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Awareness of obstetric fistula and its associated factors among reproductive-age women in Ethiopia: a multilevel analysis of Ethiopian Demographic and Health Survey data: a cross-sectional study

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ABSTRACT

Objective This study aimed to determine the magnitude and associated factors of obstetric fistula (OF) awareness among reproductive-age women in Ethiopia.

Methods This community-based cross-sectional study was conducted among 15 683 reproductive-aged women in Ethiopia. Following the presentation of a case vignette, women's OF awareness was measured by asking if they had ever heard of OF. A multilevel multivariable logistic regression analysis was employed. A 95% CI and p<0.05 were used to declare statistical significance.

Result The magnitude of women's awareness of OF was 38% (95% CI 0.37 to 0.39). Individual level variables including being in the age group of 20–25 (adjusted OR, AOR 1.17; 95% CI 1.02 to 1.35), 26–30 (AOR 1.50; 95% CI 1.27 to 1.76) and >30 (AOR 1.76; 95% CI 1.50 to 2.07), being Muslim (AOR 0.83; 95% CI 0.73 to 0.94), having primary (AOR 1.70; 95% CI 1.53 to 1.89), secondary (AOR 3.43; 95% CI 2.95 to 3.99) and tertiary education (AOR 5.88; 95% CI 4.66 to 7.42), history of pregnancy termination (AOR 1.31; 95% CI 1.13 to 1.51), media exposure (AOR 1.33; 95% CI 1.2 to 1.49), internet use (AOR 2.25; 95% CI 1.84 to 2.75), medium (AOR 1.17; 95% CI 1.02 to 1.34) and rich house hold wealth (AOR 1.50; 95% CI 1.31 to 1.72) and community level factors including high community media exposure (AOR 1.30; 95% CI 1.05 to 1.61), high community antenatal care rate (AOR 1.66; 95% CI 1.37 to 2.02) and low health facility distance problem (AOR 1.49; 95% CI 1.23 to 1.81) were significantly associated with women's awareness of OF.

Conclusions and recommendations The magnitude of women's awareness of OF was very low in Ethiopia. Awareness of OF was influenced by sociodemographic, economic, obstetric and community-related factors. Thus, tailored public health education is required at the national level to enhance women's awareness of OF.

Strengths and limitations of this study

► Because of the data's hierarchical nature, we employed a suitable statistical analysis called multilevel analysis, which can account for factors beyond the individual level.

► The use of a large sample size is another strength of the study. As the sample gets closer to the actual population, the potential for deviations from the actual population decreases.

► To overcome disproportionate sample allocations and non-responses, sample weighing was used.

► Due to the cross-sectional nature of the data, it may not be possible to establish causal relationships.

► Because the study relied on secondary data, relevant variables that could influence women's awareness of obstetric fistulas may have been overlooked.

INTRODUCTION

Obstetric fistula is a life-altering birth associated injury[1] that creates an abnormal connection between the genital tract and the urinary tract (urogenital fistula) or the gastrointestinal tract (most commonly, rectovaginal fistula) that occur as the result of obstetric trauma, typically from prolonged obstructed labour.[2 3] It is a public health concern for women and their communities within developing nations, particularly in Africa and Southeast Asia[4] and it is found to be one of the most visible indicators of maternal morbidity.[5] WHO estimates there are 130 000 new cases of obstetric fistula each year, calculated from an assumption that fistula is likely to occur in 2% of the 6.5 million cases of obstructed labour that occur in developing countries.[3 6] Of these, around 33 000 women are found in sub-Saharan Africa, and it affects about 1.62 women per 1000 reproductive age in Ethiopia.[7 8] Currently around 36 000 and 39 000 women living with obstetric fistula and that every year there are between 3300 and

3750 new cases of obstetric fistula in Ethiopia according to the problem analysis report.[9]

Pieces of evidence show that the risk of the vaginal fistula is common in settings with a lack of inadequate emergency obstetric care, healthcare workforce shortages and poor investment in maternity services.[6 10 11] Further, sociocultural issues such as early marriage, harmful cultural practices like female genital mutilation, home-based childbirth, poor policy implementation of female education, and misconceptions about childbirth practices are other contributing factors for the high burden of obstetric fistula in sub-Saharan Africa.[12 13] Adequate information and awareness of the risk factors, causes and treatment options for vaginal fistula may help women to take appropriate steps to prevent vaginal fistula.[14] Generally, different researches reported that still there is a low level of awareness about obstetric fistula in different African countries. Such as, 39.5%–40.8% in Ethiopia,[7 9] 45.8% in Ghana[15] and 52% in Nigeria.[12]

Despite there is high burden of obstetric fistula in sub-Saharan Africa,[16] studies addressing the awareness of obstetric fistula among women are limited, particularly in Ethiopia. Therefore, this study aims to determine the magnitude of obstetric fistula awareness and factors that could contribute to the awareness of obstetric fistula among women of reproductive age in Ethiopia. Furthermore, findings from this analysis will assist policy-makers and public health programmers to understand the magnitude of obstetric fistula awareness and the contributory factors.

METHODS
Data source, population and sampling procedure
This community-based crosssectional study was based on the most recent Ethiopian Demographic and Health Survey (EDHS) data.[17] The survey was conducted from 18 January 2016 to 27 June 2016. For this survey, a complete list of 84 915 enumeration areas (EAs) from the Ethiopian Population and Housing Census was used as a sampling frame. A stratified two-stage cluster sampling technique was employed. In the first stage, 645 EAs were selected. In the second stage, an average of 28 households was selected per cluster/EA. The data is freely available in public and we accessed the dataset used for this study after we registered and received an authentication letter from the Demographic and Health Survey (DHS) programme at The DHS Programme—Ethiopia: Standard DHS, 2016 Dataset. For this study, a total weighted sample of 15 683 reproductive-age women were included. Detailed information about the sampling strategy, questioner or other important information is documented somewhere else.[18]

Variables of the study
The outcome variable of this study was women's awareness of obstetric fistula. The variable was dichotomised into 1 = 'ever heard of fistula' and 0 = 'never heard of fistula'. The independent variables were further classified into

individual level (level 1) variables and community level (level 2) variables. Individual-level variables included age, marital status, religion, educational status, media exposure, internet access, family wealth index, sexual activity, birth history, pregnancy termination, current working status and current pregnancy status. Whereas, community variables involved variables directly taken with no aggregation (residence and contextual region), and variables obtained by aggregating individual values into their respected community (community poverty, community female education, community media exposure, community antenatal care (ANC) service utilisation rate, and community health facility distance). Since the aggregate values of each variable did not follow a normal distribution curve, we categorised the aggregate values of a cluster into groups based on median values.

Operational definitions
Household wealth quintile
The wealth index classifications were done in quintiles: poorest, poor, middle, rich, richest. These were computed using principal component analyses. This variable was further categorised into three categories (poor, medium and Rich) by merging the lower two (poorest and poor) quantiles and the upper two (richest and rich) quantiles.

Media exposure
This variable was computed from the frequency of exposure to the two most common mass media routes (radio and television). In this study exposure to magazines/newspapers was excluded because little (<5%) women were exposed to this channel. The variable was categorised into three categories: no exposure to either media route; exposure to either one of the two routes and exposure to both within a week.

Contextual region
For this survey, regions were categorised into three categories (agrarian, pastoral and metropolitan) that may have a strong relationship to health information seeking and awareness of obstetric fistula. The Tigray, Amhara, Oromia, Southern Nations, Nationalities and Peoples (SNNP), Gambella and Beneshangul Gumuz were recorded as agrarian. The Somali and Afar regions were merged to form the pastoralist region and the city administrations—Addis Ababa, Dire Dawa and Harar were combined as metropolitan.

Community female education
This is the aggregate value of the educational levels of women based on the average of proportions of educational levels in the community. It was defined as low if the proportion of women with secondary education and above in the community was 0%–12.4% and high if the proportion was 12.5%–100%.

Community media exposure
This variable was derived from the individual responses for exposure to radio or television. It was defined as low

if the proportion of women exposed to media in the community was 0%–18.7% and high if the proportion was 18.8%–100%.

Community ANC utilisation rate

This variable is also derived from the individual values for ANC utilisation. It was defined as low if the proportion of women who attended at least one ANC visit in the community was 0%–81.3% and high if the proportion was between 81.4%–100%.

Community poverty

With the same procedure, this variable is also derived from an individual household's wealth index. It was defined as high if the proportion of women from the two lowest wealth quintiles in a given community was 25.9%–100% and low if the proportion was 0%–26%.

Community distance to the health facility

The variable was aggregated from individual perceived distance to a health facility is a big problem. It was as categorised as low if the proportion of women who perceived health facility distance as a big problem in the community was 0%–42.2% and categorised as high if the proportion was between 42.2% and 100%.

Data processing and analysis

Data were extracted from individual records files and further coding and transformations were done using statistical software, STATA V.14. The weighted samples were used for analysis to adjust for unequal probability of selection and non-response in the original survey. Since the EDHS employed multistage stratified cluster sampling techniques, the data have a hierarchical structure. Therefore, a multivariable multilevel binary logistic regression model was used to estimate the fixed and random effects of the factors associated with awareness of fistula. Four models were constructed. The first model also called an empty model which was fitted without any explanatory variables. This model is important for understanding the community variations, and we used it as a reference to estimate how much community factors were able to explain the observed variations in the awareness of fistula. Moreover, this model was used to justify the use of a multilevel statistical framework as it is a litmus paper on whether multilevel or the traditional logistic regression should be used. It was assessed using the likelihood ratio test, Median OR (MOR), intraclass correlation coefficient (ICC) and proportional change of variance (PCV). The second model contained only individual-level factors. The third contained only community-level factors. Whereas, the final (fourth) model containing both individual and community-level factors. Moreover, the model comparison was done using model deviance, a model with the lowest deviance selected for reporting and interpretation results.

Patient and public involvement

The public was not involved in the design or conduct, choice of outcome measures and recruitment of the study. The public was not involved in the dissemination of the research.

RESULT

Individual-level factors

A total of 15 683 reproductive-age women were included in this study. The median age of the participants was 27 with an IQR of 15. Nearly half (47.8%) of the participants did not attend any formal education and more than half (63.8%) of them were married. Only one-third (33.3%) of them were employed during the survey. Regarding the reproductive history, about 77% (12 033), 67.5 (10587) and 7.2% (1135) of the participants were ever had sex, ever had a child and currently pregnant respectively. Moreover, only 18.5% (2896), and 4.4% (693) of women had been exposed to either television or radio at least once a week and had ever used the internet, respectively (table 1).

Community-level variables

The majority (77.8%) of the participants were from rural residency. About 50.8% (7714), 60.3% (9452), 58.0% (9089) and 62.8% (9848) were from a community where there is high poverty low female education, low media exposure and low ANC utilisation rate, respectively (table 2).

Awareness of obstetric fistula

The overall awareness of obstetric fistula among reproductive-age women was 38% (95% CI 37% to 39%).

Random effect and model comparison

As is depicted in table 3, the null model revealed that awareness of obstetric fistula was significantly varied across communities/clusters. This was assessed by the ICC value in the null model by which 36.0% of the total variation in awareness of obstetric fistula was due to the difference between clusters. Moreover, the MOR in the null model, which was 3.63 (95% CI 3.32 to 3.97), indicated that there was a significant variation between clusters. This shows if a woman moves to another area with a higher probability of awareness of fistula, her risk of becoming aware of obstetric fistula would increase by a factor of 3.63 times. The final model that included both the individual and community level factors explained the greatest variance (52 %) in obstetric fistula awareness as it was indicated by PCV. All of the three parameters revealed that the effect of clustering was significant. Indeed, based on model fit comparison indices, the final model was found to be the best-fitted model (had the lowest deviance) (table 3).

Individual and community-level factors associated with women's awareness of obstetric fistula

The multivariable multilevel logistic regression analysis showed that age, religion, education, ever pregnancy termination, media exposure, internet use, household wealth index, community media exposure, community health facility distance problem, and community ANC

Table 1 Sociodemographic and sexual characteristics of the reproductive age women in Ethiopia (n=15 683)

Variables	Frequency	Proportion
Age		
15–19	3381	21.6
20–25	3655	23.3
26–30	2882	18.4
≥31	5765	36.7
Religion		
Christian	10 580	67.4
Muslim	4893	31.1
Others	205	1.3
Highest educational level		
No-formal education	7498	47.8
Primary	5490	35
Secondary	1818	11.6
Higher	877	5.6
Marital status		
Married	10014	63.8
Unmarried	5669	36.2
Ever had a child		
No	5096	32.5
Yes	10587	67.5
Sexual experience		
Never had sex	3650	23.3
Ever had sex	12033	76.7
Currently pregnant		
No or unsure	14548	92.8
Yes	1135	7.2
Ever had a terminated pregnancy		
No	14447	92.1
Yes	1236	7.9
Mass media exposure (TV/radio)		
Both less than a week or not at all	11702	74.6
Either at least once a week	2896	18.5
Both at least once a week	1085	6.9
Use of internet		
Never	14904	95.0
Ever	693	4.4
Currently working		
No	10463	66.7
Yes	5220	33.3
Household Wealth Index		
Poor	8420	53.7
Medium	3100	19.8
Rich	4164	26.5

TV, television.

Table 2 Community-level factors of women's awareness of obstetric fistula in Ethiopia (n=15 683)

Variables	Frequency	Proportion
Residence		
Urban	3476	22.2
Rural	12207	77.8
Contextual region		
Agrarian	13870	88.5
Pastoral	792	5.0
Metropolitan	1021	6.5
Community poverty		
Low	7969	49.2
High	7714	50.8
Community female education		
Low	9452	60.3
High	6231	39.7
Community media exposure		
Low	9089	58.0
High	6594	42.0
Community ANC utilisation rate		
Low	9848	62.8
High	5835	37.2
Distance to health facility is a big problem		
Low	6656	42.4
High	9027	57.6

ANC, antenatal care.

utilisation rate were significantly associated with women's awareness of obstetric fistula at p<0.05.

The odds of having awareness of obstetric fistula was higher among women with the age of 20–25 years old (adjusted OR, AOR 1.17, 95% CI 1.0 to 1.35), 26–30 years old (AOR 1.5, 95% CI (1.27 to 1.76)) and >30 years old (AOR 1.76, 95% CI 1.5 to 2.07) as compared with women with the age of 15–19 years old. Women of Islamic religion followers had 17% lower odds of having obstetric fistula awareness (AOR 0.83, 95% CI 0.73 to 0.94) than Christianity followers. Women with primary (AOR 1.7, 95% CI (1.53 to 189), secondary (AOR 3.43, 95% CI 2.95 to 3.99) and tertiary education (AOR 5.88, 95% CI (4.66 to 7.42)) had higher odds of having awareness of obstetric fistula than women with no formal education, respectively. Moreover, the odds of having obstetric fistula awareness were higher among women who had ever terminated pregnancy than their counterparts (AOR 1.31, 95% CI 1.13 to 1.51). Women who were exposed to radio and/or TV at least once a week were more likely to have awareness of obstetric fistula than those who were exposed less than a week/not at all (AOR 1.33, 95% CI 1.2 to 1.49). Moreover, the odds of having awareness of obstetric fistula were 2.3 times higher among women who had ever used internet (AOR 2.25, 95% CI 1.84 to 2.75). Regarding woman's family wealth index, a woman from a family with the highest two quantiles (rich) and third quantile (medium) was more likely to have awareness of obstetric fistula as compared with a woman from a family with the lowest two quantiles (AOR 1.17, 95% CI 1.02 to 1.34) and (AOR 1.50, 95% CI 1.31 to 1.72), respectively.

Table 3 Random effect model and model fitness for factors associated with women's awareness of obstetric fistula in Ethiopia (n=15 683)

Measure of variation	Model 1(null)	Model 2	Model 3	Model 4
Community level variations (SE)	1.84 (0.18)	0.85 (0.07)	0.69 (.06)	0.68 (0.06)
Intraclass correlation coefficient	0.360	0.211	0.174	0.171
Median OR	3.63 (3.32, 3 .97)	2.40 (2.24, 2.58)	2.20 (2.07, 2.35)	2.19 (2.06, 2.34)
Proportional change of variance	Reference	0.414	0.516	0.52
Model fitness				
Deviance	18 290.62	16 908.39	17 801.16	16 775.54

The odds of having obstetric fistula awareness were 1.3 (AOR 1.30 95% CI 1.05 to 1.61), 1.66 (AOR 1.66, 95% CI 1.37 to 2.02) and 1.49 (AOR 1.49, 95% CI 1.23 to 1.81) times higher among a woman from a community with high media exposure, high ANC utilisation and low community health distance problem, respectively (table 4).

DISCUSSION

The study aimed to assess the magnitude and associated factors of awareness of obstetric fistula in among reproductive-age women in Ethiopia using EDHS 2016 data. More than half of women were not aware of obstetric fistula in Ethiopia. Being in the age group of 20–25 and 26–30 years, Muslim, having better education, having history of pregnancy termination, having media exposure, internet use, being from household with a better wealth, being from a community with a higher ANC utilisation rate, and a low health facility distance problem were positively associated factors of women's awareness of obstetric fistula. According to the findings of this study, the estimated magnitude of women's' obstetric fistula awareness in Ethiopia was 38% which is consistent with studies done in Bench Sheka Zone, south, Ethiopia, and Awi zone Amhara region Ethiopia 40.8% and 39.5%, respectively.[7 9] The possible justification for the similarity might be due to the same sociodemographic characteristic of the respondents. Whereas the finding is lower than studies conducted in different countries like Nigeria (57.8%), Ghana (45.8%), Nepal (72.99%), and Dabat, northwest, Ethiopia (54.7%).[8 13–16] The difference might be due to the study period, study population, study design and sociodemographic characteristics the above studies were based on a small sample size or they are mostly facility and community-based cross-sectional studies. Moreover, the low magnitude of women's awareness of obstetric fistula may be due to lack of adequate and comprehensive reproductive health education or low literacy of the population in the country. This result also implied that women may stay at home with obstetric fistula without treatment as long as they are unaware of it and its treatment. Thus, there is an urgent need for national public health intervention to raise their awareness towards fistula, ultimately enable women to protect themselves and to seek for treatment promptly if they develop it.

When compared with younger women, older women had a higher likelihood of being aware of obstetric fistula; this could be because older women have had more or different exposures to media, different health education forums, and better opportunities to access/engage in healthcare services, including counselling services.[11] Attending formal education has had higher odds than not attending formal education for fistula awareness. The finding is consistent with studies done in the Awi zone of North West Ethiopia, Bench Sheka Zone, south, Ethiopia Burkina Faso and Northern Ghana.[7 9 11] It is probable that persons who have received formal education have more opportunities to obtain information, ask questions and receive healthcare than those who have not received formal education.

Furthermore, previous experience or exposure to pregnancy termination had statistical significance with the level of women's obstetric fistula awareness, according to our research. Women who had a history or experience with pregnancy termination were 1.31 times more likely to have better awareness than those who had not. Obtaining or seeking healthcare services may provide an indirect opportunity for counselling and health education, which may raise their degree of awareness or knowledge about obstetric fistula.

In this study, community ANC rate has a significant association with awareness on obstetric fistula, those who have high community ANC rate have high odds compared with low community ANC rate. The finding is more supported with a study conducted in the Amhara region, Delanta woreda and Asela, Oromia region.[19 20] This implies that more awareness regarding obstetric fistula might be linked to ANC coverage increment where women can be counselled about maternal health issues.

Other important factors which have a significant association with obstetric fistula awareness were wealth quintiles, and access to information dissemination platforms (mobile and internet utilisation) in this study, which had also been previously reported in studies[6 21–23] conducted in different areas.

In this study, there was a significant association between women's awareness about obstetric fistula and distance

Table 4 A multilevel logistic regression analysis of factors associated with women's awareness of obstetric fistula among reproductive-age women in Ethiopia (n=15 683)

Variables	Model II AOR (95% CI)	Model III AOR (95% CI)	Model IV AOR (95% CI)
Age			
15–19	1		1
20–25	1.20 (1.04 to 1.38)*		1.17 (1.02 to 1.35)*
26–30	1.57 (1.33 to 1.85)†		1.50 (1.27 to 1.76)†
>30	1.87 (1.59 to 2.20)†		1.76 (1.50 to 2.07)†
Religion			
Christians	1		1
Muslim	0.77 (0.67 to 0.87)†		0.83 (0.73 to 0.94)†
Education			
No formal education	1		1
Primary	1.79 (1.61 to 1.99)†		1.70 (1.53 to 1.89)†
Secondary	3.77 (3.25 to 4.38)†		3.43 (2.95 to 3.99)†
Higher	6.50 (5.16 to 8.18)†		5.88 (4.66 to 7.42)†
History of birth			
No	1		1
Yes	1.11 (0.96 to 1.29)		1.14 (0.98 to 1.33)
Sex history			
No	1		1
Yes	1.15 (0.98 to 1.35)		1.16 (0.99 to 1.35)
Ever terminated pregnancy			
No	1		1
Yes	1.31 (1.13 to 1.52)†		1.31 (1.13 to 1.51)†
Media exposure			
Less than a week/never	1		1
At least once a week	1.46 (1.31 to 1.62)†		1.33 (1.2 to 1.49)†
Internet use			
Never	1		1
Ever	2.43 (1.99 to 2.96)†		2.25 (1.84 to 2.75)†
Currently working			
No			
Yes	1.12 (1.03 to 1.23)*		1.10 (0.9 to 1.19)
Household Wealth Index			
Poor	1		1
Medium	1.27 (1.11 to 1.45)†		1.17 (1.02 to 1.34)*
Rich	1.92 (1.69 to 2.17)†		1.50 (1.31 to 1.72)†
Residence			
Rural		1	1
Urban		1.62 (1.23 to 2.15)†	1.11 (0.84 to 1.48)
Contextual region			
Pastorals		1	1
Agrarians		1.28 (1.07 to 1.53)*	1.09 (0.91 to 1.31)
Metropolitans		1.29 (0.99 to 1.70)	0.97 (0.74 to 1.28)
Community-level poverty			

Continued

Table 4 Continued

Variables	Model II AOR (95% CI)	Model III AOR (95% CI)	Model IV AOR (95% CI)
High		1	1
low poverty		1.17 (0.94 to 1.46)	0.93 (0.74 to 1.16)
Community female education			
Low		1	1
High		1.57 (1.27 to 1.93)†	1.09 (0.88 to 1.34)
Community media exposure			
Low		1	1
High		1.49 (1.21 to 1.84)†	1.30 (1.05 to 1.61)*
Community ANC rate			
Low		1	1
High		1.81 (1.49 to 2.20)†	1.66 (1.37 to 2.02)†
Health facility distance problem			
High		1	1
Low		1.55 (1.28 to 1.88)†	1.49 (1.23 to 1.81)†

*Statistically significant at p<0.05.
†Statistically significant at p<0.01, model II=a model contained only individual-level factors, model III=a model contained only community-level factors, model IV=a model contained both the individual and community level factors.
ANC, antenatal care; AOR, adjusted OR.

to the nearby health facility. For women who perceived health, facility distance as a low problem in the community, their awareness is 1.55 more likely to be good than those women who perceived health facility distance as a high problem. The finding is supported by the studies in Ethiopia and China, respectively,[24 25] that identify the distance to the healthcare facility was linked with poor knowledge related to fistula and poor health-seeking behaviour. This might be due to as the health facility becomes near; women are willing to visit the healthcare facilities and have got a chance to attend health-related information and education.

The utilisation of nationally representative data and large sample size was the study's key strength that would enhance the generalisability its findings. The fact that we used a sophisticated and relevant statistical approach (multilevel analysis) to accommodate the data's hierarchical nature was another strength. The EDHS survey, however, has limitations in that it relies on respondents' self-report and may be subject to recall bias because respondents/mothers were asked to recollect events that occurred in the past. Additionally, this study is constrained in its design to show causality between the outcome of interest and these crucial independent variables, as it simply creates connections between women's awareness of obstetric fistula and some important individual-level and community-level determinants.

CONCLUSION AND RECOMMENDATIONS

The magnitude of awareness towards fistula among reproductive age mothers was very low in Ethiopia. Maternal age, religion, being educated, media exposure, better family wealth, a low distance of health facility problem and high community ANC utilisation rate are factors that were significantly and positively associated with women's awareness towards fistula. It is vital and mandatory to raise awareness about obstetric fistula and to address the contributing factors. Promoting women's education, disseminating targeted behavioural change communication messages through various media/channels, and strengthening community health-seeking behaviour are all things that need to be addressed.

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