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Determinants of Institutional Delivery in Ethiopia: A Cross-sectional Study

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ABSTRACT

Background & aim: Government of Ethiopia is promoting institutional delivery despite the fact that there are a high number of home deliveries in the country mainly in hard-to-reach areas. Choice of institutional delivery is vital for the reduction of maternal and neonatal mortalities. The present study aimed to investigate the determinants of institutional delivery in Ethiopia.

Methods: This cross-sectional survey was conducted on 11023 women (age 15-49 years) who delivered in the preceding five years before the 2016 Ethiopian demographic health survey in Ethiopia from January 18, 2016 to June 27, 2016. The primary outcome variable was institutional delivery. Statistical analysis was performed using SPSS software (version 20). The multivariate logistic regression was used to identify variables that had a significant association with institutional delivery ($P<0.05$).

Results: Institutional delivery was 4.36 times higher in women with secondary education (OR: 4.36; 95% CI: 3.12-6.09). In addition, it was threefold higher among the subjects who were residents of urban areas (OR: 3.26; 95% CI: 2.19-4.35). Institutional delivery was higher among women who had antenatal care (ANC) visits (OR: 1.81; 95% CI: 1.58-2.07) and watched television at least once a week (0R: 1.90; 95% CI: 1.35-2.66). Based on the wealth index, the wealthiest subjects were 2.61 times more likely to deliver in health institutions (OR: 2.61; 95% CI: 1.95-3.50).

Conclusion: Having higher educational levels, being wealthy, residing in urban areas, having ANC visits and watching television at least once a weak were considered as important determinants for the choice of institutional delivery.

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Introduction

Globally, about 140 million women give birth every year, and about 890 females die from causes related to pregnancy and childbirth every day. However, most of these problems are considered preventable. In this regard, out of 99% of all maternal mortalities in developing countries (1), 66% of them were reported in Sub-Saharan Africa. Major direct causes of maternal morbidity and mortality were hemorrhage, high blood pressure, unsafe abortion, and obstructed labor (1-3).

Increment of institutional delivery is important for the reduction of maternal and neonatal mortalities (4). High attention and effort are being given to reach target populations with specific programmatic strategies. This is more valuable, especially in countries that have not achieved the Millennium Development Goals (MDGs) (5). About

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125 million women gave birth in 2015 out of whom 303,000 died, and many children were left without mothers. Pregnancy-related mortalities are estimated to be 25% in Ethiopia (4, 6). One of the contributing factors in pregnancy-related mortalities is access to health facilities, particularly in the rural areas of the country.

Health facilities in rural settings are distant and inaccessible, with limited resources that scare health professionals (4). Delivery with a skilled birth attendant is one of the indicators in meeting the 5th MDG improving maternal health. In countries where skill birth attendants are present in more than 80% of deliveries, the maternal mortality rate is below 200 per 100,000 live births (7). Although there is a sharp decline in the rate of home deliveries in Ethiopia, it was higher than those in some African countries, such as Kenya (4, 8).

Maternal health programs were designed to encourage young women to receive adequate antenatal care (ANC) at least four times during pregnancy. The ANC visits at least four times affected pregnant women to give birth at health facilities (9). Lower levels of income to utilize maternal health services and lack of knowledge of delivery care from a trained provider remain substantial barriers to institutional deliveries (3, 9-11). Physical access to health facilities and/or lack of transport also hinders women to deliver in a health facility (8).

Generally, the rate of institutional delivery was still lower in Ethiopia reported as below 30% in most studies; however, there was progress in the past two decades (4, 6). Therefore, the present study will assess the determinants of institutional delivery in Ethiopia according to the Ethiopian demographic health survey (EDHS) datasets.

Materials and Methods

Population of Ethiopia is various encompassing 80 diverse ethnic groups. Given the 2017 estimates, the population of Ethiopia was about 107,406,158. Ethiopian ranks number twelve among the world population, which is equivalent to 1.41% of the total global population. About 20% of the Ethiopian population were residents in urban areas (12, 13). The EDHS and data collection were carried out from January 18, 2016 to June 27, 2016. The data collectors were health experts employed from various health facilities throughout the country. The study subjects were all women in the reproductive age (age range: 15-49 years) who resided permanently in the selected households or individuals who stayed the night before the survey in the household.

The present cross-sectional survey was conducted in the 11 administrative regions of Ethiopia. The sampling technique used in the EDHSs was multistage sampling. Each region was stratified into urban and rural areas and selected in two stages. Samples of enumeration areas (EAs) were independently chosen in each stratum in two stages. In the first stage, out of 645 EAs, 202 and 443 regions were selected from urban and rural areas, respectively. In the second stage, regarding the selection of households for the study, household lists helped as a sampling frame. There were up to 300 households listed in single EA. Then, the household listing was conducted only in the selected segments. The following formula was used for the calculation of the final sample size:

$$n = \mathrm{Deft}^2 \times \frac{(1/P - 1)}{\alpha^2} \Big/ (R_i \times R_h \times d)$$

Where n is the sample size in households; *Deft* is the design effect; P is the estimated proportion; α is the desired relative standard error; *Ri* is the individual response rate; *Rh* is the household gross response rate; d is the number of eligible individuals per household.

Sampling frame of the 2016 EDHS was according to the Population and Housing Census conducted in 2007 by the Central Statistical Agency of Ethiopia (4). Out of 16,583 women identified for individual interviews, 15,683 respondents completed the interviews resulting in a 95% response rate (4). In order to assess the determinants of institutional delivery, the mothers who gave birth within the preceding five years were extracted from the EDHS dataset. Therefore, a total of 11,023 women were included in the present study.

During the EDHS data collection, the Central Statistical Agency uses the internet file streaming system to assure the quality of data. Secondary editing was performed with a resolution of computer-identified inconsistencies. The editing was conducted using CSPro software (version 6). Tables were

prepared to check the quality parameters of different data during the fieldwork (4), and the collection team was provided with feedback in order to improve performance.

Bivariate logistic regression was employed with the outcome variable of institutional delivery. Missing data of the outcome variable were excluded from the study. Firstly, univariate analysis was performed on each of the selected indicators for the EDHS dataset. Those variables significant at $P \leq 0.2$ were incorporated in the multivariable logistic regression model. This model was used to identify variables that had significant association with institutional delivery ($P<0.05$). Variables with no significant regression coefficient were removed from the model. Variables that were not significant at the univariate analysis were again added to the model, and their significance assessed in the presence of other significant variables. The Hosmer-Lemeshow test was utilized to test the goodness of fit of the final model. The data administration procedures and statistical analysis were performed using SPSS software (version 20).

Results

Characteristics of Study Participants

The present study was carried out on a total of 11,023 mothers who gave birth within the preceding five years. Mean age of the participants was reported as 29.5±6.6 years. Minimum and maximum ages of the participants were 15 and 45 years, respectively. Most (n=9807; 89%) of the subjects resided in rural areas. In addition, the majority (93.8%) of the cases were married. Christianity and Islam as prominent religions were reported as 55.3% and 41.4% among the respondents, respectively. Furthermore, above half (n=7284; 61.1%) of the women had no formal education, and 48.5% (n=5077) of the husbands were reported with formal education.

Out of 11,023 mothers, 2892 (26.2%) and 8131 (73.8%) subjects delivered at a health facility (i.e., public or private sector health facility) and home, respectively. In about half (n=5605; 50.9%) of the respondents, birth order was the fourth delivery and above, as described in Table 1. Moreover, 4772 (62.9%) women had ANC visits at least once during their pregnancy. In addition, out of all women who had ANC visits at least once, about 2145 (45%) participants were told about the danger signs of pregnancy during their follow-up. According to the five categories of the wealth index, about half (46.8%) of the subjects were in the poorest and poorer categories. A very small number of women (n=390; 3.5%) were covered by health insurance in the present study.

Determinants of Institutional Delivery

Variables that had significant associations with the place of delivery were maternal age, maternal education, place of residence, religion, wealth, ANC visits, being told about danger signs of pregnancy during ANC visit, and frequency of watching television. The multivariate analysis in Table 2 showed that maternal age had a significant effect on the choice of institutional delivery. After controlling other sociodemographic variables, women within the age range of 15-24 years had a significantly higher percentage of institutional delivery, compared to older women. The participants with a secondary educational level were 4.36 times more likely to choose institutional delivery, compared to the subjects with no formal education (OR: 4.36; 95% CI: 3.12-6.09).

Regarding the place of residence, the probability of giving birth in an institution was higher in urban women, compared to that in rural areas. The subjects who resided in urban areas were three times more likely to give birth at a health institution than their counterparts (OR: 3.26; 95% CI: 2.19-4.35). Among the three dominant religions, most orthodox women were observed to undergo institutional delivery as presented in Table 2. The subjects who had ANC visits were about two times more likely to deliver at a health institution than young women who did not receive ANC at all (OR: 1.81; 95% CI: 1.58-2.07). Probability of giving birth at health institutions is 41% higher in women who were told about danger signs of pregnancy (OR: 1.41; 95% CI: 1.23-1.62).

Exposure to mass media had also a significant association with institutional delivery Women who watched television at least once a week were two times more likely to deliver their neonates at a health institution than those who did not watch at all (0R: 1.90; 95% CI: 1.35-2.66).

Table 1. Background characteristics of study participants based on Ethiopian demographic health survey, 2016

Variable	Frequency (%)	Variable	Frequency (%)
Place of grouped delivery		**Religion**	
Health institution	2892 (26.2)	Orthodox	3772 (34.2)
Home	8131 (73.8)	Protestant	2329 (21.1)
Maternal age		Muslim	4561 (41.4)
15-24	2446 (22.2)	Others	361 (3.3)
25-34	5843 (53.0)	**Birth order**	
35-49	2734 (24.8)	First delivery	2058 (18.7)
Place of residence type		Second and third deliveries	3359 (30.5)
Urban	1216 (11.0)	Fourth delivery and above	5605 (50.9)
Rural	9807 (89.0)	**Frequency of watching television**	
Present marital status		Not at all	9019 (81.8)
No	684 (6.2)	Less than once a week	1089 (9.9)
Yes	10339 (93.8)	At least once a week	915 (8.3)
Maternal education		**Covered by health insurance**	
No education	7284 (61.1)	No	10633 (96.5)
Primary	2951 (26.8)	Yes	390 (3.5)
Secondary	514 (4.7)	**Being told about danger signs during antenatal care visit**	
Higher	274 (2.5)	No	2627 (55.0)
Husband educational Level		Yes	2145 (45.0)
No education	5077 (48.5)	**Antenatal care visit**	
Primary	4116 (39.3)	No	2818 (37.1)
Secondary	798 (7.6)	Yes	4772 (62.9)
Higher	471 (4.5)		
Wealth index		**Total**	11023 (100.0)
Poorest	2636 (23.9)		
Poorer	2520 (22.9)		
Middle	2280 (20.7)		
Richer	1999 (18.1)		
Richest	1588 (14.4)		

Socioeconomic status of a woman determines the choice of institutional delivery. The wealthiest subjects were 2.61 times more likely to deliver in a health facility, compared to the women in the poorest category (OR: 2.61; 95% CI: 1.95-3.50).

Table 2. Multivariate analysis of the determinants of institutional delivery based on Ethiopian demographic health survey, 2016

Variable	Crude odds ratio (95% CI)	Adjusted odds ratio (95% CI)	P-value
Age group (year)			
15-24	1	1	
25-34	0.66 (0.59-0.73)	0.679 (0.56-0.79)	<0.001
35-49	0.50 (0.44-0.56)	0.68 (0.55-0.83)	<0.001
Currently married			
No	1	1	
Yes	1.47(1.25-1.74)	0.81 (0.63-1.06)	0.125
Religion	.		
Orthodox	1	1	
Protestant	0.55 (0.49-0.62)	0.55 (0.46-0.65)	<0.001
Muslim	0.44 (0.40-0.48)	0.73 (0.62-0.85)	<0.001
Others	0.18 (0.13-0.26)	0.31 (0.18-0.52)	<0.001
Residence			
Rural	1	1	
Urban	7.06 (5.44-8.61)	3.26 (2.19-4.35)	<0.001
Highest educational level			
No education	1	1	
Primary	3.07 (2.79-3.39)	1.57 (1.35-1.83)	<0.001
Secondary	18.10 (14.58-22.46)	4.36 (3.12-6.09)	<0.001
Higher	56.70 (36.94-87.01)	4.49 (2.50-8.06)	<0.001
Wealth index			
Poorest	1	1	
Poorer	1.93 (1.65-2.27)	1.50 (1.20-1.87)	<0.001
Middle	2.42 (2.06-2.83)	1.54(1.24-1.92)	<0.001
Richer	3.17 (2.71-3.71)	1.61(1.28-2.01)	<0.001
Richest	18.47 (15.69-21.74)	2.61 (1.95-3.50)	<0.001
Covered by health insurance			
No	1	1	
Yes	2.35 (1.91-2.88)	1.30 (0.96-1.76)	0.096
Antenatal care visit			
No	1	1	
Yes	5.20 (4.52-5.99)	1.81(1.58-2.07)	<0.001
Being told about danger signs during antenatal care visits			
No	1	1	
Yes	2.01 (1.79-2.26)	1.41 (1.23-1.62)	<0.001
Frequency of watching television			
Not at all	1	1	
Less than once a week	2.45 (2.14-2.79)	1.32 (1.07-1.63)	0.009
At least once a week	16.02 (13.53-18.97)	1.90 (1.35-2.66)	<0.001

Discussion

Although institutional delivery is important for the reduction of maternal and neonatal mortalities, the performance rate (26%) is lower in Ethiopia, compared to those in developing countries, such as Uganda (61.7%), Kenya (42.6%), and Nepal (46%) (3, 4, 8, 9). Therefore, the present study aimed to assess the determinants of institutional delivery in Ethiopia. The multivariate analysis showed that being younger, following Orthodox religion, residing in urban areas, having maternal higher education, being rich, having antenatal care visits, being told about the danger signs of pregnancy, and watching television had strong associations with the choice of institutional delivery. This finding suggested that institutional delivery will increase with a growing level of the socio-economy of the country.

Younger women within the age range of 15-24 had better institutional delivery than older subjects (3, 8, 11, 14). The participants who had formal education delivered their neonates more frequently in health institutions than those without education. This result is consistent with the findings of multiple studies performed in African and Asian countries with similar socioeconomic status (3, 8-11, 14). Since education enhances the need for information and knowledge, the increase in the educational level affects women to visit health facilities.

Similar findings were obtained in terms of the economic status of women indicating that the wealthiest subjects were more likely to deliver in a health facility (8-11, 14). This may be due to a lack of money to cover their health or transportation costs, which finally leads them to give birth at home or on the way to a health facility. Although the aforementioned constraints can be reduced by community health insurance, the results of the present study showed that the number of women covered by health insurance is very low (3.5%) as presented in Table 1.

Although the provision of ANC helped mothers to give birth at health facilities, ANC visits were lower in Ethiopia than those in some African countries. Results of a study conducted in Kenya and Guinea demonstrated that 92.6% and 81.7% of women had ANC visits during pregnancy, respectively (8, 14). The women who had ANC visits were about two times more likely to choose institutional delivery than the subjects who did not have ANC visits at all, which is in line with most findings.

Counseling during ANC visits and telling women about the danger signs of pregnancy may be the reasons for the increased rate of institutional delivery among the women who received ANC services. The subjects who were told about the danger signs of pregnancy were 41% more likely to choose health facilities for delivery, which is consistent with the results a study carried out in Uganda and Tanzania (2, 3). Being aware of the danger signs of pregnancy will increase a woman attitude towards healthcare and health-seeking behaviors that will finally make her deliver at the health institution.

Media exposure influenced the choice of institutional delivery according to the results of the present study. The women who watched television at least once a week were two times more likely to undergo an institutional delivery. Findings of a similar study conducted in Pakistan also showed that exposure to mass media was an important reason for choosing an institutional delivery (10). Since the present study was performed using the secondary data collected from EDHS, it was difficult to investigate the variable of interest.

Conclusion

Having higher educational levels, being the richest in wealth, residing in urban areas, having ANC visits at least once, and watching television at least once a weak were important determinant factors in the choice of institutional delivery. Improvement of access to education, health promotion through obstetrics, and delivery through mass media will increase the possibility of institutional delivery.

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Informed consent was obtained from the participants during the EDHS while data collection. In addition, the data were namelessly collected in this study. The survey also obtained ethical clearance from the Ethiopian National Ethics Review Committee. Permission to use the EDHS 2016 data was achieved based on the DHS program. The author acknowledges the DHS for

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Conflicts of interest

The authors declare no conflicts of interest.

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