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Mismatch between antenatal care attendance and institutional delivery in south Ethiopia: A multilevel analysis

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ABSTRACT

Objectives Uptake of maternal health services remains suboptimal in Ethiopia. Significant proportions of antenatal care attendees give birth at home. This study was conducted to identify the predictors of non-institutional delivery among women who received antenatal care in the Southern Nations Nationalities and Peoples Region, Ethiopia.

Design A community-based cross-sectional survey was conducted among women who delivered in the year preceding the survey and who had at least one antenatal visit. Multistage cluster sampling was deployed to select 2390 women from all administrative zones of the region. A mixed-effects multivariable logistic regression analysis was performed to assess the predictors of non-institutional delivery; adjusted ORs (AOR) with 95% CIs are reported.

Results The proportion of non-institutional deliveries among participants was 62.2% (95% CI 60.2% to 64.2%). Previous experience of short and simple labour (46.9%) and uncomplicated home birth (42.9%), night-time labour (29.7%), absence of pregnancy-related problem (18.8%) and perceived providers poor reception of women (17.8%) were the main reasons to have non-institutional delivery. Attending secondary school and above (AOR=0.51; 95% CI 0.30 to 0.85), being a government employee (AOR=0.27; 95% CI 0.10 to 0.78) and woman's autonomy in healthcare utilisation decision making (AOR=0.51; 95% CI 0.33 to 0.79) were among the independent predictors negatively associated with non-institutional delivery. On the other hand, unplanned pregnancy (AOR=1.67; 95% CI 1.16 to 2.42), not experiencing any health problem during pregnancy (AOR=8.1; 95% CI 3.12 to 24.62), not perceiving the risks associated with home delivery (AOR=6.64; 95% CI 4.35 to 10.14) were the independent predictors positively associated with non-institutional delivery.

Conclusions There is a missed opportunity among women attending antenatal care in southern Ethiopia. Further health system innovations that help to bridge the gap between antenatal care attendance and institutional delivery are highly recommended.

Strengths and limitations of this study

- The study covered all administrative levels in Southern Nations Nationalities and Peoples Region, which are home to 56 nations and nationalities and thus accounted for possible cultural diversities and variations in residential settings (urban, rural agrarian and rural pastoralist).
- The multistage cluster sampling and the multilevel analysis deployed helped to minimise clustering of the outcome variable (place of delivery).
- This study would have benefited more from exploration of women's experiences of antenatal care that are believed to highly influence their decision on place of delivery.

INTRODUCTION

Regardless of significant reduction in global maternal mortality, low-income and middle-income countries (LMICs) still remain home to almost all (99%) global maternal mortality; 66% of the global maternal mortality happened in the sub-Saharan African region only, in 2015.[1] Ethiopia (3.6%) together with Nigeria (19%), India (15%), Democratic Republic of the Congo (7.3%) and Pakistan (3.2%) collectively contribute to 48% of global maternal mortality.[1] The 2016 Ethiopian Demographic and Health Survey revealed that the maternal mortality ratio in the country was 412 per 100 000 live births, a 52.7% reduction from its level in the year 2000 (817 per 100 000 live births). In 2015, maternal deaths accounted for 25% of all deaths among women aged 15–49 years in the country.[2] Women's (dis) empowerment, poverty, lack of education, poor access to and utilisation of reproductive and maternal health services and demographic features such as early marriage are among the constellation of factors that accelerate maternal mortality.[3]

Although there is strong evidence that most maternal deaths happen during the time of childbirth or during the 24 hours following childbirth, access to and utilisation of life saving maternal health services remains inadequate in LMICs. Cultural beliefs and practices, impoverishment, weak governance,

limited and low-quality health infrastructure, conflicts, disasters and inequities are factors that impede access to and utilisation of maternal health services in the sub-Saharan Africa.[4 5] In Ethiopia, the proportion of pregnant women who have at least one antenatal care visit increased from 27% to 67.4% between 2000 and 2015. In the same period, the proportion of institutional delivery increased from 5% to 26%.[2] This suggests a missed opportunity in the continuum of care provided to women of reproductive age. A study conducted in northwest Ethiopia in 2012 revealed that antenatal care utilisation had a limited role in health facility reattendance for skilled delivery services.[6]

In Ethiopia, perceived poor quality of care,[7 8] previous bad experiences of health facility-based delivery,[9] long distance,[6 10] costs associated with facility-based delivery[11] and pressure from elders in the communities[12] are among the most frequently cited reasons for having non-institutional delivery. In addition, poor health providers' behaviour and attitudes towards women, these days termed as mistreatment, also contribute to a preference for home delivery in Ethiopia.[12 13]

There is an evidence gap on why the majority of Ethiopian women who receive antenatal care do not reattend health facilities for skilled delivery care. Therefore, a community-based study was conducted to identify factors associated with non-institutional delivery among women who attended at least one antenatal visit. The study included women from all administrative catchments of the Southern Nations Nationalities and Peoples Region (SNNPR) to account for the cultural diversity, which is believed to affect place of delivery.[14] Accordingly, this study adds to existing limited evidence that can inform the design of strategies that aim to retain antenatal care attendees in the continuum of care.

MATERIALS AND METHODS

Study setting

This study was conducted in the SNNPR, Ethiopia that is home to 56 nations and nationalities (ethnic groups) with different languages and cultural heritage. The capital city of the region is Hawassa. The total population size of the region was estimated to be 16 738 177 in 2012 of which 49.7% were males while the remaining were females; women of reproductive age group account for 23.3% of the general population and 3.9% of them bear a child each year. The region had 324 urban and 3602 rural (where close to 90% of the population live) administrative kebeles, the lower administration levels in Ethiopia comprising about 1000 households. During the survey period, 1 specialised teaching hospital, 1 referral hospital, 8 general hospitals, 9 primary hospitals, 513 health centres, and 3498 health posts were available in the region. In the current study, all 14 administrative zones, 1 city administration (Hawassa city), and 4 special districts of the SNNPR were included. In SNNPR, there are a total of 164 districts (locally called woredas). The four special districts and the city administration are standalone administrative subregions that are accountable to the regional government and are treated as equivalent to an administrative zone. The remaining districts are accountable to the administrative zones. Administrative zones have a higher proportion of their population from one ethnic group, although they are home to more than one ethnic groups. Similarly, districts and kebeles are typically populated with a higher proportion of similar ethnic groups, although more than one ethnic group may belong to them.

Study design

A community-based cross-sectional survey was conducted in January 2013. A structured and pretested questionnaire was administered to assess why women who attend antenatal clinics do not deliver in health institutions.

Study participants and eligibility

Women who had at least one birth in the 1 year preceding the survey period and who had received at least one antenatal care assessment from a skilled provider were invited to participate in the study. Women who had not lived permanently in the sampled study area for at least 1 year were excluded from the study.

Sample size and sampling

The minimum sample size required for this study was computed using the sample size estimation formula for single population proportions with the assumptions of: 87% of women who have at least one antenatal care visit have a non-institutional delivery (further analysis of the 2011 Ethiopian Demographic and Health Survey data was made to get this figure), 95% confidence level, 2% margin of error, a design effect of 2 and 10% compensation for possible non-response. The sample size required for the study was calculated to be 2390.

The study employed multistage cluster sampling technique to identify the study respondents. Considering the cultural and ethnic diversity of the region (SNNPR), the total sample was allocated proportionately to all administrative subregions (administrative zones, the city administration and special woredas) referring to their respective number of expected deliveries in the year 2012. Next, 76 districts were randomly selected from the administrative subregions; 1 district was chosen for every 55 women participants in the same administrative zone, on average, until the sample for a specific administrative zone is met. Following the selection of districts, all health centres situated in the districts were classified into two categories as close to or distant from the districts' administrative hub. Next, one health centre from each of the close and distant health centres were selected to accommodate the sample allocated for their respective district. A similar fashion was also used to select two health posts under the catchment of the selected health centres. In most of the scenarios, there are five health posts under the catchments of a health centre. Finally, women who delivered

in the past 1 year preceding the survey time were systematically selected from the catchments of selected health posts using information from family folder registries that exist at the health posts of the selected kebeles.

Variables

The dependent variable of the study was place of delivery dichotomised as 'institutional' and 'non-institutional'. Women who delivered in health facilities staffed with skilled birth attendants (minimum of nurses) were considered to have had institutional delivery. The explanatory variables were women's sociodemographic characteristics, obstetric characteristics, knowledge and perception on maternal health services and their utilisation, autonomy in decision making, and health facility related factors including distance. To accommodate for the cultural and contextual differences across the different administrative subregions, three-level administrative hierarchy factors (zones, districts and kebeles) were included in the independent variables.

Data collection and processing

Data were collected by 24 trained data collectors and 6 supervisors in the community, organised in six teams. Data collectors and supervisors received 2 days training on the data collection tool by the principal investigator and two co-investigators. The interviewer administered tool was initially prepared in English and later translated to Amharic, the official working language in the region. The data collectors recorded women's responses to closed-ended questions. A total of 34 questions were included in the questionnaire. Administration of the interview questionnaire to participant women took 15–20 min on average. The data collection tool was pretested on 5% of the total sample size in Dale district, Sidama zone. Further revision of the questionnaire was made to improve its clarity and simplicity.

Quality of the collected data was monitored on a daily basis by the field supervisors who were responsible for assessing the completeness and coherence of every questionnaire. Furthermore, three of the study investigators were responsible for overseeing the quality of the data collected across the entire data collection period.

Data were entered into EpiInfo V.3.4.2 software by expert data entry clerks of the College of Medicine and Health Sciences, Hawassa University. Randomly picked questionnaires were compared with the corresponding entered data for quality control purposes by the principal investigator. Later data were exported to STATA V.14 software for cleaning and analysis purpose by the principal investigator. Frequency distribution, measures of central tendency and dispersion were done to describe essential variables of the study. Furthermore, a mixed-effects logistic regression analysis with random intercepts for zones, districts and kebeles was performed to identify factors related to place of delivery. Initially, bivariate multilevel logistic regression analysis was done to select variables to be included in the multivariate multilevel logistic regression analysis; variables that showed p value <0.25 in the bivariate analysis were included in the multivariate analysis. The absence of multicollinearity between the independent variables was also checked. Participants' marital status and decision making on household financial expenditure were the only two variables not to be included in the multivariate analysis. ORs with their respective 95% CIs were used as a measure of association between the dependent and independent variables.

Patient involvement

This study involved only women who had given birth in the year preceding the survey period. The women were not involved in setting the research question, the outcome measures, the design of the study, and the recruitment of study participants. The findings of this study will not be directly disseminated to study participants.

RESULTS

Sociodemographic characteristics

From the total 2390 potential respondents initially approached, 2225 respondents were available and willing to participate in the survey, making the response rate 93.1%. The median±IQR for age of the respondents was 26±7 years and more than half of the participants (56.5%) were in the 25–34 years age group. With regard to religion, 60.1% of participants were protestant Christians. In addition, almost all (98.0%) participants were married; more than half (56.8%) had formal education; 67.6% were housewives and 21.4% had an estimated monthly income of >1044 Ethiopian birr (US$57.3 equivalent). Close to half (46.6%) of the participants' male partners were reported to have attended grade 1–8, while 22.2% did not attend formal education at all. Pertaining to household family size, it was reported to be five and above in 62.8% of the families, median±IQR=5±3 (table 1).

Obstetric and reproductive health characteristics

Early marriage (marriage before the age of 18 years) was 37.2% in the current study, mean±SD=18±3 years. The mean age at first pregnancy was 19±3 years; more than half (55.0%) of the participants got pregnant before 20 years of age for the first time. In addition, 43% of participants had ever been pregnant four or more times prior to the survey. One-fifth (20.2%) of the participants reported that their last pregnancy was unplanned. With regard to care during pregnancy, 43.8% of participants had three or less antenatal visits during their index pregnancy. Furthermore, 14.2% of participants had experienced at least one pregnancy-related health problem during their index pregnancy (table 2).

Access to health facilities and decision making on key events

Using the most accessible mode of transport, health posts were the closest health facilities to 68.1% of the respondents, while hospitals and health centres were close to 4.2% and 26.7% of respondents, respectively. With regard

Table 1 Sociodemographic characteristics of respondents, SNNPR, 2013

Characteristics	Frequency (%)
Age in completed years	
15–24	652 (29.3)
25–34	1257 (56.5)
≥35	316 (14.2)
Total (n)	**2225 (100.0)**
Median±IQR=26±7	
Total (n)	**2225 (100.0)**
Religion	
Orthodox	469 (21.1)
Protestant	1338 (60.1)
Muslim	310 (13.9)
Catholic	45 (2.0)
Others	63 (2.8)
Total (n)	**2225 (100.0)**
Marital status	
Single	27 (1.2)
Married	2180 (98.0)
Divorced	6 (0.3)
Widowed	12 (0.5)
Total (n)	**2225 (100.0)**
Educational status of woman	
No education	963 (43.3)
Grade 1–8	878 (39.5)
Grade 9 and above	384 (17.3)
Total (n)	**2225 (100.0)**
Educational status of male partners of currently married women	
No education	484 (22.2)
Grade 1–8	1016 (46.6)
Grade 9 and above	680 (31.2)
Total (n)	**2180 (100.0)**
Occupation	
Farmer	327 (14.7)
Pastoralist	40 (1.8)
Merchant	183 (8.2)
Government employee	128 (5.8)
Housewife	1503 (67.6)
Student	22 (1.0)
Others	22 (1.0)
Total (n)	**2225 (100.0)**
Estimated regular monthly income (in Ethiopian birr)	
<1045	1713 (78.2)
≥1045	477 (21.4)
Total (n)	**2190 (100.0)**
Median±IQR=500±800	
Household family size	
≤4	828 (37.2)
≥5	1397 (62.8)
Total (n)	**2225 (100.0)**
Median±IQR=5±3	

SNNPR, Southern Nations Nationalities and Peoples Region.

to the women respondents' household financial management, 38.7% of them reported that they make joint decisions with their male partner; 53.6% of respondents reported that household financial expenditure decisions

Table 2 Obstetric and reproductive health characteristics of respondents, SNNPR, 2013

Characteristics	Frequency (%)
Age at first marriage (in years)	
<18	816 (37.2)
≥18	1379 (62.8)
Total (n)	**2195 (100.0)**
Mean±SD=18±3	
Age at first pregnancy (in years)	
<20	1220 (55.0)
≥20	1000 (45.0)
Total (n)	**2220 (100.0)**
Mean±SD=19±3	
Number of total pregnancy/ies	
≤3	1269 (57.0)
≥4	956 (43.0)
Total (n)	**2225 (100.0)**
Mean±SD=3±3	
Was the index pregnancy planned?	
Yes	1775 (79.8%)
No	450 (20.2)
Total	**2225 (100.0)**
Number of antenatal visits for the index pregnancy	
≤3	974 (43.8)
≥4	1251 (56.2)
Total (n)	**2225 (100.0)**
Experienced any health problem during index pregnancy	
Yes	317 (14.2)
No	1883 (84.6)
Do not remember	25 (1.1)
Total (n)	**2225 (100.0)**

SNNPR, Southern Nations Nationalities and Peoples Region.

Table 3 Access to health facilities and household decision making on key events, SNNPR, 2013

Characteristics	Frequency (%)
Closest health facility using the most accessible transport method	
Hospital	94 (4.2)
Health centre	595 (26.7)
Higher clinic	21 (0.9)
Health post	1515 (68.1)
Total	2225 (100.0)
Decision maker on household financial expenditure	
Woman and her male partner	861 (38.7)
Woman respondent	154 (6.9)
Male partner	1193 (53.6)
Woman's close relative	13 (0.6)
Others	4 (0.2)
Total (n)	**2225 (100.0)**
Decision maker on healthcare service utilisation	
Woman and her male partner	715 (32.1)
Woman respondent	788 (35.4)
Male partner	699 (31.4)
Woman's close relative	5 (0.2)
Others	18 (0.8)
Total (n)	**2225 (100.0)**
Decision maker on place of delivery	
Woman and her male partner	705 (31.7)
Woman respondent	934 (42.0)
Male partner	516 (23.2)
Woman's close relative	8 (0.4)
Others	62 (2.8)
Total (n)	**2225 (100.0)**

SNNPR, Southern Nations Nationalities and Peoples Region.

are taken by their male partner alone. Furthermore, decisions on healthcare services utilisation was reported to be usually made by male partner alone by 31.4% of respondents; 35.4% of women reported that they independently make decisions on their own healthcare services utilisation. Joint decisions (by respondents and respective male partners) on the place of childbirth was reported by 31.7% of the respondents; 42% of respondents make decision on their place of delivery alone (table 3).

Knowledge, perception and experience of danger signs during pregnancy and childbirth

Less than half (43.0%) of the respondents know danger sign/s that may occur during pregnancy; the most commonly reported danger sign was bleeding from the uterus (57.2%) followed by severe headache (35.6%) and severe abdominal pain (33.9%) (table 4). Similarly, 58.5% of respondents knew danger sign/s that may occur

Table 4 Knowledge and perception of danger signs and place of delivery, SNNPR, 2013

Characteristics	Frequency (%)
Do you know any danger sign/s of pregnancy?	
Yes	956 (43.0)
No	1269 (57.0)
Total (n)	**2225 (100.0)**
Risks mentioned by respondents* (n=956)	
Swelling of the leg or face	306 (32.0)
Bleeding from the uterus	547 (57.2)
Foul smelling discharge from the uterus	51 (5.3)
Absence of fetal movement	140 (14.6)
Severe abdominal pain	324 (33.9)
Severe headache	340 (35.6)
Difficult breathing	119 (12.4)
Leak of water	82 (8.6)
Fever	143 (15.0)
Blurring of vision	218 (22.8)
Do you know any danger sign/s of childbirth?	
Yes	1301 (58.5)
No	924 (41.50)
Total (n)	**2225 (100.0)**
Risks mentioned by respondents* (n=1301)	
Too long labour	933 (71.70)
Excessive bleeding	801 (61.6)
Early breakage of water	256 (19.7)
Retained placenta	547 (24.6)
Convulsion	324 (33.9)
High blood pressure	96 (7.4)
Cessation of labour pain	80 (6.1)
Respondent experienced any of these danger sign/s during childbirth	
Yes	307 (32.1)
No	645 (67.5)
Total (n)	**952 (100.0)**
Respondent perceives giving birth at home pose risk/s	
Yes	1599 (71.9)
No	626 (28.1)
Total (n)	**2225 (100.0)**
Respondent perceives most complications during childbirth are preventable	
Yes	1523 (68.4)
No	702 (31.6)
Total (n)	**2225 (100.0)**
Respondent perceives oneself susceptible to complication/s during childbirth	
Yes	1672 (75.1)

Continued

Table 4 Continued

Characteristics	Frequency (%)
No	553 (24.9)
Total (n)	**2225 (100.0)**
Place of delivery of the index pregnancy	
Non-institutional	1384 (62.2%)
Institutional	841 (37.8%)
Total	**2225 (100.0)**
Reason/s for non-institutional delivery* (n=1384)	
Previous short and simple labour	649 (46.9)
I had previous uncomplicated home delivery	593 (42.9)
Night-time labour	411 (29.7)
I had no problem during my pregnancy	260 (18.8)
Perceived providers poor reception	247 (17.8)
Transport problem	76 (5.5)
Health facility is far	65 (4.7)
Fear of exposing private area	51 (3.7)
Prefer traditional birth attendants	51 (3.7)
Male partner did not allow	32 (2.3)
Fear of male birth attendants	20 (1.5)

*More than one response possible.
SNNPR, Southern Nations Nationalities and Peoples Region.

during childbirth; long labour was the most frequently reported danger sign (71.7%), followed by excessive bleeding (61.6%) and convulsions (33.9%) (table 4). About one-third (32.1%) of respondents reported that they had experienced at least one of these danger sign/s during their childbirth. From the total respondents, 75.1% perceived themselves to be susceptible to complications during childbirth; 68.4% of respondents believed that childbirth complications are preventable. In addition, 71.9% of respondents knew that giving birth at home poses a risk (table 4).

Place of delivery

The proportion of non-institutional deliveries among the respondents was 62.2% (95% CI 60.2% to 64.2%), while the remaining delivered in health institutions. Among the reasons for non-institutional delivery, previous experience of short and simple labour (46.9%), previous experience of uncomplicated home birth (42.9%), night-time labour (29.7%), no pregnancy-related problem while pregnant (18.8%), and transportation problem (5.5%) were the major ones (table 4). In addition, 17.8% of respondents reported providers' poor reception of women as a reason to avoid institutional delivery.

Predictors of non-institutional delivery

The multivariable mixed-effects logistic regression analyses revealed that attending secondary school and above (AOR=0.51; 95% CI 0.30 to 0.85), having a male partner who attended secondary school or above (AOR=0.58; 95% CI 0.37 to 0.92), being a government employee (AOR=0.27; 95% CI 0.10 to 0.78), and 20 or more years of age at first pregnancy (AOR=0.70; 95% CI 0.49 to 0.99) were the sociodemographic features negatively associated with non-institutional delivery. Participants whose index pregnancy was unplanned (AOR=1.67; 95% CI 1.16 to 2.42) and who did not experience any health problem during their pregnancy (AOR=8.1; 95% CI 3.12 to 24.62) were more likely to have non-institutional delivery. In addition, women who reside closer to health posts were more likely to have non-institutional delivery than those who reside closer to hospitals (AOR=9.07; 95% CI 3.74 to 21.99) (table 5).

With regard to household decision making, the odds of non-institutional delivery was less among women who make independent decisions on healthcare service utilisation than those who make joint decisions with their male partners (AOR=0.51; 95% CI 0.33 to 0.79). However, no significant difference on place of delivery was observed with regard to women's decision-making scope on household financial expenditure and the choice of place of delivery. The odds of non-institutional delivery were higher among women who did not perceive any risks associated with home delivery (AOR=6.64; 95% CI 4.35 to 10.14) (table 6).

DISCUSSION

Differences in livelihood characteristics, health system performance and cultural beliefs and practices are believed to be associated with maternal health services utilisation in SNNPR.[4 5 15] Therefore, this study has taken into account the potential clustering of the variation in institutional delivery service utilisation that may exist between the different administrative zones and their subdivisions in south Ethiopia. Previous researches,[13 16 17] a systematic review[17] and further analyses of the demographic and health survey data[5 18 19] all focus on identifying the determinants of institutional delivery, including antenatal visits, among women of reproductive age groups. However, our study investigated predictors of institutional delivery among women who attended antenatal visits.

The proportion of antenatal care attendees who had non-institutional delivery was 62% in this study. This proportion is less than the proportion (87%) reported by the Ethiopian Demographic and Health Survey for the 5 years preceding 2011.[2] This reduction may be due to implementation of the multidimensional strategies of the health sector development programme that have included rapid expansion of healthcare facilities and training of health workforce, including health extension workers.[5 20 21]

Previous experience of simple labour and uncomplicated home delivery were the main reasons for having non-institutional delivery in the current study. A qualitative study from rural catchments of South Wollo, Ethiopia,

Table 5 Sociodemographic and obstetric predictors of non-institutional delivery, SNNPR, 2013

Variables		Place of delivery		Crude OR (95% CI)	Adjusted OR (95% CI)
		Non-institutional	Institutional		
Age in completed years	15–24	335	317	Ref.	Ref.
	25–34	847	410	2.1 (1.6 to 2.7)	1.81 (1.28 to 2.57)
	≥35	202	114	1.9 (1.3 to 2.7)	1.65 (0.97 to 2.81)
Religion	Orthodox	222	247	Ref.	Ref.
	Protestant	916	422	1.7 (1.2 to 2.5)	1.70 (1.16 to 2.52)
	Muslim	160	150	0.6 (0.4 to 1.0)	0.63 (0.37 to 1.07)
	Catholic	27	18	1.0 (0.5 to 2.3)	0.72 (0.3 to 1.73)
Marital status	Single	13	14	Ref.	Ref.
	Married	1359	821	1.8 (0.6 to 5.5)	
Educational status of woman	No education	749	214	Ref.	Ref.
	Grade 1–8	559	319	0.6 (0.4 to 0.7)	1.00 (0.73 to 1.39)
	Grade 9 and above	76	308	0.1 (0.06 to 0.15)	0.51 (0.30 to 0.85)
Educational status of male partners of currently married women	No education	395	89	Ref.	Ref.
	Grade 1–8	705	311	0.6 (0.5 to 0.7)	0.86 (0.59 to 1.25)
	Grade 9 and above	259	421	0.2 (0.2 to 0.3)	0.58 (0.37 to 0.92)
Occupation	Farmer	272	55	Ref.	Ref.
	Pastoralist	33	7	0.5 (0.2 to 1.8)	0.78 (0.18 to 3.32)
	Merchant	88	95	0.2 (0.1 to 0.4)	0.56 (0.30 to 1.06)
	Government employee	12	116	0.03 (0.01 to 0.07)	0.27 (0.10 to 0.78)
	Housewife	965	538	0.3 (0.2 to 0.5)	0.73 (0.44 to 1.22)
Estimated regular monthly income (in Ethiopian birr)	<1045	1183	530	Ref.	Ref.
	≥1045	174	303	0.39 (0.29 to 0.53)	0.72 (0.50 to 1.02)
Household family size	≤4	424	404	Ref.	Ref.
	≥5	960	437	0.4 (0.3 to 0.5)	1.33 (0.92 to 1.91)
Age at first marriage (in years)	<18	559	257	Ref.	Ref.
	≥18	811	568	0.7 (0.5 to 0.8)	1.06 (0.74 to 1.52)
Age at first pregnancy (in years)	<20	820	400	Ref.	Ref.
	≥20	562	438	0.6 (0.5 to 0.8)	0.70 (0.49 to 0.99)
Number of total pregnancy/ies	≤3	690	579	Ref.	Ref.
	≥4	694	262	1.9 (1.5 to 2.3)	1.02 (0.70 to 1.48)
Was the index pregnancy planned?	Yes	1044	340	Ref.	Ref.
	No	731	110	2.3 (1.6 to 3.1)	1.67 (1.16 to 2.42)
Number of antenatal visits for the index pregnancy	≤3	728	246	Ref.	Ref.
	≥4	656	595	0.5 (0.4 to 0.6)	0.56 (0.42 to 0.73)
Experienced any health problem during the index pregnancy	Yes	130	187	Ref.	Ref.
	No	1238	645	9.0 (3.0 to 27.4)	8.1 (3.12 to 24.62)

SNNPR, Southern Nations Nationalities and Peoples Region.

reported that women consider a short birth (one that lasts <4 hours) that takes place at home surrounded by relatives as a normal delivery that does not necessitate a medical care.[22] This is also supported by another study from northwest Ethiopia which found that most women sought antenatal (40.8%) and skilled delivery (45.3%) care because of illness only.[6] In addition, non-institutional delivery was 10-fold higher among women who did

Table 6 Access, decision making, knowledge and perception-related predictors of non-institutional delivery, SNNPR, 2013

Variables		Place of delivery		Crude OR (95% CI)	Adjusted OR (95% CI)
		Non-institutional	Institutional		
Closest health facility using the most accessible transport method	Hospital	13	81	Ref.	Ref.
	Health centre	181	414	1.5 (0.7 to 3.2)	1.41 (0.59 to 3.38)
	Higher clinic	4	17	1.2 (0.3 to 4.7)	1.55 (0.34 to 7.02)
	Health post	1186	329	10.5 (4.8 to 23.0)	9.07 (3.74 to 21.99)
Decision maker on household financial expenditure	Woman and her male partner	476	385	Ref.	Ref.
	Woman respondent	79	75	0.8 (0.6 to 1.4)	
	Male partner	818	375	1.3 (1.0 to 1.6)	
Decision maker on healthcare service utilisation	Woman and her male partner	398	317	Ref.	Ref.
	Woman respondent	418	370	0.8 (0.6 to 1.1)	0.51 (0.33 to 0.79)
	Male partner	551	148	2.0 (1.5 to 2.8)	1.05 (0.65 to 1.68)
Decision maker on place of delivery	Woman and her male partner	366	339	Ref.	Ref.
	Woman respondent	558	376	1.3 (1.0 to 1.8)	1.38 (0.90 to 2.13)
	Male partner	399	117	2.2 (1.6 to 3.0)	1.16 (0.70 to 1.91)
Do you know any danger sign/s of pregnancy?	Yes	506	450	Ref.	Ref.
	No	878	391	2.1 (1.7 to 2.7)	1.08 (0.79 to 1.47)
Do you know any danger sign/s of childbirth?	Yes	730	571	Ref.	Ref.
	No	654	270	2.4 (1.9 to 3.1)	1.25 (0.89 to 1.75)
Respondent perceives giving birth at home pose risk/s	Yes	813	786	Ref.	Ref.
	No	571	55	10.2 (7.1 to 14.7)	6.64 (4.35 to 10.14)
Respondent perceives oneself susceptible to complication/s during childbirth	Yes	1006	666	Ref.	
	No	378	175	1.7 (1.3 to 2.3)	1.15 (0.82 to 1.62)

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not recognise the risks associated with home delivery. A similar scenario was also evident in a study conducted in three sub-Saharan African countries (Kenya, Nigeria and Tanzania) and three South Asian countries (Bangladesh, India and Pakistan).[15]

Fear of poor reception by health service providers during facility-based childbirth was reported as a reason for avoiding institutional delivery by 17.8% of participants of the current study. Ethiopian health service providers have also witnessed the hostile way some health service providers treat women during facility-based childbirth, which discourages women and their neighbourhoods from attending health facilities in the future.[11] Discrete choice experiments among women in Tanzania and southwest Ethiopia also revealed that the health service providers' attitudes are one of the most important attributes women consider when deciding whether to have an institutional delivery.[23 24]

In the current study, non-institutional delivery was less common among participants who make independent decisions on general health services utilisation. A secondary review from Ethiopia also revealed that women who make autonomous decisions on healthcare spending have lower odds of delivering outside health institutions.[18] The same scenario is true in a neighbouring Eritrea,[25] Ghana[26] and Bangladesh.[27] In addition, a study from Jimma, south-western Ethiopia, revealed that autonomous decision making was a strong predictor of place of delivery among antenatal care attendees.[28]

As depicted by this study and a study from northern Ethiopia[29] and Nigeria,[30] drop out of women from the continuum of care, which runs from antenatal through to postnatal care, is a missed opportunity in the efforts to reduce maternal mortality. However, there are field-tested proven interventions to improve the quality of maternity care services, thereby mitigating drop out in Ethiopia and other low-income settings.[31–34]

This community-based study is different from other studies conducted in Ethiopia because it sampled women who had attended at least one antenatal visit. Furthermore, the study covered all administrative levels in SNNPR which are home to 56 nations and nationalities and thus accounted for possible cultural diversities and variations in residential settings (urban, rural agrarian and rural pastoralist). This study would have benefited more from exploration of women's experiences of antenatal care that are believed to highly influence their decision on place of delivery. We recommend future similar studies include qualitative enquiry among antenatal care attendees to deepen understanding of causes of dropouts from the continuum of maternal health services rendered in Ethiopian health facilities.

CONCLUSIONS

This study has revealed that almost two-thirds of women who had antenatal visits delivered at home. This highlights a major missed opportunity to retain women in the continuum of maternal healthcare in southern Ethiopia. Further health system innovations that help to bridge the gap between antenatal care attendance and institutional delivery are highly recommended to improve the health of Ethiopian women and reduce maternal mortality from preventable causes.

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