




Expanding Maternity Waiting Homes as an Approach to Improve Institutional Delivery in Southwest Ethiopia: A Community-Based Case-Control Study

INQUIRY: The Journal of Health Care
Organization, Provision, and Financing
Volume 58: 1–8
© The Author(s) 2021
Article reuse guidelines:
sagepub.com/journals-permissions
DOI: 10.1177/00469580211018294
journals.sagepub.com/home/inq


Meaza Hailu¹, Fikru Tafese², Gebeyehu Tsega³, Ayinengida Adamu³,
Kiddus Yitbarek² , Tizta Tilahun⁴, Yibeltal Siraneh², Belay Erchafo⁵ ,
and Mirkuzie Woldie^{2,4}

Abstract

With the promising efforts in increasing institutional delivery yet, maternal and child mortality is high in Ethiopia. One of the strategies used to minimize this problem was the introduction of Maternity Waiting Homes (MWH). MWHs are residential facilities for pregnant women near a qualified medical facility. The introduction of MWHs has improved institutional delivery in many countries. In Ethiopia however, the contribution of MWHs was rarely studied. To fill this gap, we have conducted a community-based unmatched case-control study from March 1 to April 20, 2016, in Southwestern Ethiopia. Mothers who delivered at a health facility within 1 year were considered as cases while mothers delivered at home were controls. We used simple random sampling to identify study participants from the pool of cases and controls who were identified by census. Data were analyzed using SPSS Version 20. Binary logistic regression was used to identify significant predictors. A total of 140 cases and 273 controls were included in the study. Among the case, 86 (61.4%) used MWHs during their last delivery. Variables like educational status of the mothers [AOR = 2.96, 95% CI: 1.41, 6.23], educational status of the husband [AOR = 5.19, 95% CI: 1.52, 17.76], and having antenatal care follow up [AOR = 3.22, 95% CI: 1.59, 6.54]. This study remarks, accessing MWHs, creating better awareness in utilizing them, and practicing antenatal follow-up have a crucial role in improving institutional delivery. Therefore, strengthening the existing and establishing new MWHs to deliver quality services is a good strategy in reducing home delivery.

Keywords

institutional delivery, maternity waiting home, Ethiopia

What is already known?

- Institutional delivery is low in Ethiopia and the study area, Southwest Ethiopia. Various personal socio-economic and demographic characteristics, and health services related factors affect the use of delivery service at the health facility.

Contribution to the field

- We have generated evidence based on a mixed-method case-control study. According to the study, the recently introduced maternity waiting homes have contributed to the use of institutional delivery services. However, there are challenges from the family of the pregnant women that hinders them to use the maternity waiting homes.

Implications for practice

- Strengthening the existing and establishing new maternity waiting homes to deliver quality services is a good strategy in reducing home delivery.
- Health promoters and community health workers have to raise the awareness of the rural community to improve the use of maternity waiting homes in rural settings.



Introduction

Institutional delivery is giving birth to a child in a health care institution under the supervision of trained and competent health personnel. The service should be given in a healthcare setting where there are more facilities available to handle a complicated situation and save the life of the mother and child. It is one of the major contributing factors to reduce maternal and child morbidity and mortality.^{1,2}

Institutional delivery is one of the most appropriate cost-effective and achievable strategies in resource-poor countries to reduce maternal and child mortality. Hence, improved maternal and newborn health increases the quality of life.³ The World Health Organization (WHO) promotes skilled attendance at every birth to reduce maternal and child mortality.⁴ Nearly all births in developed countries, 61.9% in less developed countries, 35.3% in the least developed countries and 33.7% births in eastern Africa attended by skilled health personnel.⁵

Maternal mortality remains challenging to the health system worldwide. Globally, an estimated 303 000 mothers die each year and 800 mothers die every day due to complications during pregnancy and childbirth. About 302 000 (99.67%) mothers each year die in developing countries. The majority of which are in the sub-Saharan Africa (SSA) region accounting for approximately 201 000 (66.34%) followed by Southern Asia 66 000 (21.78%).⁶

In Ethiopia maternal mortality ratio (MMR) was projected to be reduced to 267 per 100 000 live births in 2015.⁷ However, trends showed 743 deaths in 2005, 523 deaths in 2010 and 412 deaths in 2016 per 100 000 live births. The lifetime risk of maternal death is 1 in 64 in the country. This figure reveals there is high maternal death in the country as compared to the developing countries average 1 in 150.^{6,8}

In Ethiopia, institutional delivery service utilization at the national level is still very low. As consecutive demographic and health survey results indicated, the proportion of mothers who delivered in a health facility were 5% in 2001 and 2005 each, 10% in 2011, 26% in 2016 and it became 48% in 2019.^{4,9-12} Majority of maternal deaths (61%) occur in the postpartum period and more than half of these deaths occur during the first day of delivery. Health facility delivery in the urban setting is very high compared to the rural areas, 70 versus 40 percent.¹² The institutional delivery service utilization of Oromia National Regional State is still among the lowest, which is 13% next to Afar 10% and Amhara 12%.¹⁰

Utilization of delivery service affected by multiple factors including service availability, distance, cost, quality of service, socio-economic factors and personal health beliefs.¹³⁻¹⁵ Studies conducted in Ethiopian so far indicated some of the factors to use institutional delivery services. For instance, a woman's education, economic status, antenatal care (ANC) service, accessibility of health facilities and previous mode of delivery can be listed.^{14,16,17}

Taking lessons from successful countries, the Ethiopian government expanded the availability and access to maternity waiting homes in the country. Maternity Waiting Homes were introduced in the Ethiopian health care system especially in the rural areas. Even if its introduction is 3 decades back in very limited areas in the country, formal introduction of MWHs is a recent event.^{18,19} These homes built nearby a health facility (primary health center or hospital), and accommodation services being delivered. The MWHs built stand-alone near health facilities or room within the compound of the health facility. The health facility supervises all the activities performed in the MWHs. There will be at least 1 midwife assigned there to follow-up on the status of pregnant women. The Ethiopian Federal Ministry of Health has launched MWHs as a major policy option to improve skilled birth attendance so that the country can achieve national and international goals.²⁰ Experience from various African nations has shown MWHs have a great impact on institutional delivery service utilization improvement.^{21,22} A recent finding in Ethiopia indicated the intention of using these homes increasing.²³ This study aimed to assess the determinants of institutional delivery services and tried to explore barriers and facilitators to use MWHs before institutional delivery service.

Materials and Methods

Study Setting and Design

The study was conducted in Omo Nada District located in Jimma Zone, Southwest Ethiopia from March 1 to April 20, 2016. The district's center, Nada town, is 300 km far away from Addis Ababa, Capital city of Ethiopia and 70 km from the capital of the zone, Jimma town. The total projected population of the district was 316 606 in 2016. Out of this 157 984 (49.9%) are females. Pregnant women were estimated to be 10 986 in the year 2016. The district is divided into 41 *kebeles* (the smallest administrative division in

¹Oromia Regional State Health Bureau, Addis Ababa, Ethiopia

²Jimma University, Jimma, Ethiopia

³Bahirdar University, Bahirdar, Ethiopia

⁴Harvard T.H. Chan School of Public Health, Boston, MA, USA

⁵Wachemo University, Jimma, Ethiopia

Corresponding Author:

Kiddus Yitbarek, Department of Health Policy and Management, Jimma University, Jimma, P.O.Box: 378, Ethiopia.

Email: kiddus.yitbarek@yahoo.com

Ethiopia) (39 rural and 3 urban). There are 10 health centers and 39 health posts in the district.

A community-based unmatched case-control study design was used constituting of both quantitative and qualitative data collection methods.

Sample and Sampling Procedure

The sample size was calculated by double population proportion formula for unmatched case-control study using Epi Info software version 7. Various variables were considered to calculate the sample size. We have used the maximum sample size that was calculated using the proportion of antenatal care follow up.²⁴ The sample size calculation has considered 95% confidence level, 80 power, case to control ratio 1:2, percentage of controls exposed 79.46%, percentage of cases exposed 90.5% and OR 2.45. After adding a 10% expected non-response rate, the total sample size became 426. Finally, this number was divided into 142 cases and 284 controls.

Cases in this study were women who gave birth at a health facility in the last 12 months. On the other hand, the controls were women who gave birth at home in the last 12 months. Ten *kebeles* were randomly selected from Omo Nada district. We then identified women who gave birth to a child within 12 months with a census. The calculated sample size was then proportionally allocated to the numbers of cases and controls in each *kebele*. Finally, study participants were identified based on computer-generated random numbers for cases and controls separately. Eight Focus Group Discussions (FGDs) were conducted with purposively selected mothers, health development team leaders, husbands, and community health extension workers.

Variables and Measurement

The dependent variable in this study was institutional delivery service utilization. The independent variable was the history of using MWHs for the recent delivery. There were also various controlling variables sub-divided into different categories. Personal variables including age, marital status, educational status, occupation, ethnicity, religion, wealth index, residence, knowledge about institutional delivery, attitude towards institutional delivery and decision making power of mothers were taken. Health facility-related factors were the availability of health centers and hospitals and accessibility (time to reach health institutions). Moreover, obstetric factors were family size, age of first pregnancy, ANC attendance, number of ANC visits, parity, gravidity, history of stillbirth, history of abortion, history of neonatal death, and history of prolonged labor.

Knowledge and attitude of mothers were measured by 15 and 10 items respectively. Knowledge and attitude scores were then calculated for the final regression model. Those scored more than half of the knowledge questions were reconsidered as knowledgeable and below half were

categorized as not knowledgeable. For the attitude items we used the mean score as a threshold for favorable and unfavorable attitude. On the other hand, a distance of health facility that takes less than 1 h on foot walk was considered as an accessible health facility.

Principal component analysis (PCA) was used to construct a wealth index for the participants. The eigenvalue 1 and Varimax rotation were considered during the PCA for the wealth index creation. Eventually, the main component was categorized into 5 wealth quintiles, that is, from the poorest to wealthiest quintiles.

Data Collection

Mixed methods of data collection, both quantitative and qualitative methods of data collection employed. The quantitative data collection tool was adapted from various similar studies, especially the Ethiopian Demographic and Health Survey 2011.^{10,25} FGD guides were also developed for the Focus Group Discussions. Data collection tools were translated from English to the local language, “Afan Oromo” and, translated back to English by skilled personnel to check the consistency. The survey tool was pretested on 5% of sample size in a *kebele* located in Kersa district, which is a neighboring district to the study area. Ten diploma holder trained nurses collected the quantitative data using the interviewer-administered questionnaires. The collected quantitative data were analyzed and the preliminary findings indicated that the use of MWHs became the major determinant of institutional delivery. However, in a discussion with the data collectors and supervisors we recognized that there are lots of complaints and dropouts from the MWHs. We therefore planned to further investigate and support the quantitative information using qualitative evidence using FGD. The FGDs were facilitated by the principal investigator and 2 trained professionals. During the discussion, the voices were recorded by tape recorder in addition to notes taken by the note taker. The overall data collection process was supervised by 3 BSc holder supervisors.

Data Processing and Analysis

As the data collection completed, the tools were checked for completeness, coded and entered into Epi-data software version 3.1 and exported to SPSS version 20 for analysis. Descriptive analysis was carried out and the information presented using tables. Simple logistic regression analysis was performed to assess the association of each independent and controlling variable with institutional delivery services utilization. Variables with a *P*-value of less than .25 were selected as a candidate for the final multiple logistic regression model. The backward stepwise logistic regression model was fitted to identify independent predictors of institutional delivery service utilization. The association between dependent and independent variables were declared at a

P-value of less than .05 and the 95% confidence interval of the odds ratio (OR).

The tape-recorded data from the FGDs were transcribed and translated into the English language. Then finally the results were presented in supporting the quantitative information.

Results

Socio-Demographic Information

One hundred forty cases and 273 controls participated with a response rate of 98.6% and 96.1% respectively. The majority of the study participants 294 (71.2%) were in the age group of 20 to 34 years. Most of the respondents, 136 (97.1%) cases and 257 (94.1%) controls were married. Regarding the educational status of women, most of the cases (62.1%) and controls (84.6%) were not able to read and write. One hundred thirteen (80.7%) of the cases and 233 (85.3%) of the controls were Muslim. Regarding the women's occupation 90 (64.3%) cases and 173 (63.4) controls, were farmers. More than 3 quarters of the cases 112 (80.0%), and the controls 207 (75.8%), were rural residents. In this study, we have found that the majority (67%) among controls and 36.4% among cases can make decision about place of delivery. Nearly one-fifth of both the cases, 32(22.9%), and the controls, 57 (20.9%), were at the second wealth quintile (Table 1).

Use of Maternity Waiting Homes

Most of the cases and controls 92.9% and 92.7% respectively were informed about MWHs. On the other hand, majority 86 (61.4%) of cases used MWH during their last recent delivery and 19(7.2%) mothers who used MWH did not complete the service and got back to their home before delivery (Table 2).

We have got informed from the qualitative informants that, they support their wives to use the maternity waiting homes before delivery. A 35 years old male FGD participant said *"I am happy that she (his wife) will stay in MWH in the period near her delivery. Because if a complication happens before and after delivery; I may lose even her life"*.

Health development army leaders and mothers themselves were comfortable with this service. They believe that MWHs is essential for a mother to give birth at the health institution. They stated that the benefit of MWH is not limited to only mothers. During the period when mothers stay in MWH, attendants and family are permitted to stay with her. This minimized the additional cost of accommodation and transportation for the family.

On the contrary, some husbands have a negative attitude towards MWHs *"... MWH makes trouble for a family as a whole. If she (the mother) stayed at MWH for more than 15 days; who take care of children? Who cooks food for the family? ..."* Similarly, a 33 years old female participant said *"I was started using MWH service. But left it shortly; because anyone couldn't care about my kids and also I didn't get coffee and food as per my interest. ..."*

Determinants of Institutional Delivery

Women who can read and write had about 3 more odds of using institutional delivery service [AOR=2.96, 95% CI: 1.41, 6.23]. Similarly, a husband's education increases institutional delivery more than 5 times [AOR=5.19, 95% CI: 1.52, 17.76]. Women who attended ANC service had more than 3 times higher odds to use health institutions for delivery [AOR=3.22, 95% CI: 1.59, 6.54] as compared to those who did not have ANC follow up (Table 3).

Discussion

In this study we investigated the use of health institution for delivery and factor that determine institutional delivery. We also described the relationship between institutional delivery and maternity waiting homes, eventually, we have found that 86 (61.4%) of the women who used MWHs have delivered in health facilities. The finding of this study has similarities in many dimensions with the finding of other studies conducted before. The major determinants for institutional delivery in this study were mothers' education, husband education, and ANC follow up.

The MWHs built standalone near health facilities or room within the compound of the health facility. All the activities there performed under the supervision of the health facility. Therefore, mothers do not encounter a barrier to access follow-up and delivery services from the facility. The finding supported by a study conducted in Mozambique to see the effectiveness of MWH in enhancing facility delivery. The use of MWHs has significantly improved institutional delivery.²⁶

Even though some husbands and mothers themselves have a negative attitude towards MWHs, its benefits to improve institutional delivery service users cannot be denied. Many husbands were happy that their wife stays at MWHs near the delivery period. Mothers themselves have also understood the benefit of using this service to minimize complications during delivery. And they believe that it is the best way to save their and the new bourn's life.

According to this study mothers who can read and write are about 3 times more likely to use institutional delivery service compared to those who cannot read and write. Increase in educational status results in better decision to use institution for delivery according to studies. For instance a study conducted in western Ethiopia, Bako district, showed that; women who have secondary and above education level were 3 times more likely to use health facility for delivery.²⁷ Other studies in Ethiopia also showed a similar effect of educational status to institutional delivery service uptake. Those mothers who are above the secondary school in Borecha district 4.4 times,¹⁵ Goba 3.1 times,²⁸ Bahir Dar City 3.5 times,¹⁶ Sidama Zone 26.8% times,⁵ and Samre Saharti District 13.5 time,²⁹ more likely to deliver in a health institution. This indicated that a high level of mothers' education increases the level of institutional delivery. This is because as their

Table 1. Socio-Demographic Information of Mothers in Omo Nada District, Jimma Zone, Southwest Ethiopia, May 2016.

Variables	Categories	Place of delivery		Total
		Case (Institution) n = 140	Control (Home) n = 273	
Residence	Rural	112 (80%)	207 (75.8%)	319 (77.2%)
	Urban	28 (20%)	66 (24.2%)	94 (22.8%)
Religion	Muslim	113 (80.7%)	233 (85.3%)	346 (83.8%)
	Orthodox	16 (11.4%)	20 (7.3%)	36 (8.7%)
	Others ^a	20 (14.4%)	30 (11%)	7.5 (3.1%)
Ethnicity	Oromo	128 (91.4%)	253 (92.7%)	381 (92.3%)
	Others ^b	12 (8.6%)	20 (7.3%)	32 (7.7%)
Marital status	Married	136 (97.1%)	257 (94.1%)	396 (95.2%)
	Others ^c	4 (2.9%)	16 (5.9%)	20 (4.8%)
Educational status of mother	Unable to read and write	87 (62.1%)	231 (84.6%)	318 (77%)
	Able to read and write	21 (15%)	15 (5.5%)	36 (8.7%)
	Elementary	24 (17.1%)	19 (7%)	43 (10.4%)
	Secondary and above	8 (5.7%)	8 (2.9%)	16 (3.9%)
Educational status of husband	Unable to read and write	59 (42.1%)	184 (67.4%)	243 (58.8%)
	Able to read and write	23 (16.4%)	33 (12.1%)	56 (13.6%)
	Elementary	43 (30.7%)	49 (17.9%)	92 (22.3%)
	Secondary and above	15 (10.7%)	7 (2.6%)	22 (5.3%)
Occupation of the mother	Farmer	90 (64.3%)	173 (63.4%)	263 (63.7%)
	Housewife	43 (30.7%)	86 (31.5%)	129 (31.2%)
	Others ^d	8 (5.0%)	14 (5.1%)	21 (5.1%)
Occupation of the husband	Farmer	112 (80%)	216 (79.1%)	112 (80%)
	Merchant	19 (13.6%)	42 (15.4%)	61 (14.8%)
	Others ^e	9 (6.4%)	15 (5.5%)	24 (5.8%)
Age of mother	<20 years	13 (9.3%)	18 (6.6%)	31 (7.5%)
	20-34 years	105 (75%)	189 (69.2%)	294 (71.2%)
	35-49 years	22 (15.7%)	66 (24.2%)	88 (21.3%)
Wealth index	Lowest	28 (20%)	50 (18.3%)	78 (18.9%)
	Second	32 (22.9%)	57 (20.9%)	89 (21.5%)
	Middle	21 (15%)	62 (22.7%)	83 (20.1%)
	Fourth	34 (24.3%)	48 (17.6%)	82 (19.9%)
	Highest	25 (17.9%)	56 (20.5%)	81 (19.6%)
Who decided place of delivery	Wife	51 (36.4%)	183 (67.0%)	234 (56.7%)
	Husband	26 (18.6%)	33 (12.1%)	59 (14.3%)
	Both	63 (45.0%)	57 (20.9%)	120 (29.1%)

^aCatholic, Protestant, wake feta.

^bAmhara, Gurage, Wolita, Dawero, Kafino and Silte.

^cSingle, divorced and widowed.

^dMerchant, daily servant, government and non-government employed.

^eGovernment employed, non-government employed and daily laborer.

Table 2. Distribution of Institutional Delivery in Terms of Health Facility Related Determinants of Cases and Controls, Omo Nada District Jimma zone, South West Ethiopia, May 2016.

Variables	Cases n = 140	Controls n = 273	P-value	COR (95% CI)
Information about maternity waiting home				
Yes	130 (92.9%)	253 (92.7%)	.946	1.23 (0.46, 2.26)
No	10 (7.1%)	20 (7.3%)		1
Availability of maternity waiting home in catchment				
Yes	121 (93.1%)	234 (92.5%)	.835	0.92 (0.40, 2.09)
No	9 (6.9%)	19 (7.5%)		1
Use of maternity waiting home				
Yes	86 (61.4%)	19 (7.2%)	.000*	20.32 (7.32, 31.21)
No	54 (38.6%)	245 (92.8%)		1

*p-value < 0.05

Table 3. Predictors of Institutional Delivery Service Utilization in Terms of Cases and Controls, Omo Nada District Jimma Zone, South West Ethiopia, May 2016.

Variables	Cases (n = 140)	Controls (n = 273)	COR (95% CI)	AOR (95% CI)
Educational status of the mother				
Unable to read and write	87 (62.1%)	231 (84.6%)	1	1
Can read and write	21 (15%)	15 (5.5%)	2.03 (0.09, 8.99)	2.96 (1.41, 6.23)**
Primary	24 (17.1%)	19 (7%)	3.15 (1.58, 18.56)*	1.73 (0.83, 3.61)
Secondary and above	8 (5.7%)	8 (2.9%)	2.88 (1.36, 5.42)*	0.91 (0.25, 3.40)
Educational status of the husband				
Unable to read and write	59 (42.1%)	184 (67.4%)	1	1
Can read and write	23 (16.4%)	33 (12.1%)	2.54 (0.46, 4.53)	2.08 (1.10, 3.96)**
Primary	43 (30.7%)	49 (17.9%)	1.69 (0.65, 7.68)	1.99 (1.15, 3.45)**
Secondary and above	15 (10.7%)	7 (2.6%)	2.58 (1.11, 4.33)*	5.19 (1.52, 17.76)**
History of ANC use				
Yes	129 (92.1%)	208 (76.2%)	3.66 (1.87, 7.20)*	3.22 (1.59, 6.54)**
No	11 (7.9%)	65 (23.8%)	1	1
Knowledge				
			1.06 (0.98, 1.14)	1.001 (0.93, 1.08)

*P-value < .25. **P-value < 0.05.

educational status increases, their knowledge about complications of pregnancy and benefits in using health facility to give birth also increases.

Not only the mothers' educational status but the husband also has a positive effect on his wife to go to a health facility for delivery. In this study mothers with a husband who has secondary and above educational status are 5 times more likely to deliver at the health facility as compared to mothers with illiterate husbands. The positive effect of husbands' education was also seen in other similar studies conducted in Sidama zone, southern Ethiopia. Mothers who have educated husbands were 14.79 times more likely to give birth at health facility.¹⁵ This could be because the high level of knowledge leads husbands to encourage their wives to use health institutions for delivery, to save his wife from death and complications.

Similarly, the ANC follow up history of a mother is a determinant of institutional delivery. This variable results in an increase of institutional birth 3.2 times. The finding is consistent with other findings from Bahirdar which showed a positive effect of using ANC follow up for utilization of institutional delivery,¹³ Sekela district 4.26 times,¹⁷ Goba 2.7 times,²⁸ West Wolega Zone 2.91 times,²⁵ and Samre Saharti district 4.6 times²⁹ more likely to deliver in a health facility. If mothers get appropriate, treatment, counseling, and advice during their pregnancy, it is more likely to give birth at a health facility.

Use of MWHs increased institutional delivery service use. Delivering in health care setting significantly minimizes maternal death, perinatal death, and complications during child birth. Overall, the finding of this study indicated that, despite the fact that use of MWHs raise use of institutional delivery services, the service is in a challenge. Personal and family related issues related to the pregnant women are barriers that hinder this women to use maternity waiting homes and facilitates dropouts.

Finally, it has to be noted that there were limitations in the conduct of this study. Since we have included mothers who delivered in the last 12 months, recall bias may occur. Another limitation is the temporal relationship between institutional delivery and mothers' knowledge about institutional delivery cannot be assured.

Conclusions

Even if the introduction of MWHs is a recent phenomenon in Ethiopia, our finding revealed that its role in increasing institutional delivery use is high. In addition to this major determinant, health facility delivery was determined by mothers' education, husbands' education, ANC follow up, and knowledge of the mother. Considering its huge contribution to increasing institutional delivery, the government has to strive to let mothers use the service and ensure its sustainability.

Acknowledgments

We would like to forward our thanks to Jimma University for funding this study; for all study participants, data collectors and supervisors.

Authors' contributions

Conceived and designed the study: MW GT AA MH FT. Performed the study: MH MW GT FT AA KY YS BE. Analyzed the data: MH. Wrote the paper and manuscript: MH KY. Reviewed the paper and manuscript MW GT FT AA KY. All authors read and approved the manuscript.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Jimma University, Ethiopia has funded this project.

Ethics approval and consent to participate

The study was reviewed and approved by the institutional review board of Jimma University, institute of health. After explaining the objective of the study, verbal informed consent was obtained from each study participant before the interview. No personal identifiers were used on a data collection form. The recorded data were kept confidentially and anonymous.

ORCID iDs

Kiddus Yitbarek  <https://orcid.org/0000-0001-8662-7434>

Belay Erchafo  <https://orcid.org/0000-0002-0290-7322>

Availability of data and material

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Supplemental Material

Supplemental material for this article is available online.

References

1. United Nations. Millennium development goals: progress and challenges. 2015. [https://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20\(July%201\).pdf](https://www.un.org/millenniumgoals/2015_MDG_Report/pdf/MDG%202015%20rev%20(July%201).pdf)
2. World Health Organization. Electronic nicotine delivery systems: report by WHO. WHO Framework Convention on Tobacco Control; 2014. https://apps.who.int/iris/bitstream/handle/10665/147110/FCTC_COP6_10Rev1-en.pdf?sequence=1&isAllowed=y
3. De Bernis L, Sherratt DR, Abouzahr C, Van Lerberghe W. Skilled attendants for pregnancy, childbirth and postnatal care. *Br Med Bull.* 2003;67(2003):39-57.
4. Central Statistical Agency. *Ethiopian Demographic and Health Survey 2011*. Ethiopian Central Statistical Agency; 2011.
5. Chirdan OO, Enzuladu EA. Utilization of institutional delivery services among women bringing their children for BCG in Jos, Nigeria. *J Med Trop.* 2011;13(2):98-101.
6. World Health Organization. *Trends in Maternal Mortality: 1990 to 2015*. World Health Organization; 2015:100.
7. Ethiopia Ministry of Health. *Ethiopia Ministry of Health Health Sector Development Program IV October 2010*. Ethiopia Ministry of Health; 2010.
8. Central Statistical Agency, The DHS Program ICF. *Ethiopia Demographic and Health Survey: key indicators Report 2016*. Ethiopian Central Statistical Agency and The DHS Program ICF; 2016.
9. Central Statistical Agency. *Ethiopia Demographic and Health Survey 2005*. Ethiopian Central Statistical Agency; 2005.
10. Central Statistical Agency. *Ethiopia Mini Demographic and Health Survey*. Ethiopian Central Statistical Agency; 2014:112.
11. Central Statistical Agency (CSA), The DHS Program ICF. *Ethiopian Demographic and Health Survey 2016*. Ethiopian Central Statistical Agency and The DHS Program ICF; 2017.
12. Ethiopian Public Health Institute, Ministry of Health. *Ethiopian Mini Demographic and Health Survey 2019*. Ethiopian Public Health Institute, Ministry of Health; 2019.
13. Abebe F, Berhane Y, Girma B. Factors associated with home delivery in Bahirdar, Ethiopia: a case control study. *BMC Res Notes.* 2012;5(1):653.
14. Tura G, G/Mariyam A. Safe delivery service utilization in Metekel zone, Northwest Ethiopia. *Ethiop J Health Sci.* 2008;17(4):213-222.
15. Tadele T, Tamiso A, Tadele T. Factors associated with institutional delivery in Boricha District of Sidama Zone, Southern Ethiopia. *Int J Public Health Sci.* 2015;3(4):224-230.
16. Abeje G, Azage M, Setegn T. Factors associated with institutional delivery service utilization among mothers in Bahir Dar City administration, Amhara region: a community based cross sectional study. *Reprod Health.* 2014;11(1):22.
17. Teferra AS, Alemu FM, Woldeyohannes SM. Institutional delivery service utilization and associated factors among mothers who gave birth in the last 12 months in Sekela District, north west of Ethiopia: a community-based cross sectional study. *BMC Pregnancy Childbirth.* 2012;12(1):74.
18. Gaym A, Pearson L, Soe KWW. Maternity waiting homes in Ethiopia—three decades experience. *Ethiop Med J.* 2012;50(3):209-219.
19. Tiruneh GT, Taye BW, Karim AM, et al. Maternity waiting homes in Rural Health Centers of Ethiopia: the situation, women's experiences and challenges. *Ethiop J Health Dev.* 2016;30(1):19-28.
20. Hadis M, Dibaba A, Ababor S, Assefa Y. An evidence-based policy brief improving skilled birth attendance in Ethiopia, Full Report. 2014. <https://www.who.int/evidence/sure/frimproving-skilled-birth-attendance-in-ethiopia.pdf?ua=1>
21. Kruk ME, Mbaruku G, McCord CW, Moran M, Rockers PC, Galea S. Bypassing primary care facilities for childbirth: a population-based study in rural Tanzania. *Health Policy Plan.* 2009;24(4):279-288.
22. Sialubanje C, Massar K, Kirch EM, van der Pijl MSG, Hamer DH, Ruiter RAC. Husbands' experiences and perceptions regarding the use of maternity waiting homes in rural Zambia. *Int J Gynecol Obstet.* 2016;133(1):108-111. doi:10.1016/j.ijgo.2015.08.023
23. Endayehu M, Yitayal M, Debie A. Intentions to use maternity waiting homes and associated factors in Northwest Ethiopia. *BMC Pregnancy Childbirth.* 2020;20(1):281.
24. Bayu H, Fisseha G, Mulat A, Yitayih G, Wolday M. Missed opportunities for institutional delivery and associated factors among urban resident pregnant women in South Tigray Zone, Ethiopia: a community-based follow-up study. *Glob Health Action.* 2015;8:28082.
25. Feyissa TR, Genemo GA. Determinants of institutional delivery among childbearing age women in Western Ethiopia, 2013: unmatched case control study. *PLoS One.* 2014;9(5):e97194.
26. Ruiz IZ. *Effectiveness Assessment of Maternity Waiting Homes in Increasing Coverage of Institutional Deliveries Using*

- Geographical Information Systems in Six Districts of Cabo Delgado Province, Mozambique*. University of South Africa; 2010.
27. Ejeta E, Nigusse T. Determinants of skilled institutional delivery service utilization among women who gave birth in the last 12 months in Bako District, Oromia, Ethiopia, 2012/13 (Case-control study design). *J Gynecol Obstet*. 2015;3(2):36-42.
 28. Odo DB, Shifti DM. Institutional delivery service utilization and associated factors among child bearing age women in Goba Woreda, Ethiopia. *J Gynecol Obstet*. 2014;2(4): 63-70.
 29. Assfaw YT, Sebastian MS. *Determinants of Antenatal Care, Institutional Delivery and Skilled Birth Attendant Utilization in Samre Saharti District, Tigray, Ethiopia*. Umeå International School of Public Health; 2010:1–72.