Primary Health Care: Open Access

Zegeye et al., Primary Health Care 2014, 4:1
DOI: 10.4172/2167-1079.1000150

Research Open Access

The Role of Geographical Access in the Utilization of Institutional Delivery Service in Rural Jimma Horro District, Southwest Ethiopia

Kiflom Zegeye[1], Abebaw Gebeyehu[2]* and Tesfahun Melese[3]

[1]*Communicable disease control Team, Kellem Wollega Zonal Health Department, Oromia Regional State, Ethiopia*
[2]*Department of Reproductive Health, Institute of Public Health, University of Gondar, Ethiopia*
[3]*Department of Health Informatics, Institute of Public Health, University of Gondar, Ethiopia*

Abstract

Introduction: Access to skilled maternal care in a suitable setting at all births is momentous to reduce maternal mortality. The role of geographical access particularly in rural Ethiopia is not sufficiently investigated. Hence, the central intention of this study was to estimate the effect of geographic access of rural mothers on institutional delivery care use in Jimma Horro District, Southwest Ethiopia.

Methods: A community-based cross-sectional survey was conducted in April 2012 in six randomly selected *kebeles*. Data on socio-demographic, maternal history and maternity services use were collected from 528 eligible mothers using structured questionnaire. Geo-referenced data on respondents' houses and health institutions as well as walking tracks from each village center to the nearest health center were recorded using hand-held Global Positioning System (GPS) instrument and mapped using Arc GIS 9.3. Multivariate logistic regression analysis was performed to estimate the effect of distance on facility delivery use by controlling for range of confounders.

Results: Only 8% of the mothers gave birth to their last babies in health facilities. One third of the respondents live within 5-kilometer walking distance of the nearest health center. Each kilometer increase in walking distance to the nearest health center resulted in a reduction of institutional delivery service by 22% (AOR=0.78, 95% CI: 0.64 to 0.96). Use of institutional delivery service was also significantly higher among mothers who faced obstetric complications, and those who attended four and more ANC visits.

Conclusion: Geographic access to health centers plays a major role in institutional delivery care use among rural mothers. Tackling the geographical dimension of access is pivotal in elevating institutional delivery care utilization.

Keywords: Geographic access; Institutional delivery

Background

Access to skilled maternal care at all births is a central strategy for ensuring safe motherhood [1]. It is also well documented that, apart from the skill, an enabling environment, where there is access to the necessary equipments, drugs, and other supplies that improve management of pregnancy-related complications has substantial impact on the reduction of both maternal and neonatal deaths [2,3].

Despite such proven interventions, the issue of maternal mortality remains to be a major public health problem of many developing countries to this day [4,5]. Sub-Saharan Africa alone accounts for 56% of the global maternal deaths, where rural women bear the highest burden [5-7]. Maternal deaths occur mostly during labor, delivery, and the immediate postpartum period [4]. The Ethiopian Demographic and Health Survey (EDHS) 2011 reported 676 maternal deaths per 100,000 live births, which is almost the same with that of 2005 EDHS figure (673) [7].

Historical and contemporary evidences ascribed the fundamental grounds for such high mortalities and morbidities at least partly to lack of access and timely use of appropriate delivery care services [8,9]. Majority of these deaths could be averted by improving access to the interventions for addressing complications of pregnancy and childbirth and utilization of these services by all mothers [4]. This requires both the availability of such services as well as the will of pregnant women to seek apposite care at delivery.

Despite decades of ongoing efforts to strengthen delivery care services, institutional delivery service utilization by women during childbirth has been persistently very low in Ethiopia [10]. The situation is more serious in rural areas where only 4.1% of the deliveries occur in health facilities compared to 49.8% for urban areas [7].

While the likelihood of a woman giving birth in a health facility depends on multitude of factors, poor geographic access has been identified as one of the major barriers facing rural women in seeking and using life-saving maternity care services in many developing countries including Ethiopia [2,11].

Geographic access, the distance (or time) needed in order to reach a health facility, is not only a direct physical barrier that precludes women from reaching health institutions but it also affects even the decision to look for care. It could have more influence in rural areas of Ethiopia, where it is norm to see women in labor being carried on men's shoulder traveling many kilometers to reach a health facility [12].

Many of the studies, particularly in Ethiopia, assess geographic accessibility in terms of subjective data on distance or travel time to health facilities as study participants or "informants" reported [13,14]. This kind of assessment often raises the question of internal validity of the data. Hence, this study was conducted to shed light on the extent to which geographic access of rural women to health facilities can influence the use of institutional delivery care by adjusting for

***Corresponding author:** Abebaw Gebeyehu, Department of Reproductive Health, Institute of Public Health, University of Gondar, Ethiopia, Tel: +251 581110243; E-mail: abebawgebeyehu@yahoo.com

Received November 18, 2013; **Accepted** Feburary 20, 2014; **Published** Feburary 24, 2014

Citation: Zegeye K, Gebeyehu A, Melese T (2014) The Role of Geographical Access in the Utilization of Institutional Delivery Service in Rural Jimma Horro District, Southwest Ethiopia. Primary Health Care 4: 150. doi:10.4172/2167-1079.1000150

the effects of some socio-demographic, maternal and other service utilization related factors. Objective distance measurements were also employed by integrating some features of Geographic Information System (GIS). Findings could be helpful to understand the pattern of geographic accessibility of rural women to health facilities and the role it plays in utilization of institutional delivery service.

Methods

A community-based cross-sectional survey was conducted in Jimma Horro District in April 2012. Jimma Horro lies in Kellem Wellega Zone of Oromia Regional State, Southwest of Ethiopia with 8° 57' 41.314" North 34° 49' 16.864" East geographic coordinates. Nunnu, the capital of the district, is found 663 km of Addis Ababa, the capital of Ethiopia. According to the 2007 census, total population of the district for the year 2011/2012 was 54,081. The district was organized into one urban and 19 rural *kebeles* - the smallest administrative unit in Ethiopia (Figure 1). The district's health care system is made up of two health centers and 20 health posts [15]. During the data collection period, there was neither ambulance nor public transport services within the district available.

The required sample size was computed using single population proportion formula under the assumptions of 95% confidence level, 4.1% rural mothers delivered in health facility [7] and 2.5% margin of error (d). After taking into account design effect of two and 10% possible non-response rate, the final sample size was calculated to be 530. The outcome of interest was institutional delivery service utilization, which was dichotomized as "Yes" and "No". In this study, childbirths took place in hospitals or health centers were considered as institutional deliveries whereas those occurred in health posts or at home were not.

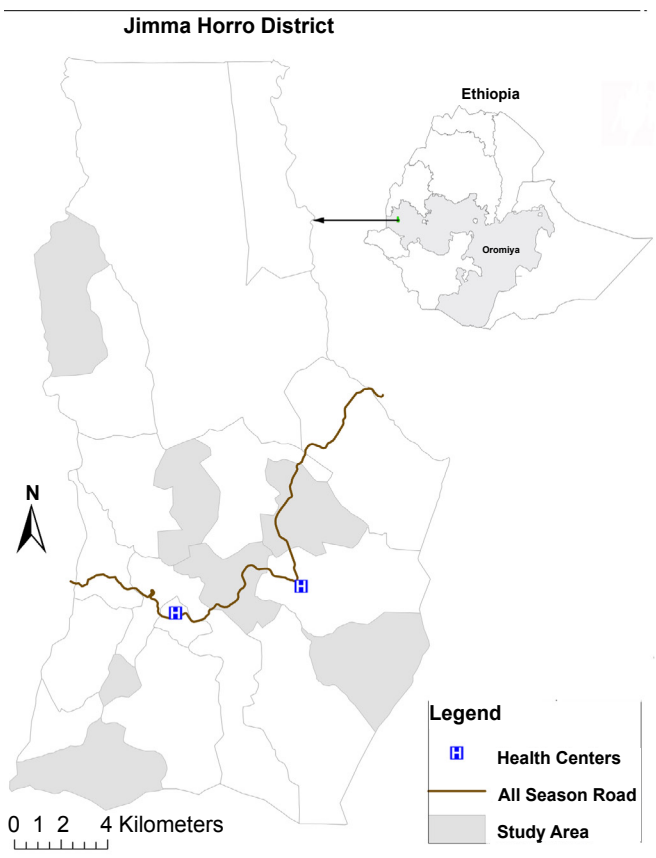

Figure 1: Map of Jimma Horro District and the study area.

Cluster sampling technique was employed to select the study units considering rural *kebeles* as logical clusters. From the 19 rural *kebeles,* six were selected by simple random sampling. Each household within the selected *kebeles* was visited. All women in the selected *kebeles* who had reported to have at least one birth (≥ 28 weeks of gestation) within the two years preceeding the data collection period were included in the survey regardless of the birth outcome.

Geographic access to health facilities was determined in terms of walking distance from center of each village to the nearest health center. A village (locally known as '*Gere*') is a neighborhood or group of people, which comprises roughly 20 households. The distance was measured in kilometers; and implemented as continuous walking distance. Moreover, means of transportation used to reach health facilities, socio-demographic, and other factors like history of service utilization were included as independent variables.

The data were collected in April 2012. The *Garmin® H72* GPS handheld device was used to collect all the geo-referenced data. Data were collected using structured survey questionnaire, which was developed first in English and translated into local language, Oromo, by native speaker. The questionnaire included socio demographic information, obstetric history (age at first marriage, age at first pregnancy, ANC, birth complication, and birth attendant), and health facility delivery service utilization information (place of delivery, birth attendant, mode of transportation, time needed to reach health facility, distance).The field data collectors were divided into six teams - one team per *kebele*. Each team comprises two data collectors with handheld GPS device and two *kebele* informants. Two supervisors coordinated movements of teams.

Data collectors together with kebele and village informants determined center of 52 villages. Then, track data on routes from each village center to the nearest health center (following the path the study participants commonly use to reach health center close to the village) were registered. Besides, geo-referenced location data (x-y coordinates) on interviewee houses, health centers and health posts were recorded. All the GPS data were collected in Geographic Coordinate System (GCS), Adindan, and datum D_Adindan in decimal degrees with five places of precision (dd.ddddd). Finally, the GPS data were re-projected to Projected Coordinate System (PCS), Adindan _UTM_Zone_37N. *Kebele* and District boundaries and polygon maps for the entire study area and other geographic features within it were obtained from the Ethiopian Central Statistics Authority (CSA) (Figure 2). For each woman a face-to-face interview procedure was done by female data collectors.

The GPS (walking track, household and facility location) data were entered into Arc GIS version 9.3 and integrated into respective *kebeles*` polygon map, and were processed for interpretations. In addition, all the other collected data were entered into Epi Info version 3.5.1. Eventually, both the data in the Epi Info and Arc GIS were transferred to SPSS version 16.0 for further analysis. Logistic regression analysis was used to control possible confounders.

Training was given to data collectors and supervisors prior to the actual data collection time focusing on skills of conducting interview, field GPS and questionnaire data collection and recording. The questionnaire was pretested and checked for its cultural appropriateness and clarity. This study was reviewed and approved by the Institutional Review Board (IRB) of the University of Gondar. Formal permission

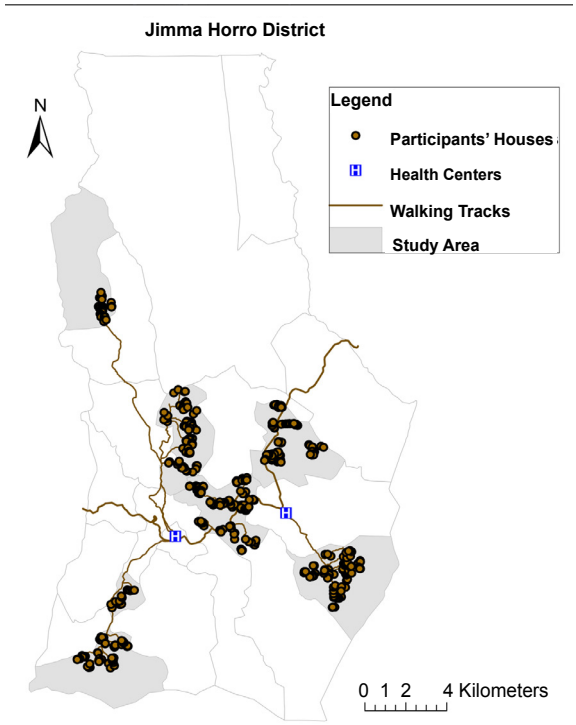

Figure 2: Participants' houses, health centers and walking tracks to health centers in rural Jimma Horro, Ethiopia.

to conduct the study was obtained Kellem Wellega Zone Health Department and Jimma Horro District Health Office. Verbal informed consent was also obtained from each study subject.

Results

Socio-demographic characteristics of the study participants

In the study, 528 eligible mothers were identified. The mean age was 28 ± 6.1 SD years. About three-fourth (73.3%) were between 20-34 years of age. Most, 97.7%, 94.1%, of them were married and were housewives respectively. About 80% of the women and 47% of their husbands did not attend any formal education. More than half (65.7%) reported to have more than four family members (Table 1).

Institutional delivery service utilization

Out of 528 mothers, 42 (8%) delivered in health institutions (37 mothers in health center and 5 in hospital)

During delivery, three-forth (74.2%) and 16.5% of the mothers were assisted by relatives and/or neighbors and Traditional Birth Attendants (TBAs), respectively. Skilled health workers and Health Extension Workers (HEWs) assisted only 8.1% and 0.8% mothers, respectively.

The role of geographic access in the utilization of institutional delivery service (before and after controlling of confounders)

In the study, 189 (35.8%) of the mothers were found to live within 5 kilometer, 495 (93.8%) of the mothers reside within 10 km walking distance of the nearest health center. Proportion of institutional delivery service utilization was 13.2% among those who live within 5 km of a

Characteristics		Institutional delivery		Total
		Yes n (%)	No n (%)	n (%)
Mother's age at interview	15-19	19(15.2)	106(84.8)	125(23.7)
	20-24	8(5.5)	138(94.5)	146(27.7)
	25-29	4(3.4)	112(96.6)	116(22)
	30-34	9(8.1)	102(91.9)	111(21)
	35+	2(6.7)	28(93.3)	30(5.7)
	Mean (Standard deviation)	28(6)		
Marital status	Married	42(8.1)	474(91.9)	516(97.7)
	Others (separated, divorced and widowed)	0(0)	12(100)	12(2.3)
Religion	Protestant	31(11.4)	240(88.6)	271(51.3)
	Muslim	4(3.1)	126(96.9)	130(24.6)
	Orthodox	7(5.5)	120(94.5)	127(24.1)
Mother's education	No formal education	28(6.7)	393(93.3)	421(79.7)
	Primary and above	14(13.1)	93(86.9)	107(20.3)
Mother's occupation	House wife	41(8.2)	456(91.8)	497(94.1)
	Others (farmer, employed [waged], student)	1(3.2)	30(96.8)	31(5.9)
Husband`s Education (n=517)	No formal education	9(3.7)	233(96.3)	242(46.8)
	Primary and above	33(12)	242(88)	275(53.2)
Husband`s occupation (n=517)	Farmer	40(8)	461(92)	501(96.9)
	Others (Merchant, employed[waged])	2(12.5)	14(87.5)	16(3.1)
Monthly family income	83-250 ETB	6(3.6)	159(94.6)	165(31.2)
	251-417 ETB	6(4.5)	128(95.5)	134(25.4)
	418-832 ETB	9(10.2)	79(89.8)	88(16.7)
	≥ 833 ETB	21(14.9)	120(85.1)	141(26.7)
	Mean (Standard deviation)	574.7(531.3)		
Family size	1-4	22(12.2)	159(87.8)	181(34.3)
	>= 5	20(5.8)	327(94.2)	347(65.7)
	Mean (Standard deviation)	5.6(1.9)		
Have radio	Yes	27(11.2)	215(88.8)	242(45.8)
	No	15(5.2)	271(94.8)	286(54.2)

Table 1: Socio-demographic characteristics of rural women in relation to delivery service use in Jimma Horro, Southwest Ethiopia.

Characteristics		Institutional delivery		Total
		Yes n (%)	No n (%)	n (%)
Age at 1st marriage	15-19	30(8.2)	338(91.8)	368(69.7)
	20-24	12(8.8)	125(91.2)	137(25.9)
	25-29	0(0)	23(100)	23(4.4)
	Mean (Standard deviation)	18.3(2.9)		
Age at 1st pregnancy	15-19	21(6.9)	284(93.1)	305(57.8)
	20-24	19(10.6)	160(89.4)	179(33.9)
	25-29	2(4.8)	42(95.2)	44(8.4)
	Mean (Standard deviation)	19.6(3.1)		
Pregnancy planned	Yes	40(8.5)	431(91.5)	471(89.2)
	No	2(3.5)	55(96.5)	57(10.8)
Gravidity	1	16(16.2)	83(83.8)	99(18.8)
	2-4	16(6.2)	242(93.8)	258(48.9)
	≥ 5	10(5.8)	161(94.2)	171(32.3)
	Mean (Standard deviation)	3.7(2.2)		
Birth order	1	17(16.3)	87(83.7)	104(19.7)
	2-4	15(5.9)	240(94.1)	255(48.3)
	≥ 5	10(5.9)	159(94.1)	169(32)
	Mean (Standard deviation)	3.6(2.2)		
Any abortion	Yes	2(7.7)	24(92.3)	26(4.9)
	No	40(8)	462(92)	502(91.9)
Obstetric complication	Yes	9(20.9)	34(7.1)	43(8.1)
	No	33(6.8)	452(93.2)	485(91.9)
ANC visit	Yes	38(10.9)	310(89.1)	348(66)
	No	4(2.2)	176(97.8)	180(34)
Number of ANC visit(s)	No visit	4(2.2)	176(97.8)	180(34)
	1-3 visit(s)	7(4.5)	148(95.5)	155(29.4)
	≥ 4 visits	31(16.1)	162(83.9)	193(36.6)
Distance (home to HC)	<5 km	25(13.2)	164(86.8)	189(35.8)
	>5 km	17(5)	322(95)	339(64.2)

Table 2: Maternal history and service use characteristics of rural women in relation to delivery service use in Jimma Horro, Southwest Ethiopia.

health center and 5% among those who were reside in more than 5 km of the nearby health center (Table 2). The longest and shortest one-trip distances to a nearby health center were 15.8 and 2.6 kilometers respectively.

The bivariate analysis indicated that there was statistically significant association between distance and use of institutional delivery service. One-kilometer increase in walking distance to the nearest health center resulted in a reduction of odds of institutional delivery service use by a factor of 0.78 (COR=0.78, 95%CI: 0.65 to 0.93) (Table 3).

The association between distance to a nearest health center and use of institutional delivery was significant even after the model was adjusted for the selected socio-demographic, obstetric and other factors. As walking distance to the nearest health center increased by a kilometer, institutional delivery declined by 22% that means by a factor of 0.78(AOR=0.78, 95%CI: 0.64to 0.96) (Table 3). Concerning mode of transportation to reach health facilities during childbirth, all mothers delivered in health facilities was taken to a health center or health post with locally made stretcher-like "bed" carried by relatives and or neighbors. Those who gave birth in hospital used trucks which are not made for such purpose (such as *NPR ISUZU*) to reach a hospital.

In addition to distance to the nearest health center, experience of complications, presence of ANC visits and number of ANC visits showed statistically significant association with institutional delivery service utilization (Table 3).

Discussion

The present study has emphasized the importance of geographical access in the use of institutional delivery services in such rural areas with extremely low facility delivery service.

Despite of the fact that institutional delivery care is an important factor for health of the mother and the newborn, utilization of institutional delivery service by rural mothers in the study area was very low, where fewer than 1 in 10 mothers gave birth in health institution. Comparable previous findings were reported from rural mothers in different parts of Ethiopia (Metekel, 6.8%, rural Jimma, 6.2%) [16,17]. This finding was higher than the recent EDHS estimate; merely 4.1% of rural births took place in health facilities [7]. The difference in facility delivery use in this study when compared to the national figure could be attributed partly to differences in methodological settings.

In this study, an attempt has been made to look at the pattern geographic access to health facilities in light of two access standards. The first one is the international standard for access to clinical/curative services, which defines good geographic access as being within five kilometers distance of service delivery point. The other one is the potential coverage or access standard of the Federal Ministry of Health of Ethiopia (FMHE), as having access to health facilities within distance of 10 km [18]. The later standard might not pose substantial difficulties in having access to many preventive services. Yet, considering the former benchmark is instrumental, particularly in rural Ethiopia where

Characteristics		Crude Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
Religion	Protestant	4.07(1.41-11.78)	3.48 (0.98,10.86)
	Muslim	1.84(0.53-6.44)	1.82(0.47, 7.00)
	Orthodox	1	1
Mother's education	No formal education	1	1
	Primary and above	2.11(1.07-4.17)	1.45(0.59, 3.58)
Husband`s Education	No formal education	1	1
	Primary and above	3.530(1.65-7.54)	2.09(0.87, 5.02)
Monthly family income	83-250 ETB	1	1
	251-417 ETB	1.23(0.39-3.89)	0.79(0.25, 2.55)
	418-832 ETB	2.82(0.97-8.19)	1.53(0.47, 4.97)
	≥ 833 ETB	4.81(1.88-12.29)	2.48(0.91, 6.77)
Family size	1-4	2.26(1.20-4.27)	1.64(0.63, 4.25)
	≥5	1	1
Have radio	Yes	2.27(1.18-4.37)	1.68(0.75, 3.77)
	No	1	1
Birth order	1	3.11(1.36-7.08)	3.05(0.86, 10.78)
	2-4	0.99(0.44-2.27)	0.94(0.35, 2.54)
	≥5	1	1
Obstetric complication	Yes	3.63(1.60-8.19)	4.08(1.49, 11.14)
	No	1	1
ANC visit	Yes	5.39(1.89-15.36)	3.79(1.21, 11.85)
	No	1	1
Number of ANC visit	No visit	1	1
	1-3 visit(s)	2.08(0.60-7.25)	1.39(0.38, 5.06)
	≥ 4 visits	8.42(2.91-24.37)	5.72(1.90, 17.19)
Distance to health center		0.78(0.65-0.93)	0.78(0.64, 0.96)

1 - Reference category

Table 3: Association of distance and other factors with institutional delivery service utilization among rural women in Jimma Horro, Southwest Ethiopia.

virtually the only means of reaching health facilities is traveling on foot or by stretcher, which might deteriorate the mothers' condition along the way and make treatment more complicated [4,12,18].

When the 5 km criterion was taken, around one third of the mothers have access to health centers. When the 10 km standard was considered, however, great majority of the mothers have access to health centers. Rural mothers in the study area travel an average of 7.3 kilometers to reach the nearest health center; a 10 km discrepancy was noticed between the shortest and the longest walking distances to reach the nearest health center.

Geographic access to health centers was materialized to be a strong predictor of facility delivery utilization. Use of institutional delivery service declined as distance from the nearest health center became longer and longer. Institutional delivery utilization among mothers living within 5 km distance of the nearest health center was virtually 3 fold higher than those who live more than 10 km of a health center near to them. Such role of distance was observed in many developing countries. In rural Uttar Pradesh, India, women who live within a radius of 3 km from health facility were more likely to seek institutional delivery service than those living 8 km or more from the facility [19]. A study from rural Haiti also indicated as distance to hospital increased from 5 km to 30 km the utilization of institutional delivery deceased by 12% [20]. Women within 5 km of health facility were almost 4 times more likely to deliver in health facility than those of 6+ km in southern Tanzania [21].

The odds of institutional delivery service use among these rural mothers declined by 22%, as distance to the nearest health center increased by a kilometer. In rural Zambia 29% decrease in odds of facility delivery was observed for every doubling of distance [22]. Possible explanation for this might be pregnant women do not even attempt to reach a facility for delivery since walking many kilometers is difficult in labor and worse if labor starts at night and transport means are traditional and often unavailable particularly in such rural area [4,11,23]. Apart from this, women in higher monthly income families were more likely to opt for institutional delivery service than those in lower monthly income families. This finding was in line with previous studies in India [23,24]. The main reason for mothers with higher monthly income to deliver in health facilities is that delivery service requires extensive costs during transportation and care which is difficulty for the lower income families to afford.

Though not significant, the probability of giving birth in health facilities increased in lower birth orders. First births were more likely to take place in health facilities than fifth and more births. This finding was supported by previous studies [25]. There are a number of explanations for this. It could be because mothers often face more difficulty in their first pregnancy and are less experienced in childbirth that increases the probability of using health facilities during delivery. Contrarily, mothers with high birth orders could have previous experience in childbirth that might build their confidence, which in turn increase chance of home delivery [24-26].

Mothers who had experience of obstetric complications were more likely to use health institutions during their pregnancy and/or childbirth. Similar previous studies from rural Nepal supported this finding [27]. This might be due to the fact that experience of complications during pregnancy and/or delivery might make women seek skilled assistance from health professionals in health institutions [26].

The current study also showed mothers who had ANC visits, and who had four and more ANC visits during their most recent pregnancy were more likely to use health institutions during their childbirth than those who had never visited. Similar results were also found from previous studies in rural Cambodia, rural India and Bangladesh [2,24,28]. This might be because ANC visit especially when it is more than four ANC visits expose the women to more health education and counseling which are both likely to increase service utilization [26].

It is worth considering that due to its cross-sectional nature, recall and interviewer bias could be potential limitations of this study. Besides, while the use of such smaller geographic areas reduces unmeasured geographic access variations within area of aggregation in large studies, it does not consider the border crossing issue. It is important to note that, the nearest health facilities are not necessarily health facilities actually the mothers gave their birth.

Conclusion

The present study documented that institutional delivery service utilization among mothers in rural Jimma Horro district was very low (8%). The study identified that geographic access to health centers plays a major role in the utilization of institutional delivery care. Strong emphasis is commendable to consider the geographical dimension when planning expansion of maternity care services particularly delivery care service to reach the remote rural women. Increased attention should be given for distant mothers to boost up their access to health centers. However, this should be interpreted in cautious since distance alone is not always informative which depends on seasonal variation, mode of transportation and nature of roads. In this regard, efforts such as establishing affordable and sustainable emergency transport services should be given due weight, as it could minimize the effect of long distance.

Authors' Contributions

All authors contributed equally during the process of proposal development. KZ handled the data collection process. All authors involved during data analysis. KZ prepared the draft. Then AG and TM revised drafts of the paper. All authors read and approved the final manuscript.

Acknowledgements

We are very grateful to University of Gondar for the approval of the ethical clearance and its technical and financial support. We would like to extend our heartfelt thanks to the Kellem Wellega Zonal Health Department, Jimma Horro District Health Office, and the Ethiopian Central Statistics Authority Head Office for their kind collaboration. Special thanks go to Dereje Abdena and Yaddesa Hailu, for their valuable support during data collection. Authors are also highly indebted to data collectors and study participants.

References

1. UNFPA (2012) Skilled Attendance at Birth.
2. Yanagisawa S, Oum S, Wakai S (2006) Determinants of skilled birth attendance in rural Cambodia. Trop Med Int Health 11: 238-251.
3. Campbell OM, Graham WJ; Lancet Maternal Survival Series steering group (2006) Strategies for reducing maternal mortality: getting on with what works. Lancet 368: 1284-1299.
4. Ronsmans C, Graham WJ; Lancet Maternal Survival Series steering group (2006) Maternal mortality: who, when, where, and why. Lancet 368: 1189-1200.
5. Prata N, Graff M, Graves A, Potts M (2009) Avoidable maternal deaths: three ways to help now. Glob Public Health 4: 575-587.
6. Hailu S, Enqueselassie F, Berhane Y (2009) Health facility-based maternal death audit in Tigray, Ethiopia Ethiop J Health Dev 23: 115-119.
7. CSA, Ethiopia, ICF International (2012) Ethiopia Demographic and Health Survey 2011.
8. Prata N, Passano P, Sreenivas A, Gerdts CE (2010) Maternal mortality in developing countries: challenges in scaling-up priority interventions. Womens Health (Lond Engl) 6: 311-327.
9. Ronsmans C, Etard JF, Walraven G, Høj L, Dumont A, et al. (2003) Maternal mortality and access to obstetric services in West Africa. Trop Med Int Health 8: 940-948.
10. FDR, Ethiopia, MOH (2010) Health Sector Development Program IV: 2010/11 - 2014/15 2010. Ministry of Health: Addis Ababa.
11. Wagle RR, Sabroe S, Nielsen BB (2004) Socioeconomic and physical distance to the maternity hospital as predictors for place of delivery: an observation study from Nepal. BMC Pregnancy Childbirth 4: 8.
12. Ethiopian (2008) Maternal Health Care Seeking Behaviour in Ethiopia: Findings from EDHS 2005: In-depth Analysis of the Ethiopian Demographic and Health Survey 2005. UNFPA: Addis Ababa.
13. Abera M, Gebremariam A, Belachew T (2011) Predictors of Safe Delivery Service Utilization in Arsi Zone, South-East Ethiopia. Ethiop J Health Sci 21: 95-106.
14. Teferra AS, Alemu FM, Woldeyohannes SM (2012) Institutional delivery service utilization and associated factors among mothers who gave birth in the last 12 months in Sekela District, north west of Ethiopia: a community-based cross sectional study. BMC Pregnancy Childbirth 12: 74.
15. Jimma Horro, Woreda Health Office (2012) Annual Report of Jimma Horro Woreda Health Office for the year 2011/2012. Jimma Horro Woreda Health Office 1-86.
16. Tura G, Mariam AG (2008) Safe delivery service utilization in Metekel zone, North West Ethiopia. Ethiopian Journal of Health Sciences 17: 213-222.
17. Kruk ME, Paczkowski MM, Tegegn A, Tessema F, Hadley C, et al. (2010) Women's preferences for obstetric care in rural Ethiopia: a population-based discrete choice experiment in a region with low rates of facility delivery. Journal of epidemiology and community health 64: 984-988.
18. The World Bank and Ministry of Health Ethiopia (2005) A Country Status Report on Health and Poverty (In Two Volumes) Volume II: Main Report.
19. Varma DS, Khan ME, Hazra A (2010) Increasing institutional delivery and Access to emergency obstetric care Services in rural Uttar Pradesh. The Journal of Family Welfare 56: 23-30.
20. Gage AJ, Guirlène Calixte M (2006) Effects of the physical accessibility of maternal health services on their use in rural Haiti. Popul Stud (Camb) 60: 271-288.
21. Mpembeni RN, Killewo JZ, Leshabari MT, Massawe SN, Jahn A, et al. (2007) Use pattern of maternal health services and determinants of skilled care during delivery in Southern Tanzania: implications for achievement of MDG-5 targets. BMC Pregnancy Childbirth 7: 29.
22. Gabrysch S, Cousens S, Cox J, Campbell OM (2011) The influence of distance and level of care on delivery place in rural Zambia: a study of linked national data in a geographic information system. PLoS Med 8: e1000394.
23. Agha S, Carton TW (2011) Determinants of institutional delivery in rural Jhang, Pakistan. Int J Equity Health 10: 31.
24. Kesterton AJ, Cleland J, Sloggett A, Ronsmans C (2010) Institutional delivery in rural India: the relative importance of accessibility and economic status. BMC Pregnancy Childbirth 10: 30.
25. Nigussie M, Haile-Mariam D, Mitike G (2004) Assessment of safe delivery service utilization among women of childbearing age in north Gondar Zone, north west Ethiopia. Ethiop J Health De 18: 145-152.
26. Gabrysch S, Campbell OM (2009) Still too far to walk: literature review of the determinants of delivery service use. BMC Pregnancy Childbirth 9: 34.
27. Dhakal S, van Teijlingen E, Raja EA, Dhakal KB (2011) Skilled care at birth among rural women in Nepal: practice and challenges. J Health Popul Nutr 29: 371-378.
28. Pervin J, Moran A, Rahman M, Razzaque A, Sibley L, et al. (2012) Association of antenatal care with facility delivery and perinatal survival - a population-based study in Bangladesh. BMC Pregnancy Childbirth 12: 111.