

Determinants of Home Delivery in the Central Zone of Tigray, North Ethiopia: Evidence from Case-Control Study

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Abstract

Background: Place of delivery is critical factor which affects the health of the mother and newborn. Delivery and early post-partum period remains the most important intervention in reducing maternal mortality and obstetric complications. This study aims to investigate the determinant factors of home delivery in North Ethiopia.

Methods: A case control study was conducted from August 2017 to Feb 2018. A total of 324 mothers who delivered and visit public health facilities for postnatal care were included in the study. Mothers who delivered at home (cases=108) and health institutions (controls = 216) were selected by systematic sampling technique. Data were coded and entered using Epi-data 3.1 and exported to SPSS Version 21 for analysis. Multivariate logistic regression was employed to identify the predictors at p-value 0.05.

Result: The mean age of cases and controls was 28.75(SD= \pm 3.5) and 25.53(SD= \pm 4.98) years respectively. The likelihood risk of home delivery was greater among mothers with no formal education (AOR=7.9, 95%CI: 1.49–42.05), no experience of institutional delivery (AOR=9.1, 95%CI: 1.58–52.21), unplanned pregnancy (AOR=8.4, 95%CI: 2.00-35.46), poor knowledge about obstetric complications (AOR=5.98, 95% CI: 1.20-29.77), and lack of joint decision on place of delivery (AOR=7.1, 95%CI: 1.34-37.61).

Conclusions: Mothers with no formal education, lack of experience of facility delivery, unplanned pregnancy, absence of obstetric complications, poor knowledge on obstetric complications, and absence of joint decision were predictors of home delivery. Health professionals should take the opportunity of antenatal care to create awareness regarding to place of delivery to tackle the problems.

Background

Globally, there were 289,000 maternal deaths in 2013. The sub-Saharan Africa region alone accounted for 62% (179,000) of the deaths followed by Southern Asia 24% (69,000) (1). However a substantial 45% reduction in maternal deaths has been achieved from 1990 to 2013 where all regions except North America experienced a decline in maternal mortality ratio (MMR). The highest reduction was registered in Europe (66%) followed by Asia (59%), Oceania (48%), Africa (47%) and Latin America and the Caribbean (39%) (2). The most common medical causes of maternal death between 2003 and 2009 were haemorrhage, hypertensive disorders, and sepsis which accounted for more than half of maternal deaths worldwide (3).

Skilled care during birth is crucial, as timely management and treatment can make the difference between life and death meaning most maternal deaths in low resource environments are potentially preventable (4).

During pregnancy, women need a continuum of care to ensure the best possible health outcome for them and their newborns. This starts at home with self-care and primary prevention, followed by the first level

of health care (at a health post, clinic or in the client's home) and involves the provision of high-quality midwifery care (5).

Skilled attendance at birth (SBA) remains the most important intervention in reducing maternal mortality and obstetric complications, as these often occur at the time of delivery and cannot be predicted in advance (6). Skilled attendance during labor, delivery and the early post-partum period could prevent between 13–33% of maternal deaths (7).

The World Health Organization (WHO) defines a skilled birth attendant as “an accredited health professional such as a midwife, doctor or nurse who has been educated and trained to proficiency in the skills needed to manage normal (uncomplicated) pregnancies, childbirth and the immediate postnatal period, and in the identification, management and referral of complications in women and newborns”(5).

Ethiopian Demographic and Health Surveys consider Skilled Birth Attendance (SBA) as those attended by a midwife, doctor or nurse. Health extension workers (HEWs) also have been providing clean and safe delivery; but this figure is not included in the SBA, rather reported separately(8). SBA was chosen as an indicator for monitoring progress towards the fifth millennium development goal (MDG-5) reducing the maternal mortality ratio by three quarters between 1990 and 2015; which supports the central role of professional care at birth (9).

According to local studies, around 90% of home deliveries are attended by unskilled persons (11). The place of delivery and hygienic conditions are crucial to reduce maternal morbidity and mortality as well as to reduce serious newborn illness, but in Ethiopia home delivery with unhygienic conditions is widely practiced (11, 13). Little is documented about the determinant factors of home delivery, therefore; the aim of this study was to identify the predictors of home delivery in the Tigray Regional State, Northern Ethiopia.

Methods And Procedures

Study setting

Hospital based case-control study design was employed to identify the determinants of home delivery. The central zone is one of the seven administrative zones in the Tigray regional state, Ethiopia. In this zone, the annual estimated deliveries were 32,819 in 2014 of which only 25% took place in health facilities (14). Health care service delivered in the zone through one referral hospital, three General hospital, five primary hospitals and 57 rural and urban health centers.

This study was conducted from August 2017 to February 2018.

Eligibility

The study participants were mothers aged 15–49 years who gave birth in the four months before the data collection and who visited the selected public health facilities during the study period for postnatal care and/or child vaccination services. Study participant mothers whose age less than 18 years were obtained assent consent either from husband or caregiver before information was collected on behalf of the study participants. Mothers who gave birth at health facility for their last pregnancy were considered as controls while mothers who gave birth at home were categorized as cases. Women who were physically and mentally incapable for the interview were excluded from the study.

Sample size determination

The sample size required for the study was calculated using two population proportion formula for unmatched case control study using EPI info 3.5.1 statistical software. ANC coverage was used as the exposure variable among the different variables that yield maximum sample. By considering the following assumptions: A 95% confidence level, 80% power, case to control ratio of 1:2 and a detectable odds ratio of 2, therefore the final estimated sample size was 324, in which 108 were cases and 216 were controls.

Operational definitions

Home delivery is defined as delivery with unhygienic conditions attended by an unskilled person conducted at home while skilled delivery (institutional delivery): is a delivery that has taken place at a health centre or hospital attended by a skilled person.

Wealth status was measured using the household's productive and non-productive assets and ranked to five quintiles as poorer, poorest, middle, richer and richest.

Women's autonomy decision making power on where to deliver was assessed using six autonomy dimensions and summarized as autonomous and non-autonomous.

Knowledge of obstetric complications Participants' knowledge was assessed using nine questions on danger signs of pregnancy and delivery; those who mentioned at least 6 were grouped as good knowledge and less as poor knowledge.

Data quality assurance

The data collection tool was pre-tested to assess its clarity and completeness. Training was given to data collectors and supervisors for one day focusing on understanding the research question, approaching participants, ethical conduct, techniques of interview, and value of collecting the actual data. All filled questionnaires were checked daily for completeness, and consistency by supervisors and the principal investigator.

Data management and analysis

Data were entered using Epi-data version 3.1 and exported to statistical package for social sciences (SPSS) version 21 software for analysis. Cases were coded as 1 and controls as 0. Bivariate analysis between dependent and independent variables (covariates) was performed separately using binary logistic regression and the strength of association was expressed in odds ratio (OR). Variables with p-value less than 0.2 in bivariate analysis were included in the multivariate analysis. Finally a multivariate analysis using enter method were done. Statistical significance was determined at 95% confidence interval at p value of less than 0.05. Model fitness was checked by Hosmer and Lemeshow which provided an evidence of model fitness with a predictor test level of $p = 0.54$.

Results

Socio-demographic and medical profile of study participants

A total of 300 mothers (100 cases and 200 controls) were participated in the study with a response rate of 95%. The mean age among cases and controls was 28.75(SD = \pm 3.5) and 25.53(SD = \pm 4.98) respectively. Married participants accounted 84% among cases and 94% among controls. Sixty one (61%) of the cases and 30 (15%) of the controls did not attend any formal education, whereas more than half (54%) of the controls have a secondary and above level of education. The majority of the cases (94.4%) and controls (98.9%) were Orthodox religion followers. Fifty nine (59%) of the cases and 86 (43%) of the controls were housewives. Husbands of 10% of cases and 57.5% controls had attended secondary and above level of education. Husbands of 54 (54%) and 35 (17.5%) of the cases and controls were farmers respectively. Regarding place of residence 72 (72%) cases and 60 (30%) controls were rural residents at the time of delivery of their last child (Table 1).

Table 1
Socio-demographic characteristics of home delivery study participants, central zone of Tigray, North Ethiopia

Variables	Categories	Cases No (%)	Controls No (%)
Maternal age	15–24	9 (9)	92 (46)
	25–29	16 (16)	62 (31)
	30–34	29 (29)	32 (16)
	35–49	46 (46)	14 (7)
Marital status	Married	84 (84)	188 (94)
	Others	16 (16)	12 (6)
Religion	Orthodox	80 (80)	168 (84)
	Muslim	20 (20)	32 (16)
Maternal education	Illiterate	40 (40)	20 (10)
	Read and write	21 (21)	10 (5)
	Primary	36 (36)	62 (31)
	Secondary and above	3 (3)	108 (54)
Husband education	Illiterate	34 (34)	10 (5)
	Read and write	12 (12)	10 (5)
	Primary	33 (33)	64 (32)
	Secondary and above	10 (10)	115 (58)
Place of residence	Urban	28 (28)	140 (70)
	Rural	72 (72)	60 (30)
Wealth status	Lowest	41 (20.5)	19 (9.5)
	Second	25 (12.5)	35 (17.5)
	Middle	22 (11)	38 (19)
	Fourth	8 (4)	52 (26)
	Highest	4 (2)	56 (28)

Personal and programmatic related characteristics of study participants

Almost all mothers in the cases group (98%) and half mothers in the control group (52%) lacked Knowledge of obstetric complications. Regarding maternal autonomy status, which was assessed by autonomy dimensions, 31% of cases and only 6% of the controls were not autonomous. 65% of cases and 25% controls decide their place of delivery by themselves, whereas the majority of controls (71.5%) and 18% of cases decided together with their husband (Table 2).

Table 2
 Personal and programmatic related characteristics of
 the participant in central zone of Tigrai, North Ethiopia

Variables	Cases No (%)	Controls No (%)
Knowledge on obstetric complications		
· Poor	90 (90)	88 (44.0)
· Good	10 (10)	112 (56.0)
Maternal autonomy		
· Non autonomous	31(72.1)	12(27.9)
· Autonomous	69(26.8)	188(73.2)
Decided place of delivery		
· My self	65(65)	51(25.5)
· Husband	17(17)	6(3)
· Together	18(18)	143(71.5)
Perceived quality of services		
· Inadequate	8(80.0)	2(1)
· Adequate	92(31.7)	198(99)
Time to reach health facility		
· < 1 hour	67(67)	194(94)
· ≥ 1 hours	33 (33)	6(3)
Type of road		
· Good	9(9)	124(62)
· Fair	55(55)	52(26)
· Bad	36(36)	24(12)
Mode of travel		
· Foot	97(97)	152(76)
· Car	3(3)	48(24)

Predictors of home delivery in central zone of Tigrai, Ethiopia

After adjusting variables in the multivariate logistic regression model among different variables: previous history of facility delivery, educational status, planned pregnancy, decision on place of delivery and knowledge of obstetric complication were identified as determinants of home delivery in the central zone Tigray, Ethiopia.

Mothers with no previous history of health facility delivery were 9 times high risk to face home delivery than with previous history of facility delivery (AOR = 9.09; 95% CI: 1.58–52.21). Mothers with no formal education were about eight times more likely to experience home delivery than who attended formal education (AOR = 7.9; 95% CI: 1.49–42.05). Mothers without planned pregnancy were 8.4 times odds of to have home delivery than planned pregnancies (AOR = 8.42; 95% CI: 2.00–35.46). Decision made by others on the place of delivery by others was 7 times high risk to deliver at home than decision made by self (AOR = 7.11; 95% CI: 1.34–37.61). Mothers with poor knowledge about obstetric complication were 6 times more risk than with good knowledge of obstetrics complications (AOR = 3.43; 95% CI: 1.02– 11.5) (Table 3).

Table 3
Predictors of home delivery in central zone of Tigray, North Ethiopia

Variables	Cases (n = 100)	Controls (n = 200)	Crude OR (95% CI)	Adjusted OR (95% CI)
Maternal age				
15–24	9(8.9)	92(91.1)	0.03(0.01–0.07)	0.26(0.02–2.96)
25–29	16(20.5)	62(79.5)	0.08(0.04–0.18)	0.66(0.09–4.88)
30–34	29(47.5)	32(52.5)	0.11(0.05–0.25)	0.65(0.13–3.26)
35–49	46(76.7)	14(23.3)	1	1
Maternal education				
no formal education	61(67.0)	30 (33.0)	8.86(5.07–15.50)	7.90(1.49–42.05)**
formal education	39(18.7)	170(81.3)	1	1
Residence				
Rural	72(54.5)	60(45.5)	6.00(3.53–10.20)	0.50(0.10–2.56)
Urban	28(16.7)	140(83.3)	1	1
Experience of institutional delivery				
No	31(68.9)	14(31.1)	3.52(1.74–7.15)	9.09(1.58–52.21)**
Yes	61(38.6)	97(61.4)	1	1
Pregnancy planned				
No	66(75.0)	22(25.0)	15.71(8.57–28.79)	8.42(2.00-35.46)*
Yes	34(16.0)	178(84.0)	1	1
Previous pregnancy complications				
No	83(48.8)	87(51.2)	2.54(1.12–5.79)	8.36(1.27–55.12)**
Yes	9(27.3)	24(72.7)	1	1
ANC visits				
≤ 2	8(90)	1(10)	18.76(9.78–35.98)	0.60(0.09–3.79)
3 and more	85(56.7)	65(43.3)	1	1
Birth preparedness				
*significant at P- value ≤ 0.01				
**significant at P- value < 0.05				

Variables	Cases (n = 100)	Controls (n = 200)	Crude OR (95% CI)	Adjusted OR (95% CI)
Not prepared	90(65.2)	48(34.8)	28.50(13.74–59.11)	10.42(2.18–49.73)*
Prepared	10(6.2)	152(93.8)	1	1
Decision on place of last delivery				
Others	65(56.0)	51(44.0)	11.43(6.30-20.73)	7.11(1.34–37.61)**
Together	17(73.9)	6(26.1)	1	1
Time to reach health institution				
< 1 hour	67(25.7)	194(74.3)	28.67(11.63–70.69)	4.89(0.75–31.70)
≥ 1 hours	33(84.6)	6(15.4)	1	1
Type of road available				
Good	9(6.8)	124(93.2)	1	1
Fair	55(51.4)	52(48.6)	14.57(6.7-31.65)	8.5(1.61–44.47)**
Bad	36(60.0)	24(40.0)	20.66(8.82–48.41)	11.8(1.5-95.19)**
knowledge of obstetric complications				
Poor	90(50.5)	88(49.5)	11.46(5.63–23.31)	5.98(1.20-29.77)**
Good	10(8.1)	112(91.9)	1	1
*significant at P- value ≤ 0.01				
**significant at P- value < 0.05				

Discussions

This study revealed that; previous history of health facility delivery, planned pregnancy, decision made on the place delivery, and knowledge of obstetric complication were independent predictors of home delivery.

Mothers with no previous history of facility delivery were about nine times more risk to deliver at home compared to who has a practice delivery at health facility. This finding is in line with studies conducted in other parts of the country (27,28). The possible explanation for this could be past exposure to health facilities could let the mother know skilled delivery is safer and could motivate her to give birth at health institution.

Regarding educational status of mothers, those with no formal education were about eight times more likely to give birth at home than mothers with attended formal education. This finding is consistent with studies done in different regions of Ethiopia(19,22,24,27,32,33,34,35), Ghana and Nepal (33,34). This is

due to the fact that educated women are expected to have better knowledge about the risks of home delivery.

This study also revealed that planned pregnancies significantly determine place of birth, as unplanned pregnancies were 8.4 times more likely to happen home delivery compared to the planned pregnancy. This could be due to the fact that mothers who planned their pregnancy had planned and prepared ahead where will be her place of delivery with full knowledge and understanding.

Mothers who had poor knowledge of obstetric complications were about 6 times more likely to give birth at home compared to mothers who had good knowledge. This was consistent with the studies conducted in Bahir Dar, Banja districts of Ethiopia and some other countries (27,22,19,20,24,32). The possible explanation for this could be that mothers having good knowledge of potential obstetric complications want to avoid life threatening conditions during labor skilled birth attendants in the health facility.

Absence of joint decision with husband on the place of delivery led mothers to a seven fold increased chance of delivering at home when compared to their counterparts. This result is consistent with the studies conducted in Bako and Dodota districts of Ethiopia (24,31). This could be due to the lack of psychological and financial support of the husbands to their wives that are associated with home delivery.

ANC utilization and place of residence did not show a significant association in the current study, but studies conducted in Bahir Dar, Tigray and Western Ethiopia (19,22,24,27,32,35) consistently reported to be determinants of institutional delivery. This could be due to the fact that the health extension workers might address maternal health services to the rural segment of the community.

Conclusion

In conclusion, history of previous health facility delivery, educational status of mother, unplanned pregnancy, poor knowledge on obstetric complications, and decision made by others on place of delivery were found predictors of home delivery.

Health professionals should use the opportunity of ANC follow up to create awareness on pregnancy planning, birth preparation and joint decision of the couples with regard to the place of delivery to tackle the problems related to home delivery.

Limitations of the study

The possible limitations of this study could be selection bias, this may be inevitable since cases and controls were only selected from mothers who visited health facilities for PNC and/or vaccination of children and mothers were asked about their history of birth in four months before the data collection. There may also be recall bias.

Acronym

ANC	Antenatal Care
BPCR	Birth Preparedness and Complication Readiness
HEWs	Health Extension Workers
MDG	Millennium Development Goal
OR	Odds Ratio
PNC	Post natal care
SBA	Skilled Birth Attendants
SPSS	Statistical package for Social Sciences
WHO	World Health Organization

Declarations

Authors' contributions

MGM, MWK, HBA and MGW: Conceived and designed the study. GKF and KHM: Analyzed the data. YSG, HBA, MGM, and KHM: Prepared the manuscript. All authors read and approved the final manuscript before submission for publication.

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Competing interests

The authors declare that they have no competing interests.

Consent for publication

Not applicable

Availability of data and materials

The datasets generated and analyzed during this study were included in the main document of this manuscript and available from the corresponding author on reasonable request.

Ethics approval and consent to participate

Ethical clearance was obtained from Institutional Research Review Board (IRB) of College of Health Science and comprehensive specialized hospital, Aksum University. Similarly the information sheet and informed consent form prepared by the investigator was approved by IRB. Moreover, all study participants were explained about the purpose of the study and informed verbal consent was obtained from each study participants before data was collected. Meanwhile study participant mothers whose age less than 18 years were obtained assent consent either from husband or caregiver before information was collected on behalf of the study participants. Confidentiality was ensured by not using any identifiers.

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