Research Article
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Determinants of home delivery among childbearing age women in Gondar zuria district of central Gondar, Ethiopia, 2020

Abstract

Introduction: Birth is a critical time for the health of the mother and newborn; and place of delivery is a crucial factor for the wellbeing of both. Ethiopia is a major contributor to the worldwide death tax of mothers with a maternal mortality ratio of 412 per 100,000 live. Therefore institutional delivery has paramount importance to get skilled care throughout pregnancy from inception to postnatal care. But in the Amhara region, only 27% of mothers gave birth at the health facility. The objective of the study is to assess determinants of home delivery among childbearing age women in Gondar Zuria district of central Gondar, Ethiopia. The study duration was from January 1 to February 30 2020.

Method: Community-based age-matched case-control with the complementary qualitative design was used in Gondar Zuria district. Simple random sampling was used to select study participants for quantitative and purposive sampling used for the qualitative part. The total sample size was 264. Quantitative data were collected by in-depth interviews. Data entry and cleaning was done by epi info and analysis was done using SPSS and results were presented in odd ratios, and tables.

Result: Seventy-one 71 (26.9%) of the mothers were in the age range of 31–35 years and 50 (18.9%) of mothers were in the age range of 26-30 years. Logistic regression analyses revealed that living in the rural area (AOR, 9.53; 95%CI; 3.50-25.90), not in union with husband (AOR, 8.35 95%CI; 3.53-22.09), unable to read and write (AOR, 4.50 95%CI; 1.12-18.07) and having a monthly income of less than 600 ETB (AOR, 6.45 95%CI; 2.26-18.37) were more likely to deliver at home. Being unaccompanied by the husband during antenatal care (AOR, 2.34, 95%CI; 1.30-4.22), having no antenatal care visit (AOR, 4.60; 95%CI; 2.02-10.48), traveling on foot to get maternal services (AOR, 2.89; 95%CI, 1.19-7.01), and giving birth of above four (AOR, 4.12, 95%CI; 1.97-8.62) were also more likely to deliver at home. Mothers having good knowledge about danger signs and importance of skilled birth attendance, deliver at health facility twice (AOR, 1.77; 95%CI; 1.06-2.94) than women having poor knowledge.

Conclusion: Living in the rural area, traveling on foot, not in union with husband, being uneducated and poor, having no antenatal care visit, poor knowledge of danger signs of pregnancy, and giving birth of above four were the determinant factors to home delivery. Actions targeting maternal education; encouraging the number of ANC visits and making health facilities accessible are the recommended interventions to tackle home delivery.

Keywords: institutional delivery, home delivery, determinants

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Abbreviations: AHB, amhara health bureau; ANC, antenatal care; CD, compact disc; DC, data collector; DHS, demographic health survey; DVD, digital video device; EDHS, ethiopian demographic health survey; ETB, ethiopian birr; HEP, health extension program; HEW, health extension workers; EPHI, ethiopian public health institute; ID, institutional delivery; IRB, institutional review board; MMR, maternal mortality ratio; MoH, ministry of health; PI, principal investigator; SBA, skill birth attendant; SDG, sustainable development goal; SPHMMC, saint paul's hospital millennium medical college; WHO, world health organization

Introduction

Background

It's usually a joyful event when women give birth to a baby she wishes.[1] But birth is a critical time for the health of the mother and baby and place of delivery is a crucial factor that affects the health and wellbeing of the mother and newborn.[2] Skilled care throughout pregnancy from inception to postnatal care is life-saving for women and the child and institutional delivery is the one which is the most important place to get such services.[3] Even though birth is profoundly affected by the environment in which it takes place, childbirth takes place in different forms throughout the world depending on the cultural contexts of each community.[4] Mothers may go through the process of unattended childbirth and a few seek help from midwives and obstetricians, but two-thirds of birth in the world are assisted by traditional birth attendants who are not trained.[5] In Ethiopia, even though institutional delivery has been promoted and antenatal care coverage is good, still home birth is high, given the home environment as a place of delivery is shown to be unsafe and may have adverse neonatal and maternal outcomes.[6]

Reproductive health care is a highly focused issue in the development of a country and delivery service to pregnant women is the most important component of reproductive health care to handle high-risk deliveries.[7] Utilization of essential obstetric care services, including but not limited to antenatal care (ANC), skilled attendants

at birth, and postnatal care, contribute to the reduction of maternal and neonatal mortality and morbidity.[8] Antenatal care provides an opportunity to promote skilled attendance, prevent complications, and ensure that complications are detected and treated early.[9] The World Health Organization (WHO) has been recommending at least four antenatal care (ANC) visits during pregnancy, and postnatal care should be provided at 6 h, 6 days, 6 weeks, and 6 months after childbirth to ensure women's physical and mental wellbeing but these chances are very low for the women who gave birth at home.[10]

Statement of the problem

The health of mothers is mostly regarded as an indicator of the health of society. But maternal mortality is continued as one of the scariest health challenges globally and particularly in Sub-Saharan African countries including Ethiopia.[11] It causes considerable social and personal distress in families, and the whole society. Because women have a major responsibility in most family matters, including raising children.[12] Home delivery and unskilled birth attendance are some of the main causes of high maternal mortality in low-income countries. These deliveries are largely unplanned, accidental, and supported by unskilled health professionals.[13] According to an analysis of Demographic Health Survey data from 48 developing countries, in 23 countries more than half of the births are reported to take place at home.[14] Maternal mortality due to unsafe abortion, prolonged labor, and eclampsia also have been a major problem across the globe especially in developing countries. This is because most of those deliveries occur outside health care facilities and assisted with nonprofessionals.[15] It has been reported that a 10% increase in skilled birth attendance corresponds to a 5% reduction in maternal deaths.[15,16]

Despite the international emphasis on the need to address the unmet health needs of pregnant women and children, progress in reducing maternal mortality has been slow.[17] Every year, an estimated 300,000 maternal deaths occur worldwide and 12 million suffer from birth complications and particularly in sub-Saharan Africa where over 162,000 women still die each year during pregnancy and childbirth.[18] Over three-quarters of maternal deaths is due to causes directly related to pregnancy and childbirth and more than 60% of maternal deaths occur immediately following delivery, with more than half occurring within a day of delivery.[19] The sustainable development goals (SDGs) call for an accelerated reduction in maternal deaths so that the global MMR will fall to 70 or below by 2030, working towards a vision of ending all preventable maternal mortality.[20] But it is reported that globally, about 300,000 women die each year due to preventable causes, yielding a maternal mortality rate (MMR) of 210 maternal deaths per 100,000 live births and exposing regional disparities, Sub-Saharan Africa is the region with the worst maternal health outcomes.[21] Globally, about 80% of preventable maternal deaths are due to severe bleeding, infections, unsafe induced abortion, hypertensive disorders in pregnancy, and obstructed labor.[22]

High MMRs are not uniformly distributed across sub-Saharan Africa, and it is also unlikely that barriers are evenly distributed. For instance, for every 100,000 live births in 2013, Sierra Leone had an MMR of 1100, the Central African Republic had 880, South Sudan had 730, Nigeria had 560, and Ghana had 380.[23] The estimated maternal mortality ratio (MMR) for high-income regions was 12/100,000 live births and, for low-income regions was 239/100,000.[24] The levels of maternal mortality are "unacceptably high" in sub-Saharan Africa, sharing about 66% of all maternal deaths worldwide.[25] These maternal deaths are terrible, particularly when most of these maternal deaths can be prevented by utilizing the services of skilled health personnel as in a health facility.

Ethiopia is a major contributor to the worldwide death tax of mothers with a maternal mortality ratio of 412 per 100,000 live births and 19,000 maternal deaths annually.[26] Despite the Ethiopian government's efforts to expand health service facilities and promote institution-based delivery service in the country, maternal health services are poorly equipped, inaccessible, negligible, and not well documented. The pregnancy-related mortality ratio in Ethiopia was 412 maternal deaths per 100,000 live births according to the 2016 DHS survey. Nearly half of the mothers in Ethiopia who were booked for antenatal care gave home delivery.[27] The proportion of deliveries attended at a health facility is only 26% in 2016 in Ethiopia a far lower level than in other African countries, such as Cameroon (62%), Senegal (62%), Malawi (57%), and Lesotho (52%).[28] In the Amhara region, only 27% of mothers gave birth at health facilities.[29] Still sizable proportion of births continue to occur at home in unhygienic conditions without any skilled care and without the essential infrastructure needed to refer in the case of complications. Underutilization of maternal health care services by a sizeable proportion of women in Ethiopia results in an insignificant decline in maternal mortality ratio. This insignificant decline of maternal mortality ratio might be due to the non-use of institutional delivery services associated with knowledge, educational status, residence, and ANC attendance.[30]

Significance of the study

Improving maternal and child health requires increasing the percentage of women giving birth in health institutions with the assistance of trained staff, which is the central goal of the safe motherhood and child survival movements. Institutional delivery service (an important component in efforts to reduce health risks to mothers and their children) helps in increasing the proportion of babies that are delivered in health facilities and effective intervention for reducing the risk of maternal morbidity and mortality. However, in many developing countries the majority of births are delivered at home.[31-40]

Increasing the number of women giving birth in a health facility is the most effective and demonstrated intervention and important global strategy to reduce maternal and perinatal deaths. Even though the presence of skilled delivery service utilization at each birth can significantly reduce maternal morbidity and mortality, most of the mortality occurs because of the lack of access to skilled delivery attendance and emergency care at birth. Despite, the expansion of health infrastructure and the introduction of the health extension program (HEP), there are still many barriers preventing women from accessing skilled birth attendants (SBAs).[24] So there is a need to increase the number of institutional deliveries and increasing the rate of institutional delivery and service utilization needs to understand the reasons behind the poor use of health facilities for giving birth.

Institutional delivery services are underutilized in Amhara Region due to different constraints and obstacles. Few studies have been conducted on this area in Ethiopia and Amhara national regional state but didn't get any study in Gondar Zuria district. Understanding the determinants and constraints of institutional delivery service utilization is very crucial for proper use of the maternal health service, which is one of the most effective strategies for preventing maternal mortality. Conducting a study on the determinants of institutional delivery provides evidence for the improvement of maternal health care strategies. So this study with the objective of assessing the factors associated with low institutional delivery has had information and explored different factors that may impact institutional delivery and influence women's delivery service utilization provided at health facilities. And also the study has worth relevance for designing

intervention programs, design targeted strategies, and address the challenge to reduce maternal and perinatal deaths.

The hypothesis of the study

1. Women who have good knowledge of obstetric complications and danger signs of pregnancy are more likely to have birth at facilities than those who did not.
2. Women who are in extreme poverty and low educational status have more likely to have births at home than those who did not.

The objective of the study

General objective

To assess and identify determinants of home delivery among childbearing age women in Gondar Zuria district of central Gondar, Ethiopia from January to February 2020.

Specific objective

- To assess reproductive and obstetric related knowledge and perception factors associated with the choice of delivery points among childbearing age women.
- To identify programmatic factors associated with place of delivery among childbearing age women.
- To explore cultural practices and beliefs on the choice of place of delivery among childbearing age women.

Methods

Study area and period

Gondar Zuria district is one of the 105 districts in Amhara region of Ethiopia and part of the central Gondar Zone located at 37°24'24" E-37°45'43"E and 12o7'23" N-12°39'24" N and its total area is 1286.76 km2. Gondar Zuria is bordered on the south by the Debub Gondar Zone, on the southwest by Lake Tana, on the west by Dembiya, on the north by Lay Armachiho, on the northeast by Wegera, and the southeast by Mirab Belessa. The principal settlements are Maksegnit and Enfranz, with Maksegnit being the administrative center. Based on the projection of the 2007 national census conducted by the Central Statistical Agency of Ethiopia (CSA),[41-51] the district has an estimated total population of 264,920 of whom 130,796 are males and 134,124 are females. The district comprises of 35 kebeles. The district had potential health service coverage of 92% with five health centers and 34 health posts working to maintain the health status of people in the district.

A total of 42,753 households were counted in Gonder Zuria district and overwhelmingly rural, which constitutes 40,551 households with most settlements having no access to electricity and very limited access to a road network. The two largest ethnic groups reported in Gondar Zuria were the Amhara (91.23%), and the Qemant (8.26%). Amharic is spoken as a first language by 99.78%. Temperature ranges between 14-20°C and rainfall range between 1030-1223 mm. Notable landmarks in this woreda include Guzara Castle, a former Imperial residence said to have been built by Emperor Sarsa Dengel. (Figure 1 & 2)

Study design and period

A community-based Age-matched case-control with the complementary qualitative design was used to enroll women who gave birth in the one-year preceding data collection in Gondar Zuria district of Central Gondar from January to February 2020.

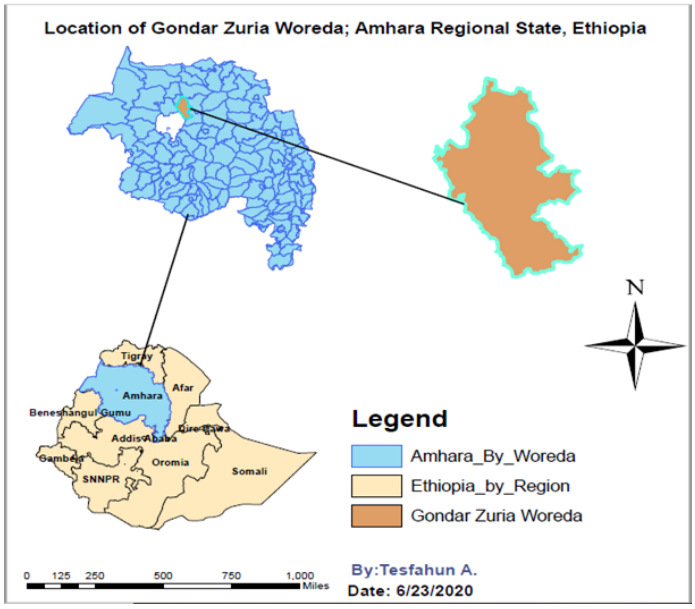

Figure 1 Map of Gondar Zuria District, January 2020.

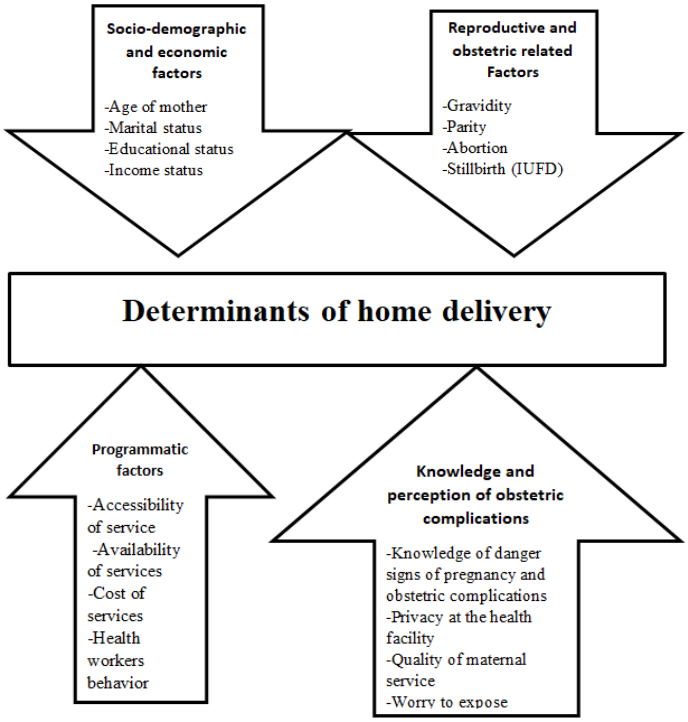

Figure 2 Conceptual framework diagram screening the association of different determinant factors to home delivery.

Source and study population

The source population for the study was all women in the reproductive age group in Gondar Zuria district of Central Gondar.

The study population was reproductive-age women who gave birth in the last one year and selected by simple random sampling technique in Gondar Zuria district of Central Gondar.

Case definition

Cases: women who gave birth at home in the last year before the study were considered as cases

Controls: women who gave birth at health institutions in the last year before the study were taken as controls.

Conclusion-Exclusion criteria

Inclusion criteria

Inclusion criteria for both cases and controls were women aged 15–49 years who gave birth in the last one year and fulfills the definition of cases and controls.

Exclusion criteria

Women who gave birth on the way to health facility were not included. Women with mental illness and severe illness were excluded from the study because it is considered that they could not give the necessary information.

Sample size calculation

The sample size was calculated using the statcalc application of Epi info version 7.2.0.1 software. The following assumptions were made in calculating sample size: General knowledge about obstetric complications were used as the exposure variable. The proportion of controls with good knowledge was 80% as well as 62.9% of cases.[5] 95% confidence level and 80% power with a case to control the ratio of 1:1 after adding 10% non-response rate yielding a total sample size of 264, including 132 for cases and 132 for controls.

Sampling procedure

Among the regions, Amhara national regional state was selected by the simple random sampling method and Gondar Zuria district selected among the poorly studied districts in determinants of home delivery and institutional delivery service utilization. Childbearing women who gave birth in the last 12 months in the District, regardless of their birth outcome, were included in the sample. Simple random sampling was used to select study participants using the master family index as the sampling frame which was taken from health extension workers (HEWs) in the district health office. The sample was allocated proportionally to the population across all kebeles based on the number of women who gave birth at home and health institutions in the one year preceding the study.

Data collection

Quantitative data were collected by a pretested structured questionnaire adapted from several studies. The questionnaire was initially prepared in English and translated to Amharic. It was then checked for consistency by back translation to English. Forty two health extension workers who were familiar with the study area and local language were trained for a day and assigned as a data collector.

The interviewer-administered interview was conducted with eligible respondents in a private and quiet room for audial privacy and to concentrate on the questions. Data were collected on mothers' age, marital status, place of residence, family income, educational status, occupation, educational status of the husband, occupation of the husband, the age difference between the mother and the husband, institutional delivery service utilization, distance from a health facility, family size, communication media possession and obstetrics variables such as age at first pregnancy, ANC visit, parity, gravidity, history of abortion and stillbirth, knowledge, and attitude of the mother towards the ANC and delivery services in health facilities. But for households where people not found were revisited on appointment once again.

For the qualitative part; in-depth interviews were conducted with key informants using a shortlist of guiding questions and taking short notes. A total of nine in-depth interviews were done with key informants (community leaders, women in childbearing age, midwife, traditional birth attendants, clan leaders, religious leaders). All questions were checked for completeness before leaving the interviewee and key informants. (Table 1)

Table 1 Proportional sample allocation of samples to each kebeles of Gondar Zuria District, Ethiopia, January 2020

S.no	Kebele	Sample	Percent	Kebele	Sample	Percent
1	Abawarka	6	2.3	Jayra	4	1.5
2	Abunesemra	13	4.9	JJ/Bahirigimb	6	2.3
3	Ambachera	6	2.3	layiyedugie	6	2.3
4	Ambober	7	2.7	Lemba	7	2.7
5	Aruagie	6	2.3	Macha	6	2.3
6	Birbuaks	6	2.3	Maksegnit	14	5.3
7	Birhala	6	2.3	Manterno	6	2.3
8	Chihra	6	2.3	Meredo	6	2.3
9	Chinchaye	6	2.3	Minichir	4	1.5
10	D/selam	6	2.3	Minziro	6	2.3
11	D/tikara	6	2.3	Mitirha	6	2.3
12	Dasmariam	6	2.3	S/gebriel	7	2.7
13	Dawadamot	6	2.3	Sendaba	7	2.7
14	Degola	6	2.3	Shehagomene	7	2.7
15	Degoma	6	2.3	Shewana	6	2.3
16	Denkez	6	2.3	Sihor sarwuha	7	2.7
17	Dinzaz	6	2.3	Tsiyon	6	2.3
18	Enfraz	7	2.7	Yimada	6	2.3
19	Firka	7	2.7	Zantra	4	1.5
20	Gubay	6	2.3	Zengaji	7	2.7
21	H/feji	6	2.3	Total	264	100.0

Data quality issues

The pretest was done two weeks before the study in Dembia district on 14 (5%) of the sample (7cases and 7 controls). Based on the pretest, a questionnaire was corrected to ensure clarity, logical sequence, wording, and skip patterns. All filled questionnaires were checked daily for completeness, accuracy, clarity, and consistency by the supervisor (principal investigator) and necessary corrections and changes were made. The training was given for data collectors. Completeness and consistency of variables during data entry and analysis were checked using frequency distributions, cross-tabulations, sorting in ascending, and descending order.

Data processing and analysis

Data entry and cleaning were done by using epi info version 7.2.0.1 software and analysis was done using SPSS version 23. Odds ratio (OR) with 95% CI was used to examine the associations between dependent and independent variables. Binary logistic regression analysis was used to describe the association between independent and dependent variables. To confirm the association, variables found to have a little association (P-value below 0.2) in the bivariate analysis were transferred to a final multivariate model. Multivariable logistic regression analysis was used to describe identified determinants of home delivery at 95% CI and P-value < 0.05. The final model was fitted using the Hosmer-Lemeshow Goodness of Fit test.

Operational definitions

Skilled assistance during delivery-Births delivered with the assistance of doctors, nurses/midwives, health officers, and health extension workers.

Institutional delivery service utilization- Means, when a mother gave birth at health institution (health center, hospital, or private clinic).

Home delivery- Means, when a mother gave birth at her home or when a birth takes place outside of health institution (others' home, neighbor, relatives, or family)

Close to a health care facility- Means "if a woman traveled <5 km to reach health care facility".

Far from health care facility- Means "If a woman traveled>5km to reach health care facility".

Woman's autonomy- Means "If a woman decides on the place to give birth by herself or with her husband jointly".

Danger signs of pregnancy- are bleeding, nausea and vomiting, reducing fetal movement, preterm labor, high grade head ache, blurred vision and edematous body, difficulty of breathing, and fainting.

Obstetric complications- are improper presentation, post-delivery sepsis, blood pressure, gestational diabetes mellitus, pre-term birth, still birth, uterine rupture, and ectopic pregnancy.

a. Variables

i. Dependent variable:

The outcome variables of this study were the place/site of delivery. It is classified into two broad dichotomous variables based on the location of the delivery settings: home and health institution.

ii. Independent variables:

Socio-economic and demographic factors, like age of mother, educational status, Residency and occupation of mother and father, household income, reproductive and obstetric related factors like parity, programmatic factors like presence of health facility in their kebele, road accessibility and knowledge of mother about obstetric complications and pregnancy danger signs are some of the predictor variables.

iii. Measurement of variables

Knowledge about danger signs during pregnancy was measured by comparing mean score responses to eight danger signs. Those with scores at or below the mean are classified as having "poor knowledge" while those with scores above the mean are categorized as having "good knowledge". General knowledge of obstetric complications was measured by calculating mean scores to seven obstetric complications, which were then categorized into" good" and "poor" levels of knowledge. Respondents with "good knowledge" included that scoring 50% and above; "poor knowledge" included those with scores less than 50%.

b. Ethical approval

Ethical approval was obtained from the Institutional Review Board (IRB) of SPHMMC after reviewing the protocol and the consent form within.

i. Consent form

The purpose of the project and confidentiality procedures were clearly explained to participants and had given a chance to ask questions. If participants change their minds, they have given free will to leave the study any time during the interview, and confidentiality was ensured. Whatever information participants provide was kept strictly confidential and will not be shown to other persons and there is less than minimal risk to participants for being participated in this study. Informed written consent was well-maintained and oral consent was obtained for those study subjects who can't write and read and data collectors read the consent for respondents and they mark if the respondents agree. Before informed consent is obtained, the respondents have had told that they have the right to be involved or not to be involved in the study.

ii. Conflict of interest

The principal investigator declared that there is no conflict of interest for this project.

c. Dissemination of findings

Once the final report gets approved by the academic mentor, findings of the study will be disseminated to EPHI/PHEM, Amhara regional health bureau/PHEM, central Gondar zone health department/PHEM, Gondar Zuria district health offices, and Saint Paul's Hospital Millennium Medical College, department of public health. Presentations on conferences, workshops, and publications in reputable journals will be also part of the dissemination plan.

Result

Sociodemographic and cultural factors

Of the total, 208 (78.8%) were rural and 56 (21.2%) were urban residents with a 100% participation rate. Seventy-one 71(26.9%) of the mothers were in the age range of 31–35 years and 50(18.9%) of mothers were in the age range of 26-30 years. The mean and median age of mothers at marriage was 16.95 and 17 years respectively, with a standard deviation of 3.8 years. Regarding their marital status, 189 (71.6%) were in union with their husband, and 75 (28.4%) of them were separated or not in union with their husband. Only 81 (31.2%)

of the mothers attended primary and secondary education while 179 (68.8%) of the mothers were unable to read and write. Among the respondents, 211 (79.9%) of mothers were housewives and the rest 20.1% were employed mothers, (tea and tella sellers, daily laborers), and students in occupational status. As to the husband's occupational status, 204 (77.3%) were farmers and the rest agro business.

Economically, 108 (41.4%) of the households had a monthly income of below 600 ETB, 78 (29.9%) had 601–1499 ETB and 75 (28.7%) had above 1500 ETB monthly income. Only ninety-two (34.8%) of the respondents had either radio or Television, and the other 172 (65.2%) possessed neither of both as a media of communication. One hundred twenty-three (46.6%) of mothers had a family size of below or equal to four, 106 (40.2%) of mothers had a family size of 5-8 and 35 (13.3%) had more than eight individuals within the household. Concerning the time they traveled on foot to reach the nearby health facility, 97 (36.7%) of them said less than one hour, 122 (46.2%) said between one to two hours and 45 (17.0%) said more than two hours.

In multiple variable analyses of significant independent variables in the bivariate; living in a rural area has nine times higher risk of giving birth at health facilities than urban dwellers (OR, 9.53; 95%CI, 3.50-25.90). Mothers who are not in union with their husband has eight times more likely to deliver their child at home than those in union with their husbands (OR, 8.35; 95%CI, 3.53-22.09) and mothers who were unable to read and write were four times more likely to give birth at home (OR, 4.50; 95%CI, 1.12-18.07). Having a monthly income of less than 600 ETB and being a male as a head of house have six times more likely to give birth at home (OR, 6.45; 95%CI, 2.26-18.37) and (OR, 6.13; 95%CI, 2.45-15.35).

Among the qualitative study findings; knowledge is the most important factor that directly affects the site of delivery for mothers. Mothers who know danger signs of pregnancy and obstetric complications secondary to pregnancy and skilled birth attendance tends to deliver in a health facility and use institutional delivery services irrespective of other factors like the distance of health facility from residency area, waiting time to get services and anxiety to expose their genitalia and may travel many miles to get the services they deserve.

A 48-year-old mother said *"our enemy is backwardness and illiteracy and the rest is nothing. No religion is against institutional delivery, no culture is against it, and no cultural teaching is contrary to use institutional delivery. Medical doctors get the art of medicine from GOD and we shall use it. Illiterate people who are here in Abunesemra, Sendaba, and Chinchaye near to Maksegnit town are not utilizing health care and delivery service than those coming from Lemba, Meredo, Dawadamot, Yimada, and Zengaji".*

The other a 42-year-old traditional birth attendant said*; "we give service when mothers come near delivery and birth is inevitable. But when they are not in labor, we advised them to go health facility to get the finest care and some complained what additional benefits they will get by traveling to health facility other than costed for transportation and delivery services. I advised them about vaccines given for them and their child and also additional services when complicated. Most mothers convinced when I teach them. The gap is only knowledge and backwardness. No other cultural and religious factors in our community. St. Mariam is here and there at the same time and everywhere; when we call her name and pray, she listens to all of us".*

A 30-year-old mother finally said *"some husbands don't want us to go to town for delivery. But this is also emanated from their backwardness and illiteracy. Because some educated husbands (indicating one agriculture graduate person in their kebele) allow and support their wife to give birth in front of doctors and midwives; isn't it? This is due to educational advancement".* (Table 2)

Table 2 Sociodemographic factors of respondents towards health facility delivery in Gondar Zuria District of Central Gondar, Ethiopia, 2020

Characteristics	Cases (%)	Controls (%)	COR	P-value	AOR
Residency site					
Rural	121(58.2%)	87(41.8%)	5.69 (2.79-11.63)	.019	9.53 (3.50-25.90)*
Urban	11 (19.6%)	45(80.4%)	1		
Marital relationship					
Not in union	54 (72.0%)	21 (28.0%)	3.66 (2.05-6.54)	.000	8.35 (3.53-22.09)*
In union	78 (41.3%)	111 (58.7%)	1		
Educational status of mother					
unable to read and write	100(54.9%)	82 (45.1%)	3.17 (1.09-9.26)		4.50 (1.12-18.07)*
Completed primary	23 (38.3%)	37 (61.7%)	1.96 (1.08-3.56)	.027	1.54 (.67-3.55)
Secondary and above	5 (27.8%)	13 (72.2%)	1	.035	1
Occupation of mother					
Housewife	111 (52.6%)	100 (47.4%)	1		1
Merchant	8 (30.8%)	18 (69.2%)	2.50 (1.04-5.99)	.040	.61 (.11-3.49)
Student	13 (48.1%)	14 (51.9%)	1.195 (.536-2.67)	.663	.28 (.04-2.17)
Occupation of father					
Farmer	108(52.9%)	96 (47.1%)	1		1
Merchant	14 (32.6%)	29 (67.4%)	2.33 (1.16-4.67)	.017	2.37 (.35-16.00)
Student	10 (58.8%)	7 (41.2%)	.788 (.79-2.15)	.64	1.75 (.22-13.75)
Household size					
0-4	57 (46.3%)	66 (53.7%)	1.54 (.72-3.29)	.261	
5-8	55 (51.9%)	51 (48.1%)	1.24 (.57-2.67)	.589	
8+	20 (57.1%)	15 (42.9%)	1		
Monthly income					
<600	87 (64.0%)	49 (36.0%)	5.11 (2.12-12.27)		6.45 (2.26-18.37)*
600-1499	35 (37.2%)	59 (62.8%)	2.99 (1.74-5.16)	.000	3.83 (1.98-7.42)*
>1500	8 (25.8%)	23 (74.2%)	1	.000	1

Table Continued...

Characteristics		Cases (%)	Controls (%)	COR	P-value	AOR
Religion						
	Orthodox	108 (50.7%)	105 (49.3%)	1.94 (.47-7.98)	.356	
	Muslim	18 (42.9%)	24 (57.1%)	2.67 (.59-12.13)	.204	
	Protestant	6 (66.7%)	3 (33.3%)	1		
Head of household						
	Male	109 (55.9%)	105 (44.1%)	2.48 (1.39-4.41)		6.13 (2.45-15.35)*
	Female	23 (33.8%)	45 (66.2%)	1	.002	1
Possess TV/Radio						
	Yes	43 (46.7%)	49 (53.3%)	1.22 (.74-2.03)	.439	
	No	89 (51.7%)	83 (48.3%)	1		

NB: * The variable which shows significant association to home delivery in both bivariate and multiple variable analysis.

Reproductive and obstetric related Factors

In the bivariate analysis mothers who had given birth of five to eight children have three times more likely to deliver their child at home than those mothers who had given birth below five (OR, 3.82; 95%CI, 1.84-7.26) and mothers who had given birth of above eight children have twice more likely to deliver their child in the home (OR, 2.29; 95%CI, 1.25-4.21). Mothers who had got a minimum of four ANC visit for their last child have seven times more likely to give birth in health facilities (OR, 7.40; 95%CI, 3.84-14.25) and those mothers who had their husbands accompanied them to at least one ANC visit have twice more likely to give birth in health facilities (OR, 2.30; 95%CI, 1.23-4.31).

In multiple variable analysis mothers who had given birth of five to eight children in their childbirth history have four times more likely to deliver their child at home than those who give birth of fewer than five children (OR, 4.12; 95%CI, 1.97-8.62) and mothers who had given birth of above eight children have 3 times more likely to deliver their child in the home (OR, 3.54; 95%CI, 1.40-8.96). Mothers who had gotten a minimum of four ANC visits for their last child have four times more likely to give birth in health facilities (OR, 4.60; 95%CI, 2.02-10.48) and those mothers who had their husbands accompanied them to at least one ANC visit have two times more likely to give birth in health facilities (OR, 2.34; 95%CI, 1.30-4.22).

Findings from the bivariate analysis but which had insignificant association when entered in the multiple variable analysis are; mothers who didn't ever had a history of abortion and obstetric complication in their period of pregnancy have a twice higher odds of delivering at home (OR, 2.08; 95%CI, 1.23-3.51), (OR, 2.28; 95%CI, 1.34-3.90) respectively. Mothers who haven't planned their pregnancy to their last child have a twice higher odds of delivering at home without receiving medical assistance (OR, 2.28; 95%CI, 1.34-3.90). (Table 3)

Table 3 Reproductive and obstetric related Factors towards health facility delivery and service utilization in Gondar Zuria District of Central Gondar, Ethiopia, January 2020

Variable		Cases (N=132)		Controls (N=132)		COR	P-value	AOR
		No	%	No	%			
For how many time did you give birth	0-4	57	43.2	93	70.5	1		1
	5-8	23	17.4	23	17.4	3.82 (.84-3.96)	.000	4.12 (1.97-8.62)*
	8+	52	39.4	16	12.1	2.29 (1.25-4.21)	.000	3.54 (1.40-8.96)*
Did you ever had abortion	Yes	33	12.5	54	20.5	1		1
	No	99	37.5	78	29.5	2.08 (1.23-3.51)	.008	1.72 (.71-4.17)
Did you ever had still birth	Yes	13	4.9	23	8.7	1		1
	No	119	45.1	109	41.3	1.93 (.93-4.00)	.076	1.82(.80-4.18)
Was your last pregnancy planned	Yes	51	19.3	79	29.9	1		1
	No	81	30.7	53	20.1	2.37 (1.45-3.88)	.001	1.29 (.70-2.37)
Did you have ever had obstetric complication	Yes	30	11.4	53	20.1	1		1
	No	102	38.6	79	29.9	2.28 (1.34-3.90)	.003	1.11 (.57-2.15)
Who is decision maker for place of birth	Autonomous	33	12.5	45	17			
	Non-autonomous	99	37.5	87	33.0	1.55 (.91-2.65)	.107	1.06 (.52-2.14)
Did your husband accompanied you to ANC visit	Yes	60	22.7	96	36.4	1		1
	No	72	27.3	36	13.6	3.20 (1.91-5.35)	.000	2.34 (1.30-4.22)*
How many times did you get ANC visit for your last child	No visit	66	25.0	26	9.8	7.40 (3.84-14.25)	.000	4.60 (2.02-10.48)*
	1-3	43	16.3	39	14.8	2.30 (1.23-4.31)	.09	1.60 (.77-3.28)
	Four and above	23	8.7	67	25.4	1		1

NB: * The variable which shows significant association to home delivery in both bivariate and multiple variable analysis.

Programmatic factors

Among the different programmatic factors, only means of transport to health facilities have a significant association for mothers who traveled to the health facility on foot with three odds of delivering at home (OR, 2.89; 95%CI, 1.19-7.01). Having a health facility in the kebele that mothers live, having road accessibility to a health facility, minutes/hours it takes to reach a health facility and waiting minutes/hours to get maternal service didn't affect. (Table 4)

Knowledge and perception of obstetric complications and pregnancy danger signs

Mothers who didn't know the danger signs of pregnancy and skilled birth attendance have twice higher odds of delivering at home

(OR, 1.77; 95%CI, 1.06-2.94) and mothers who think giving birth in health facilities is important have four times likelihood to deliver their child at a health facility (OR, 4.46; 95%CI 1.22-16.33). Knowing about obstetric complications, think maternal health services are costly and privacy at a health facility to expose their genitalia is not good, satisfaction by maternal services given at health facilities have no significant association either in bivariate or multiple variable analysis. (Table 5)

Table 4 Program-related Factors towards health facility service utilization in Gondar Zuria District of Central Gondar, January 2020

Variable		Cases(N=132)		Controls(N=132)		COR	P value	AOR
		No	%	No	%			
Do you have health facility in your kebele	Yes	127	48.1	130	49.2	1		
	No	5	1.9	2	0.8	2.56 (.49-13.43)	.27	2.14(.38-12.02)
Do you have road accessibility to health facility?	Yes	80	30.3	88	33.3	1		
	No	52	19.7	44	16.7	1.30 (.79- 2.15)	.31	
How did you transport to health facility?	Ambulance	34	12.9	64	24.2	1		
	Public transport	37	14.0	17	6.4	.55(.28-1.09)	.08	.77(.30-2.01)
	On foot	61	23.1	51	19.3	2.25(1.29-3.93)	.02	2.89 (1.19-7.01)*
How many minutes/hour it takes to reach a health facility	<60M	44	16.7	53	20.1	1		
	60-120M	69	26.1	53	20.1	.73(.43- 1.80)	.73	.74(.34-1.64)
	>120M	19	7.2	26	9.8	.56(.28- 1.12)	.10	.60(.30-1.23)
How many minute/hour did you wait to get maternal service	<15M	41	15.5	53	20.1			
	15-30M	62	23.5	55	20.8	1.56(.79-3.08)	.19	1.23(.58-2.61)
	>30M	29	11.0	24	9.1	1.07(.56-2.056)	.83	.94(.47-1.87)

NB: * The variable which shows significant association to home delivery in both bivariate and multiple variable analysis.

Table 5 Factors related to the knowledge and perception of mothers towards obstetric complications and pregnancy danger signs of pregnancy in Gondar Zuria District, January 2020

Variable		Cases(N=132)		Controls(N=132)		COR	P value	AOR
		No	%	No	%			
Do you know about obstetric complications?	Yes	30	11.4	27	10.2	1		
	No	102	38.6	105	39.8	1.14 (.64- 2.06)	.65	
Do you know the danger signs of pregnancy?	Yes	44	16.7	64	24.2	1		
	No	88	33.3	68	25.8	1.88 (1.15-3.10)	.013	1.77 (1.06-2.94)*
Do you think giving birth in health facilities is important	Yes	119	45.1	129	48.9	1		
	No	13	4.9	3	1.1	4.70 (1.31-16.89)	.018	4.46 (1.22-16.33)*
Do you think maternal health services are costly?	Yes	26	9.8	17	6.4	.60 (.31-1.17)	.136	
	No	106	40.2	115	43.6	1		
Do you think privacy at health facility is not good for mothers	Yes	18	6.8	29	11.0	1		
	No	114	43.2	103	39.0	1.78 (.94-3.40)	.08	1.90 (.97-3.70)
Did you satisfied by maternal services given at health facilities	Yes	119	45.1	119	45.1	1		
	No	13	4.9	13	4.9	1 (.45-2.25)	1	
Did you worry to expose your genitalia	Yes	113	42.8	111	42.0	1		
	No	19	7.2	21	8.0	.89 (.45-1.74)	.73	

NB: * The variable which shows significant association to home delivery in both bivariate and multiple variable analysis.

Discussion

In line with this study findings; the highest quintile in household wealth index and four or more ANC visits has also a positive association with institutional delivery as revealed by the cross-sectional study conducted in Mara and Kagera regions in Tanzania.[10,44] Area of residence, and education, have also shown an association with the site of birth delivery in line with the study conducted in western Ethiopia, unmatched case-control study.[1] Mothers who are in union with their husband are more likely to deliver their child at a health facility than those not in union with their husbands. A study conducted among rural female adolescents in Asgede-Tsimbla district Northern Ethiopia shown that site of residency, marital relationship (being in union or not), education, and wealth status has also proven effect on site of child delivery.[25]

A qualitative study conducted in Asmara, Eritrea, recognized health education, either through mass media or sessions in the health facility, and women's empowerment is facilitators of women's access and utilization of maternal health services which is harmonized with these study findings.[49] Another qualitative study conducted in Ethiopia concluded that multiple socio-cultural factors and perceptions were affecting utilization of institutional delivery in conflicting to these study findings that knowledge deficit is the only enemy of the community irrespective of other cultural and religious factors.[4] Another study conducted in Liben zone, Somali regional state, Ethiopia complemented by qualitative design also explained socio-cultural and religious factors that could affect the site of delivery.[40-42]

In agreement with these study findings; analysis of 2016 Ethiopian demographic and health survey data publicized male partner's

attendance and inclusion of male partners in focused antenatal care have a significant association with institutional delivery.[31] The other study conducted in Tigray in harmony with these study findings; has revealed that mothers who have a husband accompanying to a health facility during ANC/delivery have more likely to deliver in a health facility (OR, 2.34; 95%CI, 1.32–4.15) and a systematic review and meta-analysis in Ethiopia showed mothers who have the previous history of pregnancy-related complications and above three ANC visit have more likely to give birth at a health facility.[41] Another meta-analysis conducted in Ethiopia said problems encountered during pregnancy increased health institutional-based delivery service (OR =2.83).[47] Mothers who gave birth of four and above prefer home delivery as supported by the study conducted in Dabat Northwest Ethiopia.[27]

In contrary to this study, the long waiting time to get maternal services, poor quality services, and partner decisions has an association with home birth delivery as evidenced by many studies.[51]

In harmony with the study findings; A study conducted in a Predominantly Pastoralist Community of Northeast Ethiopia showed mothers who have traveled to the health facility on foot for getting maternal services have more likely to deliver at home.[35] Another cross-sectional survey conducted in rural communities of Eritrea also uncovered that mothers who travel on foot or used traditional means of transport have higher odds of delivering at home than those use ambulance or public transports.[49] Opposing to this study; having a health facility in the kebele that mothers live, having road accessibility to a health facility, and long-distance travel to health facilities did affect the choice of place of delivery as indicated in the study conducted in Zala Woreda, southern Ethiopia.[33] Absence of health facility within 30 min distance or living at a distance of 5 km from nearby health facility has also increased the risk of delivering home again is contrary to the findings from the study.[50]

As supported by the community- based cross-sectional study conducted in Debretabour town, North West Ethiopia: mothers who didn't know the danger signs of pregnancy have twice higher odds of delivering at home and mothers who know the importance of giving birth in health facilities have four times of likelihood to deliver their child at a health facility.[39,46] Knowing about obstetric complications has also shown significant association with institutional delivery according to the study conducted in rural Haramaya District, Eastern Ethiopia: a triangulated community-based cross-sectional study.[16] A study conducted in Rural and Pastoralist Areas of Ethiopia concluded mothers who think privacy at a health facility to expose their genitalia is not good, and who have unplanned pregnancy have a significant association with home delivery in contrary to these study findings.[4,9] An institution-based cross-sectional study conducted in Gondar teaching hospital: Northwest Ethiopia; revealed mothers who have a reduced satisfaction for maternal health services given at health facilities and have no media exposure with maternal health service-related messages, have also the tendency to give birth at health facility which is also in antagonistic to the study.[14]

Limitation of the study

The data were collected by HEWs who were familiar to the community, which could result in social desirability bias. However, interviewers were well trained to create a setting of trust with the interviewees aimed for facilitating sincere responses.

Conclusion

Among the sociodemographic factors; the site of residency, marital relationship (being in union with the husband or not in a union), education, wealth status, and head of household has a direct or indirect effect on the preference of the site of delivery for mothers. Parity, accompanied by a husband to ANC visit and the number of ANC visits also affects the site of delivery. Means of transportation to health facility (Ambulance, Public transport, or on foot) are significant factors from programmatic factors. Knowing the danger signs of pregnancy and think giving birth in health facilities is important are the other significant determinant factors found from knowledge perspective factors.

Giving less number of births, frequent ANC visits, being in an urban residence, and education to a level secondary or above was increased the likelihood of health facility delivery. Mothers who know danger signs of pregnancy and obstetric complications secondary to pregnancy has the affinity to deliver in a health facility and use institutional delivery services irrespective of other factors like the distance of health facility from residency area, waiting time to get services and anxiety to expose her genitalia and may travel many miles to get the services she deserves. As per the qualitative study findings, knowledge is the most important factor that directly affects the site of delivery for mothers. Means of transport to health facilities have also a significant impact on delivery site selection.

Recommendation

- Program implementers at health facility level should focus on actions targeting maternal education; conducting social and behavioral change communication: providing advice on birth preparedness, pregnancy danger signs and birth complications will be useful to tackle the rate of home birth.
- Woreda women and children office should work towards empowering the community in general and women in particular by increasing the level of participation in education so that might pay off in a high level of facility delivery.
- Maternal health services at all levels should be designed to encourage women to receive adequate antenatal care services. Encouraging and promotion of Antenatal care visits at least to four gives a big opportunity to give education on birth preparedness, danger signs of pregnancy, and obstetric complications and delivery at health facility.
- Health programs designers at all levels should target poor, less educated, rural, and have more children than four as such women are less likely to choose institutional delivery.
- Provisions of the community ambulance system by the health facility can also be helpful to address the transportation problem.
- Health care providers at all levels of health facility should consider the inclusion of male partner/ husband in focused antenatal care and encourage his involvement during ANC visit/delivery.
- Promoting couples education beyond primary education regarding the danger signs of pregnancy and benefits of institutional delivery through available communication networks such as health development army have significant importance on delivery of children in health facilities.
- Woreda administrator with government Ethiopia should ensure making health facilities accessible; how much distance they travel to get maternal health services didn't matter if the means of transport is availed. Availability of either ambulance or public transport is important to increases facility delivery.

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Conflict of interest

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