deaths are preventable [27]. Nearly all (99%) of these deaths occurred in developing regions [27]. For instance, Sub-Saharan Africa alone accounts for more than half (62%) of the global maternal deaths [27]. 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 [27]. The estimated lifetime risk of maternal death in developing countries is 1 in 52 while the figure is 1 in 3400 in developed countries [27]. 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 [12, 21]. The majority of births in developing countries occur without the utilization of skilled delivery care services (midwife, nurse trained as midwife or a doctor) [1, 21]. 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 [7]. 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 [7]. 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.

1.1. 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 [7]. It was reported that the country has as many as 80 nationalities speaking 80 languages [7]. The country has nine regional states and two city administrations- Addis Ababa, Affar, Amhara, Benshangul-Gumuz, 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		Urban Population (%)	Average Persons per		Hospitals (Health centers)	Health post	
		Men	Women		Household	Adult literacy			
		(%)	(%)		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

1.2. 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% [4]. 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 [4]. 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 [7]. Moreover, remarkable regional variations exist in the utilization of skilled delivery care services [7]. 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.

1.3. Objective of the Study

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

1.4. 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?

1.5. 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.

2. Methodology and Study Design

2.1 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.

2.2 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 [7]. Similarly, these regions and woredas 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 [8].

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 [26].

2.3 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.

2.4 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.

2.5 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. Results

3.1 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 2 presented that the differences observed on the distributions of all socio-demographic characteristics across regions are all statistically significant (P-value <0.01).

Table 2: 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)	Harari (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*
1. 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)	
Religion													0.00*
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)	
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

3.2 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 services utilization across regions. As indicated in table 3, 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 ($\chi^2=1659.75$, $df=10$, $p\text{-value}<0.01$). 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 3: Skilled delivery care utilizations across regions

Regions	Assistance Utilized		Total
	Unskilled n (%)	Skilled n (%)	
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)

3.3 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 4). 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 4).

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 4).

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 4).

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 4).

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 4). 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 4).

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 4).

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 4).

Table 4: Univariate logistic regression analysis on women's characteristics and its associate with utilization of SBAs across regions (OR (95% CI))

Characteristics	Regions					
	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 (0.27-1.45)
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	<i>17.55 (9.96-30.94)</i>	<i>49.50 (11.77-208.22)</i>	<i>14.23 (7.99-25.35)</i>	<i>13.44 (8.39-21.52)</i>	<i>7.49 (3.45-16.25)</i>	<i>6.71 (3.51-12.82)</i>
Religion	*		*			
chrstian [@]	1	1	1	1	1	1
muslim or others	1.51 (0.61-3.74)	<i>0.08 (0.03-0.19)</i>	0.69 (0.32-1.49)	<i>0.20 (0.12-0.34)</i>	<i>0.02 (0.00-0.08)</i>	<i>0.33 (0.18-0.63)</i>
Place of residence						
rural [@]	1	1	1	1	1	1
urban	<i>25.37 (14.37-44.78)</i>	<i>53.81 (21.48-134.82)</i>	<i>19.84 (10.73-36.71)</i>	<i>20.08 (12.23-32.96)</i>	<i>7.85 (3.86-15.96)</i>	<i>15.50 (7.88-30.52)</i>
Gender of household head		*			*	*
Male [@]	1	1	1	1	1	1
Female	<i>4.76 (2.58-8.78)</i>	0.83 (0.40-1.76)	<i>2.78 (1.23-6.26)</i>	<i>2.78 (1.55-4.97)</i>	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)	<i>3.22 (1.10-9.49)</i>	2.14 (0.95-4.84)	<i>3.18 (1.50-6.74)</i>	1.91 (0.83-4.41)	<i>3.27 (1.35-7.92)</i>
high	<i>7.85 (2.52-24.43)</i>	<i>10.59 (3.24-34.57)</i>	<i>3.81 (1.36-10.71)</i>	<i>9.96 (4.24-23.39)</i>	<i>5.81 (2.45-13.78)</i>	<i>4.50 (1.20-16.95)</i>
Exposure to media						
low frequency [@]	1	1	1	1	1	1
high frequency	<i>16.21 (9.45-27.83)</i>	<i>28.11 (13.25-59.63)</i>	<i>6.17 (3.41-11.16)</i>	<i>6.60 (4.21-10.35)</i>	<i>13.14 (5.58-30.93)</i>	<i>6.85 (3.11-15.08)</i>
Antenatal care attendance						
no [@]	1	1	1	1	1	1
yes	<i>7.54 (3.22-17.64)</i>	<i>36.28 (10.98-119.88)</i>	<i>6.36 (3.44-11.76)</i>	<i>8.56 (4.91-14.92)</i>	<i>12.78 (5.84-27.97)</i>	<i>6.29 (3.05-12.98)</i>

Table 4: continued

Characteristics	Regions				
	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					
christian [@]	*	*		*	
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

3.4 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 turns to be insignificant in the multiple logistic regressions. As shown 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, Harari, and Dire dawa regions (see table 5).

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 5).

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 table 5).

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 5, 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 5).

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 5).

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 table 5).

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 5).

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

Characteristics	Regions					
	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 (0.003-0.89)	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 [@]	**	**	**			
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 [@]						**
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)

Table 5: 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					
christian [@]			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. 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 [11,19]. Education serves as proxy for information and knowledge of available health care services [5]. 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 [10]. 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 [2]. Moreover, educated women are considered to have better knowledge and information on modern health care services [5]. 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 [20, 23] 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 [23].

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 [16, 23]. 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 [10,16]. 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 [16].

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 [16].

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 [9, 24]. 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 [14] 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 [3, 15]. 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 [5, 6, 17]. 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 [5].

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 [18], 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 [13].

5. 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.

6. 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 conducted on women's autonomy, religion and women's occupation at regional level.

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