Factors Associated with Place of Birth Among Ethiopian Orthodox Christian Women in North Gondar, Ethiopia

Tess Harpur

A thesis
submitted in partial fulfillment of the
requirements for the degree of

Master of Public Health

University of Washington
2020

Committee:
Brandon Guthrie
Daniel Enquobahrie

Program Authorized to Offer Degree:
School of Public Health

University of Washington

Abstract

Factors Associated with Place of Birth Among Ethiopian Orthodox Christian Women in North Gondar, Ethiopia

Tess Harpur

Chair of the Supervisory Committee
Brandon Guthrie
Department of Global Health

Despite reductions in maternal mortality over the past decade in Ethiopia, at 412 deaths per 100,000 live births as of 2016, maternal deaths remain well above levels targeted by the Sustainable Development Goals.[1,2] There is strong evidence that antenatal care and giving birth at a facility substantially lower the risk of maternal mortality.[1] The purpose of this study was to identify factors associated with facility birth among Ethiopian Orthodox Christian women in the North Gondar region of Ethiopia. This was a cross sectional study of 287 women of reproductive age (15-49 years). A comprehensive survey was administered, which assessed sociodemographic factors, obstetric history, and religious activity. Descriptive and inferential analysis were performed and prevalence ratios (PR) and Wald test statistics were calculated along with 95% confidence intervals. Facility delivery was more common for first and most recent birth among women with higher levels of education (>8 years) (first birth: PR=8.16; 95%CI 3.82-17.4) (recent birth: PR=2.79; 95%CI 2.09, 3.74), younger women (16-24 years) (first birth: PR=8.16; 95%CI 3.82-17.4) (recent birth: PR=2.79; 95%CI 2.09-3.74), women living in urban towns (first birth: PR=2.93; 95%CI 1.33-6.46) (recent birth: PR=1.67; 95%CI 1.05, 2.65), women who received antenatal care (first birth: PR=8.36; 95%CI 2.11-33.05) (recent birth: PR=3.81; 95%CI 1.78-

8.14), gave birth for the first time after the age of 18 (first birth: PR=4.35; 95%CI 2.07-9.15) (recent birth: PR=1.74; 95%CI 1.15-2.63), and women who valued medical expertise (first birth: PR=9.6; 95%CI 2.42-38.00) (recent birth: PR=4.54; 95%CI 1.21-16.95). History of facility delivery was more common among women who received frequent advice and support from their spouse (PR=2.78; 95%CI 1.48-5.22) and health workers (PR=5.90; 95%CI 2.57-13.57). Facility delivery at most recent birth was less common among women who valued cultural traditions (PR=0.63; 95%CI 0.43-0.91) and delivered at home for their first birth (PR=0.37; 95%CI 0.28-0.49). History of ever delivering at a facility was less common among women who perceived home delivery as safe (PR=0.24; 95%CI 0.13-0.44) and comfortable (PR=0.29; 95%CI 0.18-0.48. These results reinforce existing research and provide valuable information specific to the Ethiopian Orthodox Christian population that could inform future interventions to increase facility delivery.

Background:
The World Health Organization (WHO) reported that in 2017 approximately 830 women die every day from preventable complications related to pregnancy and childbirth; 99% of those deaths occur in low and middle income countries, and half of those deaths occur in sub-Saharan Africa.[3] Several factors are associated with reduced maternal mortality in developing countries, including the uptake of antenatal care (recommended to consist of at least 4 visits with the first visit occurring during the first trimester), delivery in a health care facility, and delivery attended by a skilled birth attendant such as a doctor, nurse, or trained midwife.[1] These factors have been the subject of numerous studies and are the focus of programs to improve maternal health outcomes in countries across the world.[1,4-7] In Ethiopia, maternal mortality is high, with the Ethiopian Demographics and Health Survey (EDHS) estimating a maternal mortality ratio of 412 maternal deaths per 100,000 live births as of 2016.[1] While high, this shows a significant and promising decrease from the EDHS estimate of 676 deaths per 100,000 live births in 2011 and 871 deaths per 100,000 live births in 2000; but there is still much more work to be done if Ethiopia is to meet Sustainable Development Goal 3 of reducing maternal mortality to 70 deaths per 100,000 live births by 2030.[1,2]

Leading causes of maternal mortality in Ethiopia, as well as still births and neonatal mortality, include sepsis/infection, prolonged labor, and hypertensive disorders.[8,9] Reports on still births and neonatal deaths are difficult to compile due to low rates of birth registration and high rates of home birth, but the EDHS reports the perinatal mortality ratio at 33 deaths per 1,000 live births for the five years preceding 2016.[1] These conditions are treatable and the associated deaths are preventable, even in low resource settings. Increasing access to low cost interventions, education on safe birth practices and danger signs, and decision making power for women can improve maternal and newborn health outcomes.[10]

In order to achieve Sustainable Development Goal 3, Ethiopia is addressing three main factors that substantially contribute to maternal and neonatal deaths, the first of which is the low rate of facility delivery. While rates of facility birth have increased from 5% in 2000 to 26% in 2016, this level is considered too low to meet maternal mortality goals nationally. The second factor is the high rate of assistance from traditional birth attendants (42%) compared to trained health professionals such as doctor, nurse, midwife, etc.) (28%).[1] Traditional birth attendants are not trained in safe and sterile birthing practices and they operate inside women's homes, which perpetuates the practice of home delivery. The third factor is the low rate of women utilizing antenatal care services. Uptake of antenatal care has been steadily increasing from 34% in 2011 to 40% in 2014 for women who attend at least one antenatal care appointment, but only 32% of women in Ethiopia attend the WHO recommended 4 antenatal appointments and the median gestational age at first visit is 5 months while the WHO recommends the first visit occur during the first trimester.[4] The Amhara region in which this study was conducted tracks closely with the national averages in the above listed indicators.[1]

The Ethiopian health care system provides healthcare services including antenatal care, maternal and newborn immunizations, comprehensive obstetric and delivery care, and postnatal care free of charge to women across the country.[11] Given the presence of basic health care infrastructure, the priority is now on encouraging women to utilize these services available to them. Evidence shows that building on

existing social networks and engaging leaders in faith-based organizations can drastically improve the success of the health program.[12] This was demonstrated in Sierra Leone where a UNICEF backed project lead by both Muslim and Christian faith leaders increased immunization rates for children under one year of age by 69% in their intervention sites in just two years.[12] A similar example of Muslim and Christian leaders working together improved bed net usage in children under five years of age in one state in Nigeria by more than 50% compared to a 25% increase in demographically similar states receiving state run malaria interventions.[12] Considering the growing body of science on the effect of including and empowering influential faith leaders to assist in addressing public health challenges, it is a logical and potentially sustainable model for the Ethiopian context.

Ethiopia is well positioned to utilize faith leaders in conjunction with community health workers to address maternal health. The Amhara region of Ethiopia consists of 75%-85% Ethiopian Orthodox Christian (EOC) individuals as of 2013.[13] Church practices and beliefs are engrained into many facets of people's lives, including health and care seeking practices. The Health Development Army (HDA) is a nation-wide cohort of formally trained women (community health workers) who serve within their communities. They have knowledge about basic preventative health behaviors and work with the health care system to spread information on healthy practices. Faith leaders and HDA members have substantial social capital within the North Gondar region.

This study aimed to understand factors associated with place of birth of EOC women in the North Gondar region. These factors include sociodemographic characteristics as well as influences and perceptions surrounding birth. Specifically, opinions about birth location and the influence of different factors in women's lives, including faith leaders, were examined in relation to the choice of where to give birth. The goal of the analyses was to provide guidance to the most salient points of interventions for future maternal health programming in the region. Findings will inform strategies that use faith leaders in conjunction with health workers, including members of the HDA, to increase the uptake of antenatal care services provided in the community and to increase the proportion of women who give birth at a health facility in the North Gondar region of Ethiopia.

Methods:

Study Design: This study was part of a cross-sectional study conducted to inform the design of a community randomized project. The survey used for this thesis was administered between February 14 and March 23, 2018. The parent study, Faith Leaders Advocating for Maternal Empowerment (FLAME), collected these data to inform program development and implementation of a maternal health intervention aimed at increasing the uptake of antenatal services and facility deliveries within communities through the use of faith leader and community health worker pairs. The parent study trained priests from the Ethiopian Orthodox Christian church and members of the Health Development Army (HDA) from the same woredas (smallest administrative unit) to work together to increase awareness of antenatal services through counseling and education. Baseline data were used to characterize the intervention population and to gain understanding about common perceptions and attitudes related to ANC and childbirth in order to inform the training of priests and HDA members.

Study Setting: All aspects of the study were conducted in the North Gondar Zone of Ethiopia. The survey was administered at 11 churches in 6 catchment areas, which were selected from the 18 study sites included in the parent study. The parent study conducted pre-screening of all of the sites to ensure similar sociodemographic characteristics, and religion. The 18 sites were divided into three groups based on their distance from a health facility (close, medium, far). The survey was administered at one site from each of the three groups, chosen based on logistical ease of transportation to the site. Churches were considered sufficiently similar in terms of demographics within each of the three distance groupings. Completing the allotted number of surveys was not always possible with one visit to one church due to the limited number of data collectors. Therefore, a second and third church may have been visited within the site in order to minimize contamination and reach the target sample size. All surveys were conducted at churches immediately following Sunday or a holiday service. The interviewers conducted up to 50 surveys at each church location in as private a setting as was possible given the inherently public nature of a church space. The parent study received IRB approval from the University of Gondar to carry out the surveys and IRB approval from the University of Washington was not deemed necessary because the University of Washington researchers were not engaged in human subjects research activities. The parent study also received permission from the North Gondar Ethiopian Orthodox Diocese and the priests at the churches where the survey was administered. This thesis does not require IRB approval because all data are deidentified and there are no existing links between the data and identifiers.

Study Subjects: The survey was administered to 287 female participants of reproductive age (15-49 years). The priest leading the service announced the study, explained the time required, and then directed eligible women to the interviewers for screening. The study subjects were convenience sampled from among the eligible women and surveyed immediately one after the other until the interviewers had surveyed all eligible women. The number of women surveyed at each church ranged from 14-48, median=24, mean=26. Eligibility requirements for the interviewees were as follows: age between 15 and 49 years, living in the North Gondar zone for greater than or equal to six months, and, provide informed consent.

Data Collection: Structured surveys were created using Open Data Kit (ODK) for electronic data capture and administered by trained interviewers using digital tablets. The interviewers were fluent in Amharic and provided with Amharic translations of the survey. The survey itself had approximately 210 variables measuring factors related to general socio-demographics, income and wealth, obstetric history, personal attitudes and perceptions about birth, religious attendance, and travel capabilities to the health center and church. The interviewers were trained to give the survey and also trained in confidentiality.

Data Analysis: The descriptive analysis summarized the general study population characteristics for both sociodemographic factors and obstetric history related factors using counts and percentages for categorical variables. Inferential analysis was performed to measure the association between the outcome (dependent) variable facility birth (first birth, most recent birth, history of ever facility birth, discordant birth from home to facility) and independent variables for which data were collected during the survey. Most categorical variables were dichotomized while some continuous variables (age,

number of live births, etc.) were categorized. Prevalence ratios (and corresponding 95% confidence intervals [95%CI]) were calculated and Wald tests were used to test whether prevalence ratios were significantly different from a null value of 1. All data will be analyzed using RStudio version 1.1.463.

Results:

The survey included 287 respondents in total, of whom 98 (34.1%) had ever delivered in a facility, 88 (30.7%) had delivered at home and never in a facility, 94 (32.7%) had never delivered a baby, and 7 (2.4%) had insufficient data and were excluded from the analysis. The women who have never given birth tended to be younger, had higher education, were more likely to be students, and were less likely to be married compared to women who had delivered at least once (Table 1). Women who had never given birth were not included in further analysis. Women in this survey who had given birth at a facility tended to have a higher level of education than women who have not given birth at a facility (34.7% vs. 6.8% with >8 years of education) and more women who have given birth at a facility were married compared to women who only delivered at home (84.7% vs. 62.5%). More of the women who have given birth at a facility had received antenatal care (94.9%) compared to those who have only given birth at home (52.3%). A larger proportion of women who had delivered in a facility reported being a government employee compared to women who only delivered at home (20% vs 0%). Religious factors including frequency of attending church, frequency of speaking to a priest about health, and comfortability speaking with a priest about health and pregnancy were similar between the groups.

<u>Perception of home and facility delivery and sources of influence regarding choices related to pregnancy and place of delivery.</u>

Among the 189 women with at least 1 delivery 98 (51.9%) reported ever having delivered in a facility. Ever having delivered in a facility was less common among women who perceived home deliveries to be safe (PR=0.24; 95%CI 0.13-0.44) and comfortable (PR=0.29; 95%CI 0.18-0.48) (Table 3). Facility deliveries were more common among women who reported getting frequent support and information about pregnancy and delivery from their spouse (PR=2.78; 95%CI 1.48-5.22) and from health care workers (PR=5.90; 95%CI 2.57-13.57) (Table 2).

<u>Factors associated with facility birth for first and most recent birth</u>

Out of 193 women who reported giving birth at least once, 182 reported information about the location of their first birth, and of these 50 (27.5%) reported a first birth in a facility. Of the 145 women with ≥2 previous deliveries, 64 (44.1%) reported that the most recent delivery was in a facility (Table 3).

A facility delivery for the first birth was 8.2-fold more prevalent among women age 16-24 years (PR=8.16; 95%CI 3.82-17.4) and 4.4-fold more prevalent among women age 25-34 years (PR=4.36; 95%CI 2.00-9.50) compared to women 35-49 years. A first birth in a facility was also more common among women living in urban areas (PR=2.93; 95%CI 1.33-6.46), those employed by the government (PR=4.13; 95%CI 2.59-6.59), and among women with >8 years of education (PR=5.6; 95%CI 3.65-8.58). A first birth in a facility was also more common among women with a first birth at age >18 years (PR=4.35; 95%CI 2.07-9.15) and those who had utilized antenatal care services (PR=8.36; 95%CI 2.11-33.05). Based on a series of questions regarding factors that were important in deciding where to give birth, first birth in a

facility was more common among women who said that medical expertise (PR=9.6; 95%CI 2.42-38.00) and concerns about obstetric complications (PR=2.12; 95%CI 1.07-4.19) were important in their decision.

Many factors associated with facility delivery at first birth were also associated with facility delivery at most recent birth including being age 16-24 (PR=2.79; 95%CI 2.09-3.74), living in an urban area (PR=1.67; 95%CI 1.05, 2.65), being employed by the government (PR=1.96; 95%CI 1.43-2.70), higher levels of education (PR=2.79; 95%CI 2.09, 3.74), receiving antenatal care (PR=3.81; 95%CI 1.78-8.14), giving birth for the first time after the age of 18 (PR=1.74; 95%CI 1.15-2.63), and valuing medical expertise (PR=4.54; 95%CI 1.21-16.95). Some differences in associations were that facility delivery for most recent birth was not more prevalent among women age 25-34 (PR=1.31; 95%CI 0.86-1.99) years compared to women 35-49 years. Additionally, a most recent birth in a facility was more common among women who were currently married (PR=1.94; 95%CI 1.07-3.52) and less common among women with a history of 4-7 live births (PR=0.51; 95%CI 0.34-0.75). Based on a series of questions regarding factors that were important in deciding where to give birth, recent birth in a facility was less common among women who said that cultural tradition (PR=0.63; 95%CI 0.43-0.91) was important in their decision. Facility birth was also less common among women who delivered the first time at home (PR=0.37; 95%CI 0.28-0.49). Overall, many of the same factors were associated with first and most recent facility delivery, but the strength of association was weaker for more recent births.

Factors associated with of discordance in location of birth between first and most recent birth

We investigated factors associated with discordant locations of delivery between first and most recent delivery. Among 122 women who delivered at home for their first birth and had at least 1 subsequent birth for which location of birth was available, 39 (32%) reported delivering in a facility for the most recent birth (Table 4). Among those with a first birth at home, women age 16-24 were 3.4-fold more likely to subsequently deliver in a facility (RR=3.35; 95%CI 2.35-4.76) compared to women age 35-49 (Table 4). Women who delivered their first child at home and were government employees (PR=2.69; 95%CI 1.93-3.77) or married (PR=2.03; 95%CI 0.93-4.42) were more likely to subsequently deliver at a facility for their most recent birth. Of women who gave birth at home first, those who attend church 5-10 times per month were 2.2-fold more likely to subsequently give birth at a facility for their most recent birth compared to women who go to church only 1-4 times per month. Those who received antenatal care were also more likely to switch from home birth as first birthplace to facility birth for most recent birthplace (PR=3.44; 95%CI 1.46-8.14). Additionally, married women were more likely to have a first birth at home and recent birth at a facility (PR=2.03; 95%CI 0.93-4.42; p-value<0.05).

Only 2 (4%) of the women who reported a first birth in a facility reported that their most recent birth occurred at home. For this reason, it was not feasible to analyze discordant births from facility to home.

Discussion:

The results of this research support much of the existing body of literature on the subject of delivery place in Ethiopia.[11,14,15] We found that facility deliveries were more common among women who reported receiving antenatal care, having a higher level of education, living in urban towns, and delaying

first birth until after 18 years of age. We found that these associations were stronger for facility deliveries at the first birth than at the most recent birth, which may be driven by the overall increase in the proportion of women who deliver at a facility during their most recent births compared to first births. These changes could also be due to increases in the availability and accessibility of resources for rural women in recent years or increases in government programming that educates women about antenatal care and facility delivery. Changes in preference or social acceptance over time may also influence the likelihood of women to give birth at a facility.

We found evidence that sources of advice regarding pregnancy may influence where a woman delivers. We observed that women who reported getting frequent advice from a spouse were more likely to deliver in a facility. The influence of a spouse in this context may be especially useful when designing programs aimed at increasing facility delivery rates. The role of a male partner in the choice of where to deliver was further supported by the nearly 2-fold higher likelihood of a facility delivery among those who were married. This may indicate that the very act of having a spouse who can provide financial or emotional support in decision making around pregnancy motivates the associations we see. Programs could encourage conversation and dialogue about pregnancy between women and their male pregnancy partners as a pair.

Factors associated with subsequently delivering in a facility after a first birth at home were similar to those associated with any history of facility delivery, including younger age, being married, and receiving antenatal care. It's notable that women with greater education or higher status jobs such as government employee were not more likely to be discordant which may reflect the lower proportion of those women whose first birth was at home.

The only religious factor that was significantly associated with facility delivery was attendance of church between 5 and 10 times per month. These women were more likely to deliver in a facility after a first birth at home. While other religious factors were not significantly associated with facility birth overall, the rate of women who are comfortable speaking with a priest about pregnancy and delivery (88.5%) is encouraging for future programming that utilizes these faith leaders for health messaging.

Limitations:

Systematic limitations exist within this project. The first is that the sampling frame was limited to women who were currently attending a church service. This prevents our data from being representative of the larger community. The second limitation is the reliance on self-reporting and recall of the individual to perceptions and attitudes from potentially many years previous. Self-reporting could introduce bias due to the public nature of the venue (outside of the community church) and the perceived professional stature of the interviewers. These factors could have influenced the participants to respond in a way they perceived desirable by the interviewer and the faith community. Despite these limitations, this analysis is valuable because it grants insight into factors associated with the place of birth for Ethiopian EOC women in a context with high maternal and newborn mortality and low rates of

ANC and facility birth. This analysis could help inform future public health interventions around ANC and facility delivery uptake by adding to the existing body of research on the subjects.

Conclusions:

Several sociodemographic factors and self-reported perceptions are associated with facility delivery in North Gondar, Ethiopia. Some of these data show potential points of leverage for intervention including the importance of a spouse in decision making, level of education, and antenatal care utilization. Other data point to populations that may benefit from additional interventions including older women (>24 years), women who gave birth for the first time at home, and unmarried women. Overall, this study provides better understanding of factors associated with facility birth for Ethiopian Orthodox Christian women.

Table 1. Sociodemographic characteristics and prevalence of facility birth among 287 Ethiopian Orthodox Christian (EOC) women in North Gondar Zone, Ethiopia

Characteristics	Overall Sample N=280	Ever Facility Birth N=98	Never Facility Birth N=88	Never Given Birth N=94
	n (%)	n (%)	n (%)	n (%)
All women	280	98 (34.1)	88 (30.7)	94 (32.7)
Age group (years)				
16-24	102 (36.4)	21 (22.3)	5 (5.9)	76 (82.6)
25-34	81 (28.9)	41 (43.6)	27 (31.8)	13 (14.1)
35-49	88 (31.4)	32 (34.1)	53 (62.3)	3 (3.3)
Urban kebele	209 (74.6)	79 (80.6)	54 (61.4)	76 (80.9)
Occupation				
Housewife	92 (32.9)	40 (42.1)	41 (47.7)	11 (12.8)
Farmer	44 (15.7)	15 (15.8)	27 (31.4)	2 (2.3)
Government Employee	40 (14.3)	19 (20)	0 (0)	21 (24.4)
Merchant/Shopkeeper	31 (11.1)	14 (14.7)	9 (10.5)	8 (9.3)
Day laborer	17 (6)	7 (7.3)	7 (8.1)	3 (3.5)
Student	43 (15.4)	0 (0)	2 (2.3)	41 (47.7)
Education	112 (40)	34 (34.7)	6 (6.8)	72 (76.6)
Currently married	160 (57.1)	83 (84.7)	55 (62.5)	22 (23.4)
Spouse Education >8 years	45 (16.1)	28 (33.7)	5 (9.1)	12 (54.5)
Church Frequency (per month)				
1-4 visits	91 (32.5)	26 (30.6)	29 (38.6)	36 (42.4)
5-10 visits	77 (27.5)	30 (35.3)	23 (30.7)	24 (28.2)
>10 visits	77 (27.5)	29 (34.1)	23 (30.7)	25 (29.4)
Speaks with priest about health	166 (59.3)	54 (55.1)	51 (58.6)	61 (70.9)
Comfortable speaking with priest about health	251 (89.6)	93 (95.9)	79 (90.8)	79 (89.8)
Comfortable speaking with priest about pregnancy and delivery	248 (88.5)	91 (94.8)	76 (87.4)	81 (93.1)
Age at first birth >18 years	88 (31.4)	59 (68.6)	29 (39.2)	NA
Live births				
1-3	90 (32.1)	64 (65.3)	26 (33.7)	NA
4-7	66 (23.6)	26 (26.5)	40 (52)	NA
>7	19 (6.8)	8 (8.2)	11 (14.3)	NA
Lost pregnancy	36 (12.9)	22 (22.4)	14 (15.9)	1 (1)
Antenatal care ever received	139 (49.6)	93 (94.9)	46 (52.3)	NA

Table 2. Associations between perceptions of home and facility delivery and history of ever delivering at a facility.

Perception	Prevalence of reporting ever delivering in a facility	
	n of N (%)	PR (95% CI)
All women	98 of 189 (51.9)	
Perceived safety of home delivery[1]		
Unsafe	89 of 132 (67.4)	1 (ref)
Safe	9 of 56 (16)	**0.24 (0.13, 0.44)**
Perceived safety of facility delivery[1]		
Unsafe	3 of 4 (75)	1 (ref)
Safe	95 of 184 (51)	0.69 (0.38, 1.23)
Perceived comfort home delivery[1]		
Uncomfortable	85 of 123 (69.1)	1 (ref)
Comfortable	13 of 65 (20)	**0.29 (0.18, 0.48)**
Perceived comfort facility delivery[1]		
Uncomfortable	1 of 4 (25)	1 (ref)
Comfortable	97 of 184 (52.7)	2.11 (0.38, 11.58)
Satisfaction with level of privacy of home delivery[2]		
Dissatisfied	20 of 51 (39.2)	1 (ref)
Satisfied	26 of 83 (31.3)	0.80 (0.50, 1.27)
Perceived respect and compassion from home birth attendant[2]		
Disrespectful/uncompassionate	10 of 22 (45.5)	1 (ref)
Respectful/Compassionate	36 of 108 (33.3)	0.73 (0.43, 1.25)
Satisfaction with explanations of home birth attendant[2]		
Unsatisfied	17 of 38 (44.7)	1 (ref)
Satisfied	30 of 97 (30.9)	0.69 (0.44, 1.10)
Satisfaction with attitudes of home birth attendant[2]		
Unsatisfied	15 of 29 (51.7)	1 (ref)
Satisfied	32 of 103 (31)	1.33 (0.92, 1.94)
Would recommend home birth[2]		
No	47 of 126 (37.3)	1 (ref)
Yes	1 of 9 (11.1)	0.30 (0.05, 1.92)
Would recommend facility birth		
No	3 of 98 (3.1)	NA
Yes	95 of 98 (96.9)	NA
Frequency of Support[3]		
Spouse[4]		
Infrequent	5 of 22 (22.7)	1 (ref)
Frequent	75 of 116 (64.7)	**2.84 (1.30, 6.22)**
Parents		
Infrequent	21 of 44 (47.4)	1 (ref)
Frequent	68 of 135 (50.4)	1.06 (0.74, 1.50)
Mother in Law		
Infrequent	35 of 69 (50.7)	1 (ref)
Frequent	47 of 90 (52.2)	1.03 (0.76, 1.40)
Health Worker		
Infrequent	5 of 43 (11.6)	1 (ref)

Frequent	92 of 134 (68.7)	**5.90 (2.57, 13.57)**
Priest (Soul Father)		
Infrequent	42 of 88 (47.7)	1 (ref)
Frequent	48 of 84 (57.1)	1.20 (0.90, 1.59)
Importance of support from[5]		
Spouse[4]		
Unimportant	7 of 13 (53.8)	1 (ref)
Important	74 of 126 (58.7)	1.09 (0.65, 1.84)
Parents		
Unimportant	7 of 18 (38.9)	1 (ref)
Important	84 of 164 (51.2)	1.32 (0.72, 2.40)
Mother in Law		
Unimportant	20 of 36 (55.5)	1 (ref)
Important	66 of 134 (49.3)	0.89 (0.63, 1.24)
Health Worker		
Unimportant	1 of 10 (10)	1 (ref)
Important	97 of 169 (57.4)	5.74 (0.89, 37.01)
Priest (Soul Father)		
Unimportant	21 of 45 (46.7)	1 (ref)
Important	71 of 131 (54.2)	1.16 (0.82, 1.65)

[1] Responses from all women with at least one birth included

[2] Only those with history of facility and home birth responses recorded

[3] Base in the questions "how often did the following people give you information, offer advice, or assist you with your pregnancy/ies and delivery/ies?"

[4] Responses from married women only included

[5] Base in the question "how important were the following people in making decisions about your pregnancy/ies and delivery/ies?"

Table 3. Factors associated with facility birth for first and most recent birth.

Characteristics	First Birth Facility Prevalence		Recent Birth Facility Prevalence	
	n of N (%)	PR (95% CI)	n of N (%)	PR (95% CI)
All women	50 of 182 (27.5)		64 of 145 (44.1)	
Age group (years)				
16-24	17 of 25 (68)	**8.16 (3.82, 17.4)**	8 of 8 (100)	**2.79 (2.09, 3.74)**
25-34	24 of 66 (36.4)	**4.36 (2.00, 9.50)**	23 of 49 (46.9)	1.31 (0.86, 1.99)
35-49	7 of 84 (8.3)	1 (ref)	29 of 81 (35.8)	1 (ref)
Kebele				
Rural	6 of 52 (11.5)	1 (ref)	15 of 49 (30.6)	1 (ref)
Urban	44 of 130 (33.8)	**2.93 (1.33, 6.46)**	49 of 96 (51)	**1.67 (1.05, 2.65)**
Occupation				
Housewife	17 of 81 (21)	1 (ref)	31 of 67 (46.3)	1 (ref)
Farmer	6 of 43 (14)	0.66 (0.28, 1.56)	12 of 30 (40)	0.65 (0.38, 1.11)
Government Employee	13 of 15 (86.7)	**4.13 (2.59, 6.59)**	10 of 11 (90.9)	**1.96 (1.43, 2.70)**
Merchant/Shopkeeper	8 of 22 (36.4)	1.73 (0.86, 3.47)	4 of 12 (33.3)	0.72 (0.31, 1.67)
Day laborer	4 of 14 (28.6)	1.36 (0.54, 3.45)	5 of 11 (45.5)	0.98 (0.49, 1.97)
Student	0 of 2 (0)	NA	0 of 0 (0)	NA
Education				
0-8 years	21 of 146 (14.4)	1 (ref)	52 of 130 (40)	1 (ref)
>8 years	29 of 36 (80.5)	**5.60 (3.65, 8.58)**	12 of 15 (80)	**2.00 (1.44, 2.78)**
Marital Status				
Unmarried	8 (16)	1 (ref)	9 of 35 (25.7)	1 (ref)
Currently married	42 of 135 (31.1)	1.83 (0.93, 3.61)	55 of 110 (50)	**1.94 (1.07, 3.52)**
Spouse Education				
0-8 years	8 of 47 (17)	1 (ref)	40 of 92 (43.5)	1 (ref)
>8 years	20 (47.6)	3.32 (2.13, 5.19)	15 of 18 (83.3)	1.92 (1.40, 2.62)
Church Frequency (per month)				
1-4 visits	15 of 54 (27.8)	1 (ref)	16 of 48 (33.3)	1 (ref)
5-10 visits	10 of 53 (18.9)	0.68 (0.34, 1.37)	25 of 47 (53.2)	1.60 (0.99, 2.58)
>10 visits	17 of 50 (34)	1.22 (0.69, 2.18)	17 of 36 (47.2)	1.42 (0.84, 2.40)
Speaks with priest about health				
No	22 of 77 (28.6)	1 (ref)	27 of 62 (43.5)	1 (ref)
Yes	28 of 104 (26.9)	0.94 (0.59, 1.51)	37 of 82 (45.1)	1.04 (0.72, 1.50)
Comfortable speaking with priest about health				
No	3 of 12 (25)	1 (ref)	4 of 9 (44.4)	1 (ref)
Yes	46 of 168 (27.4)	1.10 (0.40, 3.01)	60 of 135 (44.4)	1.00 (0.47, 2.13)
Comfortable speaking with priest about pregnancy and delivery				
No	3 of 16 (18.7)	1 (ref)	5 of 12 (41.7)	1 (ref)
Yes	46 of 162 (28.4)	1.51 (0.53, 4.32)	58 of 131 (44.3)	1.06 (0.53, 2.13)
First birth at home				
No	NA	NA	21 of 23 (91.3)	1 (ref)
Yes	NA	NA	39 of 115 (33.9)	**0.37 (0.28, 0.49)**
Age at first birth				
<18 years	7 of 70 (10)	1 (ref)	21 of 63 (33.3)	1 (ref)
>18 years	37 of 85 (43.5)	**4.35 (2.07, 9.15)**	33 of 57 (57.9)	**1.74 (1.15, 2.63)**

Live births				
1-3	NA	NA	34 of 54 (63)	1 (ref)
4-7	NA	NA	23 of 72 (31.9)	**0.51 (0.34, 0.75)**
>7	NA	NA	7 of 18 (38.9)	0.62 (0.33, 1.14)
Lost births				
No	44 of 152 (28.9)	1 (ref)	52 of 120 (43.3)	1 (ref)
Yes	6 of 30 (20)	0.69 (0.32, 1.47)	12 of 25 (48)	1.11 (0.70, 1.75)
Antenatal care ever received				
No	2 of 47 (4.3)	1 (ref)	6 of 41 (14.6)	1 (ref)
Yes	48 of 135 (35.5)	**8.36 (2.11, 33.05)**	58 of 104 (55.8)	**3.81 (1.78, 8.14)**
Medical Expertise important[1]				
No	2 of 50 (4)	1 (ref)	2 of 18 (11.1)	1 (ref)
Yes	48 of 125 (38.4)	**9.60 (2.42, 38.00)**	62 of 123 (50.4)	**4.54 (1.21, 16.95)**
Cost/money important [1]				
No	9 of 43 (20.9)	1 (ref)	11 of 27 (40.7)	1 (ref)
Yes	41 of 138 (29.7)	1.42 (0.75, 2.68)	53 of 118 (44.9)	1.10 (0.67, 1.81)
Distance/transportation [1] important				
No	12 of 47 (25.5)	1 (ref)	12 of 35 (34.3)	1 (ref)
Yes	38 of 133 (28.6)	1.12 (0.64, 1.95)	52 of 110 (47.3)	1.38 (0.84, 2.27)
Safety important [1]				
No	6 of 36 (16.7)	1 (ref)	9 of 25 (36)	1 (ref)
Yes	44 of 145 (30.3)	1.82 (0.84, 3.94)	55 of 119 (46.2)	1.28 (0.74, 2.24)
Fear of misplacement/theft of baby important [1]				
No	29 of 109 (26.6)	1 (ref)	38 of 85 (44.7)	1 (ref)
Yes	21 of 72 (29.2)	1.10 (0.68, 1.76)	26 of 60 (43.3)	0.97 (0.67, 1.41)
Family influence important [1]				
No	17 of 54 (31.5)	1 (ref)	27 of 54 (50)	1 (ref)
Yes	32 of 126 (25.4)	0.81 (0.49, 1.32)	37 of 91 (40.7)	0.81 (0.56, 1.17)
Cultural Tradition important [1]				
No	20 of 43 (46.5)	1 (ref)	37 of 67 (55.2)	1 (ref)
Yes	30 of 118 (25.4)	0.80 (0.50, 1.29)	27 of 78 (34.6)	**0.63 (0.43, 0.91)**
Religious Reason important [1]				
No	26 of 84 (30.9)	1 (ref)	36 of 75 (48)	1 (ref)
Yes	24 of 97 (24.7)	0.80 (0.50, 1.28)	28 of 70 (40)	0.83 (0.57, 1.21)
Obstetric Complications important [1]				
No	8 of 52 (15.4)	1 (ref)	12 of 35 (34.3)	1 (ref)
Yes	42 of 129 (32.6)	**2.12 (1.07, 4.19)**	52 of 110 (47.3)	1.38 (0.84, 2.27)
Fear of C-section important [1]				
No	22 of 95 (23.2)	1 (ref)	38 of 78 (48.7)	1 (ref)
Yes	28 of 85 (32.9)	1.42 (0.88, 2.29)	26 of 46 (56.5)	0.81 (0.56, 1.18)
Privacy important[1]				
No	24 of 98 (24.5)	1 (ref)	32 of 77 (41.6)	1 (ref)
Yes	26 of 82 (31.7)	1.29 (0.81, 2.07)	32 of 68 (47.1)	1.13 (0.79, 1.63)

[1] Base in the question "For this pregnancy, please rate the following factors on how important they are to you in deciding where to give birth"

Table 4. Factors associated with birthplace discordance in place of birth between first and most recent birth.

Characteristics	Switched from home delivery to facility delivery (first to most recent)	
	n of N (%)	RR (CI)
All women[1]	39 of 122	
Age group (years)		
16-24	2 of 2 (100)	**3.35 (2.35, 4.76)**
25-34	13 of 39 (33.3)	1.1 (0.63, 1.97)
35-49	22 of 76 (28.9)	1 (ref)
Kebele		
Rural	11 of 44 (25)	1 (ref)
Urban	28 of 78 (35.9)	1.35 (0.75, 2.43)
Occupation		
Housewife	22 of 61 (36.1)	1 (ref)
Farmer	9 of 36 (25)	0.67 (0.35, 1.3)
Government Employee	2 of 2 (100)	**2.69 (1.93, 3.77)**
Merchant/Shopkeeper	2 of 11 (18.2)	0.49 (0.13, 1.79)
Day laborer	3 of 9 (33.3)	0.9 (0.34, 2.4)
Student	0 of 2 (0)	NA
Education		
0-8 years	38 of 118 (32.2)	1 (ref)
>8 years	1 of 4 (25)	0.76 (0.14, 4.25)
Marital Status		
Unmarried	6 of 36 (16.7)	1 (ref)
Currently married	33 of 86 (38.4)	**2.03 (0.93, 4.42)***
Spouse Education		
0-8 years	29 of 80 (36.3)	1 (ref)
>8 years	4 of 6 (66.7)	1.8 (0.95, 3.4)
Church Frequency (per month)		
1-4 visits	7 of 38 (18.4)	1 (ref)
5-10 visits	19 of 42 (45.2)	**2.2 (1.04, 4.66)**
>10 visits	10 of 29 (34.5)	1.68 (0.73, 3.88)
Speaks with priest about health		
No	15 of 53 (28.3)	1 (ref)
Yes	24 of 68 (35.3)	1.19 (0.7, 2.04)
Comfortable speaking with priest about health		
No	2 of 7 (28.6)	1 (ref)
Yes	37 of 114 (32.5)	0.87 (0.26, 2.88)
Comfortable speaking with priest about pregnancy and delivery		
No	4 of 12 (33.3)	1 (ref)
Yes	34 of 108 (31.5)	0.82 (0.35, 1.91)
Age at first birth		
<18 years	16 of 61 (26.2)	1 (ref)
>18 years	18 of 41 (43.9)	1.6 (0.93, 2.76)
Live births		
2-3	12 of 31 (38.7)	1 (ref)

4-7	20 of 72 (27.8)	0.68 (0.38, 1.22)
>7	7 of 19 (36.8)	0.91 (0.43, 1.89)
Lost births		
No	32 of 98 (32.7)	1 (ref)
Yes	7 of 24 (29.2)	0.88 (0.44, 1.74)
Antenatal care ever received		
No	5 of 41 (12.2)	1 (ref)
Yes	34 of 81 (42)	**3.44 (1.46, 8.14)**

[1] Responses on women with two or more births only included

*P-value=0.02

Works cited

1. Central Statistical Agency (CSA) [Ethiopia], ICF. *Ethiopia Demographic and Health Survey 2016.* Addis Ababa, Ethiopia and Rockville, Maryland, USA: Central Statistical Agency (Ethiopia) and ICF 2016.
2. Nations U. Goal 3: Ensure healthy lives and promote well-being for all at all ages. Sustainable Development Goals Web site. https://www.un.org/sustainabledevelopment/health/. Accessed.
3. *Maternal mortality.* World Health Organization;2018.
4. *Ethiopia Mini Demographic and Health Survey.* Addis Ababa, Ethiopia: Central Statistical Agency (Ethiopia) 2014.
5. Belay A, Sendo E. Factors determining choice of delivery place among women of child bearing age in Dega Damot District, North West of Ethiopia: a community based cross- sectional study. *BMC Pregnancy and Childbirth.* 2016;16(1):229.
6. Tebekaw Y, James Mashalla Y, Thupayagale-Tshweneagae G. Factors Influencing Women's Preferences for Places to Give Birth in Addis Ababa, Ethiopia. *Obstetrics and Gynecology International.* 2015;2015:7.
7. Yegezu RT, Kitilia SB. Assessment of Factors Affecting Choice of Delivery Place among Pregnant Women in Jimma Zone, South West Ethiopia: Cross Sectional Study. *Journal of Women's Healthcare.* 2014;4(1).
8. Roro EM, Sisay MM, Sibley LM. Determinants of perinatal mortality among cohorts of pregnant women in three districts of North Showa zone, Oromia Region, Ethiopia: Community based nested case control study. *BMC Public Health.* 2018;18.
9. Lindtjorn B, Mitike D, Zidda Z, Yaya Y. Reducing stillbirths in Ethiopia: Results of an intervention programme. 2018.
10. Kea AZ, Tulloch O, Datiko DG, Theobald S, Kok MC. Exploring barriers to the use of formal maternal health services and priority areas for action in Sidama zone, southern Ethiopia. *BMC Pregnancy and Childbirth.* 2018;18(1):1-12.
11. Fekadu GA, Ambaw F, Kidanie SA. Facility delivery and postnatal care services use among mothers who attended four or more antenatal care visits in Ethiopia: further analysis of the 2016 demographic and health survey. *BMC Pregnancy and Childbirth.* 2019;19(1):1-9.
12. Duff JF, Buckingham III W. Strengthening of partnerships between the public sector and faith-based groups. *The Lancet.* 2015;386(10005).
13. Lewis MW. Christianity Ethiopia Map. GeoCurrents. http://www.geocurrents.info/cultural-geography/religion/religious-change-and-tension-in-ethiopia/attachment/christianity-ethiopia-map. Published 2013. Accessed2019.
14. Belay AS, Sendo EG. Factors determining choice of delivery place among women of child bearing age in Dega Damot District, North West of Ethiopia: a community based cross- sectional study. *BMC Pregnancy and Childbirth.* 2016;16(1):229.
15. Tebekaw Y, Mashalla YJ, Thupayagale-Tshweneagae G. Factors Influencing Women's Preferences for Places to Give Birth in Addis Ababa, Ethiopia. *Obstetrics and Gynecology International.* 2015;2015:7.