



Original Research

The prevalence and determinants of institutional delivery in Siltie Zone, Southern Ethiopia

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Abstract

Maternal mortality is a major public health concern in developing countries. In 2020, approximately 287,000 women died during pregnancy and childbirth, with nearly 95% of these deaths occurring in low- and middle-income countries. Evidence suggests that institutional delivery can reduce maternal mortality by 16%–33%. However, the utilization of institutional delivery services varies considerably across settings due to differences in socioeconomic and healthcare-related factors. Therefore, this study aimed to assess the prevalence and factors associated with institutional delivery among mothers in Siltie Zone, Southern Ethiopia. A community-based cross-sectional study was conducted to investigate the topic. A three-stage stratified sampling technique was employed to select 600 participants. Data were collected using a structured questionnaire. The prevalence of institutional delivery was 73.2%. Mother's age at first childbirth, age at first marriage, educational status, transportation access, birth interval, distance to health centres, and parity were significant predictors of institutional delivery ($p < 0.001$). Mothers aged 25–49 years at first childbirth had lower odds of institutional delivery compared with those aged 11–24 years ($OR = 0.379$, 95% $CI: 0.160–0.900$), and Parity were utilizing institutional delivery services ($OR = 2.930$, 95% $CI: 1.422–6.035$). Age at first childbirth, age at first marriage, transportation access, birth interval, and distance to health facilities play an important role in increasing institutional delivery utilization and improving maternal health care. Strengthening maternal health education, enhancing transportation access, and expanding access to nearby health facilities are essential to further increase institutional delivery utilization.

Keywords: Institutional delivery, maternal health, logistic regression, Werabe University

Highlights

- Institutional delivery utilization rate was 73.2% in Siltie Zone.
- The major factors of mothers' death are high blood pressure during delivery, serve to bleed, and infection after childbirth.
- The mean age of the participants was 26.6 ± 5 years, majorities (84.33%) of the participants were in age between 30 and 49 years, and the majority (89.3%) of the participants were unemployed.
- Transportation access, giving awareness during pregnancy, and birth order are significant predictors for delivery care.

1. Introduction

Maternal mortality remains unacceptably high, 287,000 women died during and following pregnancy and childbirth in 2020 (USAID, 2020). Nearly 95% of all maternal deaths occurred in low- and lower-middle-income countries, and most of these deaths could have been prevented (Organization, 2023). Ethiopia is one of the countries with a high maternal mortality ratio. Since 2000, Ethiopia has reduced maternal and child mortality by half; however, the maternal mortality ratio of 412 per 100,000 live births and the child mortality rate of 67 per 1,000 live births remain high (USAID, 2020).

Complications during and following pregnancy and childbirth are causes of women's death. Most of these complications develop during pregnancy and are preventable or treatable (USAID, 2020). The major complications that account for nearly 75% of all maternal deaths include severe bleeding (mostly postpartum haemorrhage), infections (usually after childbirth), high blood pressure during pregnancy (pre-eclampsia and eclampsia), complications from delivery, and unsafe abortion (Organization, 2023; Say et al., 2014). Institutional delivery ensures safe childbirth, reduces postpartum complications, and improves the survival of mothers and newborn babies. Evidence shows that delivery at health facilities can reduce maternal deaths by 16%–33% (Graham, Bell, & Bullough, 2001; Ronsmans & Graham, 2006).

Institutional delivery is defined as childbirth that takes place in a medical facility equipped with necessary technology and under the supervision of skilled birth attendants. Various medical tools and technologies are used during institutional deliveries to ensure that the health of both the newborn and the mother is not compromised (Shajarizadeh & Grépin, 2022).

The utilization of institutional delivery services varies across low- and middle-income countries (LMICs) (Hailemariam, Atnafu, Gezie, & Tilahun, 2023; Sadik, Bayray, Debie, & Gebremedhin, 2019). Although the overall institutional delivery has increased in most countries, this increase is not uniform across countries and across socio-demographic subpopulations (Gudu & Addo, 2017). Unfortunately, inequalities in the utilization of institutional delivery services are widening in some countries (Hasan, Magalhaes, Fatima, Ahmed, & Mamun, 2021). For example, institutional delivery coverage is 85% in Nepal (Karkee, Binns, & Lee, 2013), 21% in Pakistan, 94% in Cambodia (Hasan et al., 2021), 97.2% in Colombia in Latin America (Hasan et al., 2021), and 57% in Sub-Saharan Africa (Hasan et al., 2021). Findings from studies conducted in different parts of Ethiopia over the past ten years show that the prevalence of institutional delivery ranges from 18.3% to 87.2% (Ansbebo, Geda, Mecha, Liru, & Ahmed, 2020; Demilew, Gebregergs, & Negusie, 2016; Eshete, Legesse, & Ayana, 2019; Nigusie, Azale, Yitayal, & Derseh, 2021).

Several previous studies have identified factors associated with institutional delivery in different settings (Gudu & Addo, 2017; Habte & Demissie, 2015). However, these factors vary across different socioeconomic contexts. Socioeconomic factors include maternal age ≥ 35 years (Nigusie et al., 2021), higher educational level of mothers (Wolelie, Aychiluhm, & Awoke, 2014), higher educational status of husbands (Nigusie et al., 2021), higher wealth index (Dahiru & Oche, 2015), family size of less than five (Nigusie et al., 2021), and urban residence (Scott et al., 2018). Obstetric factors include antenatal care visits during recent pregnancy (Eshete et al., 2019), being primigravida (Birmeta, Dibaba, & Woldeyohannes, 2013), planned pregnancy (Arega, Mulatu, Alemayehu, Mussa, & Dheresa, 2022), experiencing complications during pregnancy (Odo & Shifti, 2014), knowledge of danger signs (Demilew et al., 2016), and birth preparedness plans during pregnancy (Jinka, Wodajo, & Agero, 2018). Other factors positively associated with institutional delivery include maternal knowledge of the benefits of

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institutional delivery (Eshete et al., 2019), and distance or travel time to the nearest health facility (Demilew et al., 2016). These variations in findings highlight the need to investigate contextual factors influencing institutional delivery to develop appropriate and tailored interventions.

The Government of Ethiopia has implemented several strategies to promote institutional delivery; however, the utilization rate remains relatively low (50%) (Ababa & Calverton, 2011). Evidence from different studies conducted in Ethiopia shows inconsistent coverage and varying associated factors (Birmeta et al., 2013; Demilew et al., 2016; Eshete et al., 2019; Hasan et al., 2021). Therefore, assessing the institutional delivery in specific areas is essential for designing appropriate strategies to improve institutional delivery. Accordingly, this study aimed to assess the utilization of institutional delivery and its associated factors among mothers in Siltie Zone, Southern Ethiopia.

2. Methods

2.1. Study design and setting

A community-based cross-sectional survey was conducted from January 2022 to February 2022 in Siltie Zone. Siltie Zone is located in the Southern Ethiopia, approximately 172 km from Addis Ababa. Based on the 2018 national census conducted by the Central Statistical Agency of Ethiopia, the zone has an estimated population of 1,017,557, of whom 156,915 are under-five children. About 13% of the population is urban residents. The zone has four hospitals and 33 health centres (Ababa & Calverton, 2011).

2.2. Study subjects

The source population of the study is all women aged between 15 and 49 years who had given at least one birth in the five years before the survey. The study population was sampled women aged between 15 and 49 years who were residing in Siltie Zone during the study period. Seriously ill women were not included in the study.

2.3. Sample size and sampling technique

The sample size of the study was determined using a single population proportion formula. Due to the absence of similar studies in a comparable context, a proportion (p) of 50% was used to obtain the scientifically sound sample size, with a 95% confidence interval and a 5% margin of error. After adding a 10% non-response rate, the final sample size was 600.

A three-stage random sampling technique was applied. In the first stage, six districts were selected from a total of 12 districts using simple random sampling. In the second stage, kebeles within the selected districts were stratified into urban and rural categories. Accordingly, three urban and four rural kebeles were selected using simple random sampling.

The sample was proportionally allocated to each selected district in the following way: Werabe Town (99), Alichu Wiriro District (100), Silti District (80), West Azernet Berbere District (120), Hulbareg District (112), and Dalocha District (89). Finally, a systematic sampling technique was applied to select study participants.

2.4. Data collection tools

The question of the study was an interviewer-administered structured questionnaire. The independent variables included residence (urban/rural), women's current age, age at first marriage, age at first childbirth, educational level, employment status, media exposure, parity, history of child death, monthly income, transportation access, family size, distance from home to health center, sex of household head, number of pregnancies, and birth order. The questionnaire was adapted from previous studies (Dahiru & Oche, 2015; Eshete et al., 2019). A woman was considered to have utilized antenatal care if she attended at least one ANC visit provided by a skilled health professional during her most recent pregnancy (Dahiru & Oche, 2015). Institutional delivery utilization was the dependent variable. Mothers who gave birth to their last child in a health facility were classified as "yes," while those who did not were classified as "no".

2.5. Data quality control

To ensure the quality of data, the questionnaire was pretested on 5% of the sample size in an area not included in the actual study. Based on the pre-test results, necessary modifications were made to improve clarity and local relevance. Data collection was supervised daily by trained supervisors. Data were collected by trained data collectors.

2.6. Data processing and analysis

SPSS version 21 was used to analyse the study data. Both bivariate and multivariable logistic regression analyses were performed to see the extent of the relationship between independent and dependent variables. Variables with a p-value < 0.25 in the bi-variable analysis were included in the multivariable logistic regression model. In the multivariable analysis, variables with a p-value ≤ 0.05 were considered statistically significant. As well, adjusted odds ratios (AOR) with 95% confidence intervals not including one were also considered statistically significant.

3. Results

3.1. Characteristics of the respondents

In this study, 600 women participated. The mean age of the participants was 26.6 ± 5 years. The majority (84.3%) of participants were aged 30–49 years. Most participants (89.3%) were unemployed, and more than half (63.7%) had low educational status. The majority (78.7%) of women were rural residents. About two-thirds of the women had no media exposure.

Most women reported that their age at first marriage was between 11 and 24 years. Of the total respondents, 76.5% gave birth to their first child at the age of 11–24 years. About half (50.2%) had attended antenatal care follow-up, and 45% had no access to transportation. Overall, 73.2% of mothers delivered their last child at a health facility. The results for other variables are presented in Table 1.

Table 2: Socio-demographic and reproductive characteristics of the respondents in Siltie zone, southern Ethiopia. 2021

Variable	Category	Frequency	Percent
Age	15-29	94	15.67
	30-49	506	84.33
Mothers age at first childbirth	11-24	459	76.5
	25-49	141	23.5
Mothers age at first marriage	11-24	533	88.83
	25-49	67	11.17
Sex of household head	Male	575	95.83
	Female	25	4.17
Women work status	Employed	64	10.7
	Unemployed	536	89.3
Educational level	Primary	382	63.7
	Secondary	151	25.2
	Diploma	34	5.7
	Degree and above	33	5.5
Media exposure	No	358	59.7
	Yes	242	40.3
Child death occurs before	No	411	68.5
	Yes	189	31.5
Residence	Urban	128	21.3
	Rural	472	78.7
Antenatal care	No	301	50.2
	Yes	299	49.8
Awareness of pregnancy	No	182	30.3
	Yes	418	69.7
Transportation access	No	270	45.0
	Yes	330	55.0
Institutional delivery	No	161	26.8
	Yes	439	73.2

3.2. Factors associated with institutional delivery

In the bi-variable analysis, sex of household head, women's work status, educational level, media exposure, history of child death, residence, transportation access, parity, birth interval (order), and distance from the health center were significantly associated with institutional delivery compared to p-value 0.000.

In the multivariable logistic regression analysis, several factors remained significantly associated with institutional delivery. Mothers who gave their first birth at the age of 25–49 years had lower odds of institutional delivery compared with those aged 11–24 years (AOR = 0.38; 95% CI: 0.16–0.90). Similarly, mothers whose age at first marriage was 25–49 years had lower odds of institutional delivery (AOR = 0.35; 95% CI: 0.35–0.65).

Women who had no transportation access had higher odds of institutional delivery (AOR = 0.515; 95% CI: 0.312–0.848). A birth interval greater than two years was associated with lower odds of institutional delivery (AOR = 0.557; 95% CI: 0.39–0.79).

Distance from the health centre was significantly associated with institutional delivery (AOR = 1.357; 95% CI: 1.186–1.551), indicating that increased distance was associated with higher odds of institutional delivery. Women who had parity had significantly higher odds of the outcome compared with women who had no parity (AOR = 2.930, 95% CI: 1.422–6.035) (Table 2).

Table 2: Associated factors of institutional delivery of women in Siltie Zone, southern Ethiopia, 2021

Variable	Category	P-value	COR (95% CI)	P-value	AOR (95% CI)
Age	15-29		1		1
	30-49	0.457	1.012(0.981,1.044)	0.760	1.122(0.534,2.357)
Mothers' age at first child birth	11-24		1		1
	25-49	0.202	1.038(0.980,1.098)	0.003	0.379(0.160,0.900)*
Mother's age at first marriage	11-24		1		1
	25-49	0.127	1.046(0.987,1.108)	0.023	0.345(0.245,0.564)*
Sex of household	Male		1		1
	Female	0.014	0.856(0.336,2.182)	0.473	1.495(0.598, 4.484)
Women's work status	Employed		1		1
	Unemployed	0.004	3.283(1.465,7.357)	0.833	1.210(0.205,7.131)
Educational level	Primary		1		1
	Secondary	0.042	0.363(0.137,0.962)	0.269	0.351(0.055, 2.251)
	Diploma	0.642	0.784(0.278,2.211)	0.617	0.672(0.101,3.905)
	Degree and above	0.000	2.857(0.513,15.90)	0.004	1.360(0.183,10.12)*
Media exposure	No		1		1
	Yes	0.000	0.439(0.296,0.653)	0.652	0.879(0.503,1.538)
Child death occurs before	No		1		1
	Yes	0.000	0.446(0.289,0.653)	0.552	0.843(0.479,1.557)
Residence	Urban		1		1
	Rural	0.000	0.459(0.303,0.694)	0.640	0.870(0.487,1.557)

Transportation access	Yes				1
	No	0.000	0.511(0.355,0.737)	0.009	0.515(0.312,0.848)*
Family size		0.496	0.969(0.886,1.060)	0.477	0.805(0.443,1.463)
Birth interval	Less than two year		1		1
	greater than two years	0.002	0.872(0.798,0.952)	0.001	0.557(0.393,0.788)*
Distance from the health center to home		0.000	1.536(1.380,1.711)	0.000	1.357(1.186,1.551)*
Parity	No		1		1
	Yes	0.000	1.234(1.021,1.453)	.004	2.930(1.422,6.035)*
Number of visits heath center during pregnancy		0.000	0.926(0.874,1.024)	.000	0.445(0.355,0.559)*

*Suggests P-value <0.05, COR: Crude Odds Ratio, AOR: Adjusted Odds Ratio, CI: confidence interval

4. Discussion

Institutional delivery service utilization reduces maternal mortality by decreasing pregnancy-related complications, neonatal sepsis, and poor birth outcomes (Tadele & Lamaro, 2017). Our study assessed the prevalence of institutional delivery and its associated factors among reproductive-age women. The study found that the proportion of institutional delivery was 73.2% (95% CI: 55.6%,80.7%) in Siltie Zone.

This finding is consistent with studies conducted in other parts of Ethiopia, including Bench Maji (78.3%) (Oumer, Aragie, & Worede, 2022), Northwest Ethiopia (75.9%) (Amentie, Abera, & Abdulahi, 2016), Southern Ethiopia (77.2%) (Hailu et al., 2021), and Assosa, Western Ethiopia (72.5%) (Yaya, Idriss-Wheeler, Shibre, Amouzou, & Bishwajit, 2020). It is also consistent with a study conducted in Mozambique (70.7%) (Asmamaw, Negussie, & Adugnaw, 2016). However, the utilization of institutional delivery services is slightly lower than findings from Debre-Birhan, Ethiopia (80.2%) (Yoseph, Abebe, Mekonnen, Sisay, & Gonete, 2020), Mana District, Southwest Ethiopia (86.4%) (Gudu & Addo, 2017), Ghana (93.3%) (Barrow, Jobe, Onoh, & Maduako, 2020), Gambia (78.1%) (40), and middle-income countries (Nigusie, Azale, & Yitayal, 2020).

This observed discrepancy between studies may be due to differences in study population, study period, and sociocultural characteristics. In addition, it may be attributed to differences in awareness and knowledge of facility-based delivery, health education, and accessibility of health facilities (Eshete et al., 2019). Nevertheless, the proportion of institutional delivery in this study is higher compared with the national estimate of Ethiopia (Habte & Demissie, 2015). It is also higher than findings from studies conducted in Pawi (60.5%) (Eshete et al., 2019), Gurage (31%) (Mitikie, Wassie, & Beyene, 2020), Hossana (53.6%) (Anshebo et al., 2020), Northwest Ethiopia (38%) (Sadik, Bayray, Debie, & Gebremedhin, 2019), and Afar, Eastern Ethiopia (35.2%) (Tarekegn, Lieberman, & Giedraitis, 2014). This improvement may be due to increased access to information, improved communication on delivery services, community mobilization through health development armies, maternity waiting homes, and the availability of free ambulance services, which may have encouraged institutional delivery in the study area.

This study also identified several factors significantly associated with institutional delivery, including age at first childbirth, age at first marriage, transportation access, birth interval, and distance from health facilities. Women who gave their first birth at the age of 25-49 years were less likely to utilize institutional delivery services compared with those who gave birth at a younger

age. Similarly, older age at first marriage was associated with a reduced likelihood of institutional delivery. This finding is consistent with studies conducted in Ethiopia and other low-income countries, which show that maternal age and reproductive experience influence health-seeking behavior, often resulting in lower institutional delivery utilization among older women due to perceived self-efficacy or preference for traditional birth practices (Gabrysch & Campbell, 2009; Kitila, 2020).

Transportation access was also significantly associated with institutional delivery. Women who had access to transportation were more likely to utilize institutional delivery services compared with those who did not. This finding is consistent with studies conducted in rural Ethiopia, where transportation barriers are among the major reasons for home delivery, particularly during obstetric emergencies (Bain et al., 2022; Hailemariam, Atnafu, Gezie, & Tilahun, 2023). Improving ambulance services and community-based transport systems may therefore enhance skilled birth attendance.

Our study found that a birth interval of greater than two years was significantly associated with institutional delivery. This may be explained by the fact that women with longer birth intervals may perceive lower risk and rely on previous uncomplicated delivery experiences. However, this finding contrasts with studies showing that shorter birth intervals are associated with higher obstetric risk and increased utilization of institutional delivery (Bain et al., 2022).

This study has strengths and limitations. This study used relatively large sample size, which improves the reliability of the findings and allows adjustment for potential confounders. It also provides important local evidence on institutional delivery and its determinants in the study area. However, the cross-sectional design limits the ability to establish causal relationships between the exposure variable and the dependent variable. In addition, recall bias and social desirability bias may have affected self-reported reproductive and health service data.

5. Conclusion

This study found that 73.2% of reproductive-age women had institutional delivery in the study area. Several factors, including age at first childbirth, age at first marriage, transportation access, birth interval, and distance to health facilities, were significantly associated with institutional delivery. Strengthening maternal health education, enhancing transportation access, and expanding access to nearby health facilities are essential to further increase institutional delivery utilization. Special attention should be given to women in rural and hard-to-reach areas.

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Declarations

Competing Interests: The authors declare that they have no conflict of interest.

Author Contributions: FH conceived the idea and had major roles in the proposal development, report writing, analysis, and manuscript writing. MR had a major role in the methodology part, result interpretation, and editing the manuscript. All authors read and gave approval of the final version to be published and agreed to be equally accountable for all aspects of the work.

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Data availability statement: Data sets used and analyzed during the current study are available from the manuscript and the corresponding author on reasonable request.

Declaration of Generative AI and AI-assisted technologies in the writing processes: none

Consent for publication: Not applicable

Ethical clearance: Ethical clearance was obtained from Werabe University before data collection began. Before data collection, written informed consent was obtained from participants aged over 15 years and from emancipated minors. For non-emancipated minors, assent was obtained after written consent had been secured from their parents or guardians in triplicate to confirm their agreement for participation. A witness was involved when necessary. Participants who were unwilling to participate were given the right to decline participation. Confidentiality of participants' responses was maintained throughout the research process.

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