

Effect of Maternity Waiting Home Service Utilization on Maternal Health Outcomes in Public Hospitals of West ARSI Zone, Oromia Region: Institution Based Prospective Cohort Study

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Abstract

Background: Maternity waiting homes (MWHs), also known as mother's shelters, are structures built near healthcare facilities. The use of MWHs has been linked to reductions in maternal mortality. However, due to a lack of strong evidence in this area, conclusive evidence has not been able to be reached indicating definitively that MWHs lead to fewer maternal deaths.

Objective: The primary aim of this study was to assess the effect of maternity waiting home service utilization on maternal health outcomes in public hospitals in West Arsi Zone, Oromia Region, from March 8 to June 1, 2022.

Methods: A prospective cohort study was conducted among 1606 mothers (803 maternity waiting home users and 803 non-users) who were admitted to public hospitals in the West Arsi Zone from March 8 to June 1, 2022. Simple random sampling methods were used to approach study participants. Epi-data version 3.1 and Stata version 16 were used for data entry and analysis, respectively. Both bivariable and multivariable generalized linear model analyses were done to identify associations between dependent and independent variables. Crude and adjusted relative risk with respective 95% confidence intervals were computed, and statistical significance was declared at p-value <0.05.

Result: There was a 28% reduced risk of developing maternal complications in the exposed group when compared to the non-exposed group [RR = 0.72, 95% CI = 0.61, 0.86]. Multiparity [RR=1.42 95%CI (1.17, 1.72), advanced maternal age [RR=0.57 95%CI (0.41, 0.97), and transfer from another facility [RR=1.59, 95%CI (1.34, 1.90)] were independent predictors for maternal complications.

Conclusion & Recommendations: The present study found that maternity waiting home users had a reduced risk of developing maternal complications when compared to non-users. Besides, advanced maternal age, multiparity, maternal complications, and transfer from another facility were independent predictors of maternal complications. Strengthening maternity waiting home services is decisive to reducing maternal complications.

Keywords: Maternity Waiting Home, Public Hospitals, West ARSI Zone

1. Introduction

Maternity waiting homes (MWHs), also known as mother's shelters, are structures built near healthcare facilities to minimize the critical barrier of distance to accessing maternal health services. They serve as one potential health intervention that is incorporated into a package of maternal and newborn health services [1].

Pregnancy-related maternal mortality is usually due to the "three phases of delay": the first phase delay to decide to seek care in the community, the second phase delay to reach appropriate facilities, and the third phase delay in the provision of adequate care or receiving adequate care after reaching facilities [2]. Although MWHs have existed in Ethiopia for more than three decades, they have been restricted mostly to some hospitals, making them inaccessible for most pregnant women [3].

In 2017, globally, there were 295,000 maternal deaths. In fact, it was reduced by 35% from the year 2000, which was estimated at 451,000 maternal deaths. Least-developed countries have made a significant contribution to the global maternal mortality ratio, which is projected at about 415 maternal deaths per 100,000 live births. In 2017, roughly 86% of the estimated global maternal deaths were contributed by sub-Saharan Africa and Southern Asia, while sub-Saharan Africa only contributed nearly 66% [4]. In Ethiopia, the maternal mortality ratio is estimated at 412 per 100,000 live births [5].

These maternal deaths result from direct complications during delivery, such as hemorrhage, sepsis, obstructed labor, hypertensive disorders of pregnancy, and septic abortion [6]. Moreover, poverty, distance to facilities, lack of information, and inadequate and poor-quality services were the main factors responsible for this high burden of mortality [4]. The Sustainable Development Goal 3 targets reducing the global maternal mortality ratio to below 70 per 100,000 live births and stopping avoidable deaths of newborns and under-five children [7].

This study will provide valuable information for respective health institutions to improve the quality of MWHs and its expansion to other health facilities where the service has not been launched yet. Besides, this study will contribute to the existing body of knowledge and articulate the basis for other research on the effectiveness of MWH utilization, which will further play a role in averting maternal and childhood morbidity and mortality due to pregnancy-related complications (Figure 1).

2. Methods and Materials

2.1 Study Area & Period

The study was carried out in public hospitals in the West Arsi Zone. The zone is found in Oromia regional state, Ethiopia. In the zone, there are seven government hospitals: Shashemene Referral Hospital, Melka Oda General Hospital, Dodola General Hospital, Negele Arsi Primary Hospital, Kokosa Primary Hospital, Gambo Primary Hospital, and Loke Primary Hospital. There are three private hospitals (Negele Arsi General Hospital, Feyta Primary

Hospital, and Madda Walabu General Hospital). Additionally, there are 84 functional health centers, 351 functional health posts, 179 private clinics, 1 NGO clinic, and 95 pharmacy/drug shops. The study was conducted from March 8 to June 1, 2022

2.2 Study Design

An institutional-based prospective cohort study design was employed.

2.3 Source Population

All mothers are admitted to public health facilities in the West Arsi Zone.

2.4 Study Population

Exposed: All randomly selected mothers who were admitted through MWHs of public hospitals in West Arsi Zone.

Non-Exposed: All randomly selected mothers were admitted to the labor ward of public hospitals in the West Arsi Zone after being admitted directly to the labor ward without MWHs.

2.5 Inclusion and Exclusion Criteria

Inclusion Criteria

Exposed: Mothers who were admitted through MWHs of public health facilities in the West Arsi Zone will be included in this study.

Non-Exposed: Mothers who were admitted to the labor ward of public health facilities in West Arsi Zone after being admitted directly to the labor ward without MWHs will be included in this study.

Exclusion Criteria

Mothers who were referred to other hospitals and don't have any feedback later about their health status will be excluded, both exposed and non-exposed.

Sample Size Determination

The sample size was calculated using the double proportion formula through Open Epi Info version 7.

$$n = \frac{(Z_{\alpha} + Z_{2\beta})^2 \{p_1(1 - p_1) + p_2(1 - p_2)\}}{(p_1 - p_2)^2}$$

Parameters:

n - Size of sample in each group

P1, P2—estimated population prevalence in the comparison groups

$\beta = 1 - \text{Power}$; a power of 80% is used

Considering the following assumptions: 95% CI, 80% power, 9.7% complicated maternal outcome among urban, and 90.3% complicated maternal outcome among rural [10], an AHR of 1.79, and exposure to a non-exposed ratio of 1:1. The total sample size calculated is 1460 (730 exposed) and 730 (730 non-exposed).

Therefore, the total sample size in this study, after adding 10% for lost follow-up was 1,606 (803 exposed and 803 non-exposed).

2.6 Sampling Procedure

Firstly, out of seven public hospitals in the zone, five hospitals, namely Shashemene Referral Hospital, Melka Oda General Hospital, Dodola General Hospital, Negele Arsi Primary Hospital, and Gambo General Hospital, were selected using a simple random sampling technique. The four-month average number of women admitted through MWHs and directly to labor at each public hospital was identified. Considering the client flow per four months in the respective health institutions, the total sample size determined (1606) was distributed to each public hospital through probability proportional to size allocation. Finally, study participants were selected using a systematic random sampling technique (Figure 2).

2.7 Data Collection Tool and Procedure

Data was collected using a combination of a pretested structured questionnaire through a face-to-face interview and a paired mother chart review, which was used to retrieve medical information that could not be captured by the interview. The questionnaire was developed from related literature. The data was collected by five data collectors and supervised by three supervisors.

2.8 Data Quality Control

Two days of training were given to data collectors on the objectives of the study, sampling, and data extraction procedures. A test was conducted among 5% of the total sample size to check the validity and reliability of the instrument. Data collection was supervised daily by the supervisor and investigators to check consistency, clarity, and completeness.

2.9 Study Variables

2.9.1 Dependent Variable

Maternal health outcomes (for mothers who are diagnosed with one or more of the following complications: sepsis, uterine rupture, PPH, APH, obstructed labor, preeclampsia, and eclampsia or maternal death)

2.10 Independent Variables

2.10.1 Socio-Demographic Factors: Educational level, maternal age at birth, residence, and occupation.

2.11 Medical Factors: cardiovascular disease, gestational diabetes mellitus, systemic lupus erythematosus, thyroid disease, and liver disease.

2.12 Obstetrics Factors: multiple pregnancies, delayed commencement of ANC, birth weight, short birth interval, history of PIH, and multigravida.

2.13 Health Facility Related Factors: Maternity Waiting Home Service and Referral from Another Facility

2.14 Operational & Term Definition

2.14.1 MWH Utilizers: pregnant mothers who were admitted to the MWH service and waited until the start of labor.

2.15 Maternal Health Outcomes: mothers who are diagnosed with either sepsis, uterine rupture, PPH, APH, obstructed labor, preeclampsia, or maternal death.

2.16 Data Management and Analysis

2.16.1 Data Management

All the questionnaires were checked manually for completeness and will be cleaned, coded, and entered into Epi-data 3.1. Then, the data was exported to and analyzed using Stata version 16.

2.17 Data Analysis

Descriptive statistics such as frequencies, proportions, inter-quartile range, mean, median, and standard deviation were calculated to describe socio-demographic and other related variables of the study population and displayed using tables, figures, and graphs.

A generalized linear model (GLM) for binary outcomes was applied for the regression analysis, as this will provide the proper effect size measure (RR) for relatively common outcomes. Both bivariable and multivariable generalized linear model analyses were used to determine the association of each independent variable with the dependent variable. Initially, variables with $p < 0.25$ in the bivariable generalized linear model were taken into the multivariable logistic regression model. Both crude and adjusted odds ratios with respective 95% confidence intervals and p values < 0.05 will be used to measure the strength of the association between dependent and independent variables.

Mothers who developed maternal complications were coded "1," and those with no complications were coded "0."

Multicollinearity between the independent variables was assessed using the variance inflation factor (VIF). The maximum VIF value was 1.16 for the maternal health outcome model and 1.11 for the perinatal health outcome model, which is close to 1 or less than 10, suggesting there was no multicollinearity problem. Hosmer and Lemeshow goodness of fit statistics were done, and for each model, it was found to be a good fit ($P = 0.09$). The results were interpreted using RR as an effect measure.

2.18 Expected Outcome

This study will provide valuable information for respective health institutions in the zone and zonal health departments to improve the quality of MWHs and its expansion to other health facilities where the service has not been launched yet. Besides, this study will contribute to the existing body of knowledge and articulate the basis for other research on the effectiveness of MWH utilization.

3. Result

3.1 Background Characteristics of the Study Participants

In the current study, a total of 1606,803 maternity waiting home users (exposed) and 803 maternity waiting home non-users (non-exposed) were included. The median age of the respondents was 26 (IQR 24, 30). The age ranges from 15 to 38 years. Nearly one-fourth of study participants in the exposed group had no formal

education. 179 (22.29%) and 154 (19.18%) study subjects in the non-exposed group had no formal education. Almost three-fourths of study subjects in the exposed group were housewives (596, 74.22%), and more than half of study subjects in the non-exposed group were housewives (553, 68.87%). 785 (97.76%) respondents

in the exposed group were married, and 770 (95.89%) study subjects in the non-exposed group were married. All study subjects in the exposed group resided in the rural area 803 (100.0%) (Table 1).

Variable	Category	Exposed No. (%)	Non exposed No. (%)	Total n=1606 (%)
Maternal age	<20	15 (1.87)	46 (5.73)	61 (3.79)
	20-35	763 (95.02)	719 (89.54)	1482 (92.28)
	>=35	25 (3.11)	38 (4.73)	63 (3.92)
Marital status	Married	785 (97.76)	770 (95.89)	1555 (96.82)
	Single	6 (0.75)	4 (0.50)	10 (0.62)
	Divorced	12 (1.49)	18 (2.24)	30 (1.87)
	Widowed	0	11 (1.37)	11(0.68)
Mother's educational level	No formal education	179 (22.29)	154 (19.18)	333 (20.73)
	Read & write	131 (16.31)	103 (12.83)	234 (14.57)
	Primary education	263 (32.75)	242 (30.14)	505 (31.44)
	Secondary education	98 (12.20)	223 (27.77)	321 (19.99)
	Diploma and more	132 (16.44)	81 (10.09)	213(13.26)
Husband's educational level	No formal education	147 (18.31)	141 (12.45)	288 (17.93)
	Read & write	100 (14.82)	119 (54.34)	219 (13.64)
	Primary education	185 (18.68)	150 (23.04)	335 (20.86)
	Secondary education	163 (24.91)	200 (20.30)	363 (22.60)
	Diploma and more	208 (24.03)	193 (48.13)	401 (24.97)
Mother's Occupation	Government employee	64 (7.35)	59 (7.97)	123 (7.66)
	Merchant	64 (7.97)	86 (10.71)	150 (9.34)
	Farmer	54 (6.72)	47 (5.85)	101(6.29)
	House wife	596 (74.22)	553 (68.87)	1,149 (71.54)
	Daily laborers	14 (1.74)	48 (5.98)	62 (3.86)
	Self employed	16 (1.99)	5 (1.31)	21 (1.31)
Place of residence	Urban	0	429 (100.0)	429 (26.71)
	rural	803 (68.32)	374 (31.78)	1,177 (73.29)

Table 1: Socio-Demographic Characteristics of Maternity Waiting Home Users and Non-Users in the Public Hospitals of West ARSI Zone, 2022

3.2 Reproductive and Medical Characteristics of Respondents

Two hundred forty-one (30.01%) were primigravida in the exposed group, and nearly half of the study subjects in the non-exposed group were primigravida 330 (41.10%). Nearly one-quarter of the study subjects in the exposed group were in Paragraph 4 and

above. 201 (25.03%) and 123 (15.31%) study participants in the non-exposed group were in para 4 and above. 60 (7.47) study participants in the exposed group had no ANC follow-up, 60 (69.77%), and 26 (3.24) study subjects in the non-exposed group had no ANC follow-up, 26 (30.23%) (Table 2).

Variable	Category	Exposed No. (%)	Non exposed No. (%)	Total n=1606 (%)
Gravidity	1	241 (30.01)	330 (41.10)	571 (35.55)
	3-4	356 (44.33)	355 (44.21)	711 (44.27)
	>=5	206 (25.65)	118 (14.69)	324 (20.17)
Parity	0	243 (30.26)	334 (41.59)	577 (35.93)
	1-3	359 (44.71)	346 (43.09)	705 (43.89)
	>=4	201 (25.03)	123 (15.32)	324 (20.17)
ANC visit	0	60 (7.47)	26 (3.24)	86 (5.35)
	1-3	479 (59.65)	468 (58.28)	947 (58.97)
	>=4	264 (32.88)	309 (38.48)	573 (35.68)
History of C/S	Yes	27 (4.68)	40 (7.87)	67 (4.17)
	No	550 (95.32)	468 (92.13)	1018 (63.38)
Previous obstetrics complication	Yes	188 (23.41)	98 (12.20)	286 (17.80)
	No	389 (48.44)	410 (51.06)	799 (49.75)
Medical disease during pregnancy	Yes	16 (1.99)	58 (7.22)	74 (4.60)
	No	787 (98.01)	747 (92.78)	1534 (95.51)
Planned current pregnancy	Yes	708 (88.17)	656 (81.69)	242 (15.09)
	No	95 (11.83)	147 (18.31)	1364 (84.93)

Table 2: Reproductive and Medical Characteristics of Maternity Waiting Home Users and Non-Users in the Public Hospitals of West ARSI Zone, 2022

Nearly one-fourth of the study subjects had experienced obstetric complications; previously, 188 (23.41%) and 98 (12.20%) study subjects in the non-exposed group had experienced obstetric complications. 27 (4.68%) study subjects in the exposed group had C/S previously; 27 (40.30%) and 40 (7.87%) study subjects in the non-exposed group had C/S previously (Table 2).

3.3 Health Service Related Characteristics of Respondents

Seven hundred sixty-four (95.14%) study subjects in the exposed group had traveled 1-2 hours to reach the health facility, and more than three-fourths of the study participants in the non-exposed group had traveled 1-2 hours to reach the health facility (611, 76.09%). More than half of the study participants in the exposed group were transferred from other facilities, 431 (53.67%), and similarly, more than half of the study participants in the non-exposed group were transferred from another facility, 443 (55.17%).

3.4 Maternal Obstetrics Characteristics and Maternal Complication

More than half of the study participants in the exposed group had taken iron supplementation (511; 63.64%), and nearly three-fourths of the study subjects in the non-exposed group had taken iron supplementation (590; 73.47%). The primary attendants of the delivery in more than half of the study subjects in the exposed group were emergency surgeons (491; 61.15%), whereas the primary attendants in more than three-fourths of the study subjects in the non-exposed group were midwives (682; 84.93%). Nearly three-fourths of study subjects in the exposed group were given birth via SVD 588 (73.23%), and similarly, more than three-fourths of study subjects were given birth via SVD 631 (78.58%) (Table 3).

Variable	Category	Exposed No. (%)	Non exposed No. (%)	Total n=1606 (%)
Iron supplementation	Yes	511 (63.64)	590 (73.47)	1,101 (68.56)
	No	292 (36.36)	213 (26.53)	505 (31.44)
Primary attendant of delivery	Doctor	55 (6.85)	35 (4.360)	90 (5.60)
	Nurse	23 (2.86)	4 (0.5)	27 (1.68)
	Midwife	491 (61.15)	682 (84.93)	1,173 (73.04)
	Emergency Surgeon	214 (26.65)	82 (10.21)	296 (18.43)
	Unknown	20 (2.49)	0	20 (1.25)
Mode of delivery	SVD	548 (73.23)	631(78.58)	1,219(75.90)
	Instrumental	48 (5.98)	88 (10.96)	136 (8.47)
	C/S	167 (20.80)	84 (10.46)	251 (15.63)

Experienced obstetrics complication currently	Yes	178 (22.17)	237 (29.51)	1,191 (74.16)
	No	625 (77.83)	566 (70.49)	415 (25.84)

Table 3: Maternal Obstetrics Characteristics of Maternity Waiting Home Users and Non-Users in the Public Hospitals of West ARSI Zone, 2022

Maternal obstetrics characteristics of maternity waiting home users and non-users in the public hospitals of West Arsi Zone, 2022

Nearly one-fourth of study subjects in the exposed group had experienced complications 178 (22.17%), whereas more than one-fourth of study subjects in the non-exposed group had experienced complications 237 (29.57%) (Table 3). More than one-third of the participants in the exposed group had developed PROM 62 (34.83), and more than one-quarter of the participants in the non-exposed group had developed PROM. 36 (15.19%). Study subjects from the non-exposed group developed obstructed labor, whereas 4 (2.25%) (Figure 3). There was no maternal death recorded in both exposed and non-exposed groups.

3.5 Maternity Waiting Homes Services

The median duration of stay at maternity waiting homes was 6 (IQR 4, 9). Almost all of the respondents in the exposed group had received health services. The most common health services given were health education, food, physical examinations, laboratory tests, and antibiotics (18.80%).

3.6 Bi-Variable and Multi-Variable Generalized Linear Model Analysis of Maternal Health Outcomes

Maternal Health Outcomes

Maternity waiting home utilization, maternal age, frequency

of ANC, type of birth, parity, and transfer from another facility were factors that had p-values less than 0.20 during bi-variable generalized linear model analysis.

After controlling for possible confounders in the multivariable generalized linear model, maternity waiting home utilization, maternal age, parity, and transfer from other facilities were statistically significantly associated with maternal health outcomes at p-value <0.05.

Maternity waiting home utilization was an independent risk for maternal health outcomes. There was a 28% reduced risk of developing maternal complications in the exposed group when compared to the non-exposed group [RR = 0.72, 95% CL = 0.61, 0.86]. There was a 43% reduced risk of developing maternal complications among women whose age was 20–35 years compared to those whose age was greater than 35 years [RR = 0.57, 95% CI (0.41, 0.97).

Those women who were para 1–3 had a 1.42 times higher risk of developing maternal complications when compared to nulliparous women [RR = 1.42, 95% CL (1.17, 1.72)]. Similarly, those mothers who were transferred from another facility had a 1.59 times higher risk of developing a maternal complication than those who were not transferred [RR = 1.59, 95% CL (1.34, 1.90)] (Table 4).

Variable	Category	Complicated No. (%)	Uncomplicated No. (%)	CRR (95% CI)	ARR (95% CI)	P-value
Maternity home utilization	Utilized (Exposed)	178 (22.17)	625 (77.83)	0.75 (0.63,0.89)	0.72 (0.61, 0.86)*	0.000*
	Not utilized (non-exposed)	237 (29.51)	566 (70.49)	1	1	1
Maternal age	<20	22 (36.07)	39 (63.93)	0.98 (1.62, 1.58)	0.93 (0.57, 1.51)	0.764
	20-35	370 (24.97)	1,112 (75.03)	0.68 (0.49, 0.96)	0.57 (0.41, 0.97)*	0.001*
	>35	23 (36.51)	40 (63.49)	1	1	1
Frequency of ANC	0	25 (29.07)	61 (70.93)	1	1	
	1-3	255 (26.93)	692 (73.07)	1.23 (0.86 , 1.77)	1.41 (0.98, 2.02)	0.064
	≥4	135 (23.56)	438 (76.44)	1.14 (0.95, 1.37)	1.12 (0.94, 1.34)	0.204
Type of birth	Singleton	10 (16.95)	49 (83.05)	1.54 (0.87, 2.73)	1.42 (0.79, 2.52)	0.233
	Twin	405 (26.18)	1,142 (73.82)	1	1	1
Parity	0	142 (24.61)	435 (75.39)	1	1	1
	1-3	207 (29.36)	498 (70.64)	1.19 (0.99, 1.43)	1.42 (1.17, 1.72)*	0.000*
	≥4	66 (20.37)	258 (79.63)	0.83 (0.64, 1.07)	0.95 (0.72, 1.26)	0.727
Transferred from other facility	Yes	145 (19.81)	587 (80.19)	1.56 (1.31, 1.86)	1.59 (1.34, 1.90)*	0.000*
	No	270 (30.89)	604 (69.11)	1	1	1

* Significant with multiple logistic regression at p-value ≤0.05

Table 4: Bivariable & Multivariable Generalized Linear Model for the Effect of Maternity Waiting Home Utilization on Maternal Health Outcomes, Public Hospitals of West ARSI Zone, 2022 (N=1606)

4. Discussion

The primary aim of the current study was to determine the effect of maternity waiting home utilization on maternal health outcomes. According to the present study, maternity waiting home users had a 28% reduced risk of developing a maternal complication when compared to non-users. This finding is supported by a study done at the national level, which found that the direct obstetric complication rate was 49% lower at hospitals with maternity waiting homes compared to hospitals without maternity waiting homes [8].

The findings of the present study are also supported by a mixed prospective cohort study conducted in Yetbon, Ethiopia. As per the findings of the aforementioned study, MWH use was associated with a 73% lower risk of maternal complications compared to MWH non-users [9].

Similarly, the current funding is also in line with a study carried out in the Tigray region, which revealed that the incidence rates of maternal complications were significantly lower among the maternal waiting home users than non-users [10]. A systematic review done in developing countries also found consistent findings with the present study, which revealed that maternity waiting home users were 80% less likely to die than non-users [11].

The present study also revealed that maternity waiting home users had a reduced risk of developing maternal complications when compared to non-users. A similar finding was found in a study conducted in Ytebon, Ethiopia, in which MWH use was associated with a 77% lower risk of childbirth complications and a 94% lower risk of fetal and newborn complications [9]. Similarly, a study done in health facilities in Gurage Zone revealed that MWH users had lower odds of having delivery complications, which is consistent with the present study [12].

The present study showed a 43% reduced risk of developing maternal complications among women whose age was 20–35 years compared to those whose age was greater than 35 years. This might be due to the fact that as women get older, the risk of getting chronic illnesses is high, and these diseases might expose the mother to developing obstetric complications.

This finding is consistent with the study carried out in Debre Tabor town, Ethiopia, which found that a mother's age was associated with adverse pregnancy outcomes [13]. Similarly, a study carried out in China found a consistent finding: maternal age of 35 years or older was found to be significantly associated with at least one adverse outcome [14].

This finding is also in line with a study done in Gurage Zone, which revealed that women who did not use MWH were more likely to develop delivery complications, and women with delivery complications had higher odds of undergoing cesarean delivery and maternal death [15].

The current study also found that women who were para 1–3 had a 1.42 times higher risk of developing maternal complications when compared to nulliparous women. This might be due to the fact that it is likely that obstetric complications will repeat themselves and also be related to advanced age.

A similar finding was found in a study carried out in the Sidama region, in which women with grand multiparity gave birth to babies with a higher risk of stillbirth and preterm birth [16]. This finding is also in line with a study carried out in Northern Tanzania, which found that grand multiparous women had increased odds of prelabour rupture of membranes, stillbirth, and preterm birth delivery as compared to women in the lower parity group [17]. Similarly, in a study carried out in China, multigravida was found to be significantly associated with at least one adverse outcome, which is consistent with the present study [14].

The present study also found that women who were transferred from other facilities had a 1.59 times higher risk of developing a maternal complication than those who were not transferred. This might be due to the fact that usually complicated cases are referred or transferred from one facility to the next higher-level facility, which may lead to adverse outcomes due to other factors. This finding is supported by a study carried out in Southwestern Uganda in which referral from another health facility was a factor associated with adverse maternal outcomes [18].

5. Conclusion

The present study found that maternity waiting home users had a reduced risk of developing maternal complications when compared to non-users. Besides, advanced maternal age, multiparity, maternal complications, and transfer from another facility were independent predictors of maternal complications. Moreover, maternity waiting home utilization had an evident impact on reducing maternal complications [19-38].

Disclosure

Abbreviations: ANC, Antenatal Care; APH, Antepartum Hemorrhage; C/S, Cesarean Section; EDHS, Ethiopian Demographic Health Survey; EPHI, Ethiopian Public Health Institute; MWHs, Maternity Waiting Homes; PNM, Perinatal Mortality; PROM, Premature Rupture of Membranes; PPH, Postpartum Hemorrhage; SDGs, Sustainable development Goals; WHO, World Health Organization; SVD, Spontaneous Vaginal Delivery.

Ethics Approval and Consent to Participate

Before commencing data collection, the Ethical Review Committee of Madda Walabu University, Shashemane Campus provided approval. A letter of authorization was also received from the West Arsi Zone Health Office. In addition, verbal consent was obtained from study participants to confirm their willingness to participate after explaining the objective of the study. Respondents were notified about their right to refuse or terminate at any point of the interview. The information provided by each respondent was

kept confidential.

Consent for Publication

Not Applicable

Availability of Data and Materials

The data sets used and/or analysed during the current study available from the corresponding author on reasonable request.

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Competing Interests

The authors declared that there were no conflicts of interest.

Authors' Contributions

NG made a significant contribution in conceptualizing the idea, study design, execution, acquisition of data, analysis, and interpretation. AE made a significant contribution to the acquisition of data, analysis, interpretation, and drafting of the manuscript. AU, DY, and AY made a significant contribution to the acquisition of data, analysis, and interpretation and significantly revised the manuscript for methodological and scholarly essence. All authors have read and approved the final manuscript.

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