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Determinants of Safe Delivery Service Utilization Among Women of Childbearing Age in Egela Sub-Woreda, Tigray, Northern Ethiopia

Andemariyam Yohannes Moges[1], Tamene Naba Yaya[2]

[1]Department of Biomedical Sciences, College of Health Sciences, Samara University, Samara, Ethiopia

[2]School of Medicine, Physiology Unit, Wolaita Sodo University, Sodo, Ethiopia

Email address:
anduyo2000@gmail.com (A. Y. Moges), tamenenaba@yahoo.com (T. N. Yaya)

Abstract: Maternal mortality and morbidity in Ethiopia is among the highest in the world. Community based studies about factors affecting safe delivery service utilization are scanty only few studies done showed that professional assisted delivery is low in the country; particularly in Tigray region where the study was conducted. Community based cross-sectional survey was conducted in subworeda Egela, Tigray Central Zone, Northern Ethiopia on assessment of safe delivery service utilization and associated factors in mothers of childbearing age from March 05, 2011- July 05, 2011. The data was collected using interviewer administered questionnaire on a sample of 380 mothers residing in the Sub-woreda. The data were entered and analyzed using SPSS 16.0. Possible associations and statistical significance was measured using Odds ratio at 95% CI, and P-value of <0.05. Multivariate regression analysis was carried out to identify predictors of safe delivery services utilization. The study revealed that 25% of the urban and 6.3% of the rural women deliver at health institutions. The socio-demographic variables such as age during interview, residency, marital status, educational status of the women, levels of education attended, monthly income, family size, husband occupation, distance of health institution and obstetric factors found to have statistically significant association with institutional delivery. The monthly income and women higher educational level were independent predictors for safe delivery service utilization. In conclusion, this study revealed that the proportion of institutional delivery was unsatisfactory. The monthly income and mothers' educational status were determinant factors. Therefore, empowering women, providing health education & establishing centers for emergency obstetric care in accessible areas are used to tackle the problem.

Keywords: Safe Delivery, Maternal and Infant Mortality and Morbidity, Professional Assisted Delivery,
Women of Child Bearing Age

1. Introduction

Maternal and perinatal health has emerged as the most important issue that determines global and national wellbeing. This is because every individual, family and community is at some point intimately involved in pregnancy and the success of child birth [1]. Majority of maternal deaths are during intra-partum and postpartum periods [2]. Maternal deaths have both direct and indirect causes. About 80 percent of maternal deaths are due to causes directly related to pregnancy and childbirth — unsafe abortion and obstetric complications such as severe bleeding, infection, hypertensive disorders, and obstructed labor [3]. Conditions such as anemia, diabetes, malaria, sexually transmitted infections (STIs) can also increase a woman's risk for complications during pregnancy and childbirth, and, considered as indirect causes of maternal mortality and morbidity [4].

Globally, more than half a million women die every year because of complications related to pregnancy and childbirth.

Of that half a million, 95% are from developing nations [5], with about a half occurring in Sub Saharan Africa while about 187,000 occur in Asia [6], more than one die every minute [7]. But maternal deaths only tell part of the story. For every woman who dies as a result of pregnancy-related causes, between 20 and 30 more will develop short- and long-term disabilities, such as obstetric fistula, a ruptured uterus, or pelvic inflammatory diseases [8]. Though these women are fortunate to survive, their injuries can have devastating social and physical consequences [9].

In Ethiopia the levels of maternal and infant mortality and morbidity are among the highest in the world [10]. Maternal mortality ratio is estimated at 673/100,000 live births [11] with an infant mortality rate of 105 per 1000 [10]. The best estimates for Ethiopia suggest that over 25,000 women die each year due to pregnancy-related complications. Additionally, more than 500,000 Ethiopian women and girls will suffer from disabilities caused by complications during pregnancy and childbirth each year [12].

In Tigray MMR 505-576 per 100,000 live births based on community survey, Tigray 2001 [13]. Tigray has shortage of skilled birth attendants and has low utilizations of obstetrics care.

The rural women have poor access to basic emergency obstetric care and comprehensive emergency care [14]. The solution to reduce maternal deaths is intimately linked to maternal health and to provision of effective maternal health services with special emphasis to safe delivery [2]. Proper medical attention and hygienic conditions during delivery can reduce the risk of complications and infections that may cause the death or serious illness of the mother and the baby or both [14].

Regarding delivery care, one third of births take place at home without receiving assistance from a skilled birth attendant [15]. Proportion of deliveries attended by skilled health care personnel, around 1990 and around 2006 in Sub-Saharan Africa was 42 and 47 percent respectively [16].

Studies had been done in Ethiopia by different investigators on roles of socio-demographic factors on utilization of maternal health care services in Ethiopia [11, 17]. Those studies assess the magnitude and main factors that deter mother from using maternal health care services. They were especially crucial for the effort they made to describe the magnitude of utilization of maternal health care and the socio-demographic and cultural factors that affect mother's utilization of maternal health care services in Ethiopia's context. However, the fact that the factors; cultural, beliefs and attitudes, access to the health care giving institutions and other factors that interfere maternal delivery service utilization are different in different communities. Conducting more community based study is very crucial to undertake necessary interventions by the concerned bodies accordingly.

Therefore, this study will contribute by availing the current magnitude of safe delivery service utilization and identify determinant factors affecting utilization of safe delivery service in the study area.

2. Methods and Materials

2.1. Study Area

Community based cross-sectional survey was conducted in Egela sub woreda Tigray Regional State in Ethiopia. Tigray Regional State is the north most region of Ethiopia, having international boundaries with Sudan and Eritrea to the West and North respectively, and, borders with the Afar and Amhara Regions to the East and South [18].

2.2. Sampling and Sample Size Determination

Study population: Sampled women of child-bearing age that had at least one birth in the past 5 years preceding the data collection date.

The sample size was determined by using one sample population proportion formula by considering delivery service utilization in the region to be 12.7% [20].

$$n = \frac{(Z\frac{\alpha}{2})2 \times P\,(1-p)}{b^2}$$

$$n = \frac{(1.96)2 \times 0.127\,(1-0.127)}{0.05^2}$$

$$n = 170.237 = 171$$

Since, stratified multistage sampling method was used by stratifying Kebeles found in the Sub-Woreda as Urban and Rural kebeles. By considering the design effect 2 x 171 = 342 then, by adding 10% non response rate the total 380 sampled women were included.

2.3. Data Collection and Instruments

Pre tested interviewer administered questionnaires was used to collect data from respondents. The data were analyzed using SPSS 16.0, bivariate and multivariate analysis done with 95% CI.

3. Result

Majority of the respondents 78.9% were rural and 21.1% were urban. The mean age for the respondents was 30.37 (S.d. + 7.565). The educational status of the respondents was 67.1% and 32.9% for illiterate and literate, respectively. Majority of the respondents 93.2% were house wives. About 78.4% of the respondents were had monthly income of 100-499 Birr. (Table 1)

***Table 1.** Socio-demographic Characteristics of Respondents in Egela (sub-woreda) Tigray Region, Northern of Ethiopia July –August 2011 (n=380).*

Socio-demographic characteristics	Frequency N= 380	Percent (%)
Age during interview--- 15-19	19	5.0
20-24	86	22.6
25-29	67	17.6
30-34	78	20.5
>35	130	34.2
Religion--- Orthodox	378	99.5
Muslim	2	0.5
Ethnicity--- Tigrie	376	98.9
Amara	4	1.1
Residency---- Rural	300	78.9
Urban	80	21.1
Mother's educational status ----Literate	124	32.1
Illiterate	256	67.9
Higher grade attended --Read and write	8	6.3
1-8	105	83.3
9-12	11	10.3
Husband edu. Level --Read and write	39	17.5
1-8	158	70.9
9-12	20	9.0
12+	1	0.4
Other	5	2.2
Marital status --Single	2	5
Married	184	48.4
Diseased husband	18	4.7
Separated	166	47.7
Divorced	10	2.4
Mother occupation--- House wife	354	93.2
Merchant	25	6.6
Other	1	0.3
Husband occupation-- Farmer	310	81.6
Merchant	50	13.2
Civil servant	19	5.0
Other	1	0.3
Family size--- 1-2	20	5.3
2-4	116	30.5
>5	244	64.2
Monthly income --- <100	46	12.1
100-499	298	78.4
>500	36	9.5

4. Bivariate Analysis

4.1. Socio-demographic Determinants of Safe Delivery Utilization

Mothers whose ages 35 years and above were less likely to utilize safe delivery service than women whose age was 15-19 years (OR=0.09, 95% CI=0.028,0.28). The rural participants were less likely to deliver in health institution than the urban counter parts (OR=0.203, 95% CI=0.102, 0.403).

As far as educational status is concerned, 18.5% of the literate and 16.2% of the illiterate participants deliver at health institution. Therefore, the illiterate participants were less likely to deliver at health institution than the literate (OR=3.416, 95% CI=1.73-6.74). The merchant participants were more likely to deliver at health institution than their house wife counter parts (OR=6.07, 95% CI=2.47, 1.49) (Table 4).

The occupation of the husbands also determines for the utilization of safe delivery. The participants whose husbands were merchants and civil servants have better utilized than whose husbands were farmers; 28%, 26.3% and 6.5% were the occurrence of institutional delivery for participants whose husbands were merchants, civil servants and farmers, respectively.

Table 2. Association of Socio-demographic Factors of Respondents with Preference to Safe Delivery Services Utilization in Egela (Sub-woreda), Tigray, Northern Ethiopia June – August, 2011.

Variables	Place of delivery				Crud OR (95% CI)
	HI		Home		
	N	%	N	%	
Age at interview --15-19	10	14.7	58	85.3	1.00+
20-24	12	18.5	53	81.5	0.12 (0.03,0.40)*
25-29	4	5.0	76	95	0.18 (0.58,0.60)*
30-34	6	8.2	67	91.8	0.57 (0.04,0.50)*
>35	7	7.4	87	92.6	0.09 (0.028,0.28)*
Religion --- Orthodox	39	10.3	339	89.7	1.00+
Muslim	0	0	2	100	0.0(0)
Ethnicity --- Tigrie	37	9.8	339	90.2	1.00+
Amara	2	50	2	50	0.109 (0.015-0.798*
Residency--- Rural	19	6.3	281	93.7	0.203 (0.102,0.403)*
Urban	20	25	60	75	100+
Mother's Educational status -Literate	23	18.5	101	81.5	1.00+
illiterate	16	6.2	240	93.8	3.416 (1.73-6.73)*
Higher grade attended--Read and write	1	12.5	7	87.5	0.82 (0.007,0.926)*
1-8	15	14.3	90	83.7	0.095 (0.025,0.365)*
9-12	7	63.6	4	36.4	1.00+
Marital status – Single	1	50.0	1	50	0.64 (0.04,1.08)
Married	11	6.0	173	94.0	1.00+
Diseased husband	5	27.8	13	72.2	0.165 (0.05,0.54)*
Separated	22	13.31	144	86.7	0.416 (0.195,0.887)*
Divorced	0		10	100	1.027(0)
Mother's occupation-- House wife	30	8.5	324	91.5	1.00+
Merchant	9	36.0	16	60.0	6.07 (2.47,14.91)*
Other	0	0	1	100	0(0)
Husband occupation-- Farmer	20	6.5	290	93.5	0.19 (0.06,0.59)*
Merchant	14	28.0	36	72	1.08 (0.33,3.59)
Civil servant	5	26.3	14	73.7	1.00+
Other	0	0	1	100	0(0)
Family size--- 1-2	1	5.0	19	95.0	0.58 (0.07,4.63)
2-4	18	15.5	98	84.5	2.05 (1.04,4.05)*
>5	20	8.2	224	91.8	1.00+
Monthly income -- <100	6	13.0	40	87.0	0.34 (0.11,1.03)
100-499	22	7.4	276	92.6	0.18 (0.07,0.41)*
>500	11	30.6	25	69.4	1.00+

*= Significant results
+= Reference category

4.2. Obstetric Determinants of Safe Delivery Utilization

When we see the number of delivery of the participants, women who had number of delivery one was more liable to deliver at health institution than those who had >=5 delivery (OR=3.11, 95% CI=1.23, 7.81). About 86% of the respondents who utilized ANC and 94.9% of the respondents who did not utilize ANC deliver at home. Thus, the respondents who had ANC attendance were more liable to deliver in health institutions than those individuals who had not (OR=3.04, 95% CI= 1.35, 6.81).

Table 3. Association of obstetric factors of respondents with preference to safe delivery services utilization in Egela (Sub-woreda), Tigray, Northern Ethiopia, June – August, 2011(n=380).

Variables	Place of delivery				COR. 95% CI
	Health center		Home		
	N	%	N	%	
Age during delivery--15-19	10	14.7	58	85.3	1.00+
20-24	12	18.5	53	81.5	0.31 (0.52,3.28)
25-29	4	5.0	76	95.0	0..30 (0.09,1.02)
30-34	6	8.2	67	91.8	0.51 (0.17,1.51)
>35	7	7.4	87	92.6	0.46 (0.16,1.29)
Parity-- 1	12	18.2	54	81.8	3.11 (1.23,7.81)*
2-4	18	10.1	161	89.9	1.56 (0.68,3.60)
>5	9	6.7	126	93.3	1.00+
Complications –Yes	5	11.6	38	88.4	1.17 (0.43,3.18)
No	24	10.1	303	89.9	1.00+
ANC attendance- Yes	31	14.0	191	86	3.04 (1.35,6.81)*
No	8	5.1	150	94.9	1.00+

Variables	Place of delivery				COR. 95% CI
	Health center		Home		
	N	%	N	%	
Complication history- Yes	2	6.2	30	93.8	1.00+
No	25	9.0	253	91.0	1.53 (0.34,6.78)
Beginner	12	17.4	57	82.6	3.26 (0.68,15.52)
Fear of problems--- Yes	30	11.3	236	88.7	0.67 (0.30,1.47)
No	9	7.9	105	92.1	1.00+

*= Significant values
+= Reference category

4.3. Multivariate Analysis

The variables that have a statistically significant association in the bivarite regression analysis were entered to multivariate regression analysis model. However, only two of the variables were statistically significant. The results of the multivariate analysis show that monthly income and mothers' educational status were the independent predictors of utilization of safe delivery service utilization.

The respondents with monthly income of less than 100 birr was less likely to give birth at health institution than the respondents whose income were greater than 500 birr (AOR=0.13, 95% CI: 0.01,1.23). However, these income groups were not statistically significant in the multivariate analysis. The respondents whose monthly income was 100-499 were less likely to deliver at health institution than the participants whose income >500 birr (AOR=0.22, 95% CI: 0.05, 0.82).

Mothers' educational status was seen to be the independent predictor of maternal utilization of safe delivery services. The participant whose educational status was read and write were less likely to deliver at health institution than those secondary levels of education. However, this group was not statistically significant when we see in the multivariate analysis (AOR=0.08, 95% CI: 0.008, 1.02). Those participants whose educational levels was elementary school were less likely to deliver at health institutions than secondary school level and this was statistically significant (AOR=0.06, 95% CI: 0.0,1 0.27).

Table 4. *Adjusted for socio-demographic and obstetric factors determining preference of place of delivery of respondents in Egela (Sub-woreda), Tigray, Northern Ethiopia, June-August, 2011 (n=380).*

Variables	Place of Delivery				COR (95% CI)	AOR (95CI)
	HI		Home			
	N	%	N	%		
Age at interview --15-19	10	14.7	58	85.3	1.00	1.00
20-24	12	18.5	53	81.5	0.12 (0.03,0.40)*	0.43(0.08,2.07)
25-29	4	5.0	76	95	0.18 (0.58,0.60)*	0.58(0.08,4.30)
30-34	6	8.2	67	91.8	0.57 (0.04,0.50)*	1.68(0.17,14.46)
>35	7	7.4	87	92.6	0.09 (0.02,0.28)*	0.34(0.02,4.22)
Ethnicity --- Tigrie	37	9.8	339	90.2	1.00	1.00
Amara	2	50	2	50	0.10 (0.01-0.79*	2.38(0.16,33.73)
Residency--- Rural	19	6.3	281	93.7	0.203 (0.102,0.403)*	1.06(0.15,7.25)
Urban	20	25	60	75	100	1.00
Mom. Edu. Status Literate	23	18.5	101	81.5	1.00	1.00
illiterate	16	6.2	240	93.8	3.416 (1.73-6.73)*	0
Higher Gr. attended -Read and write	1	12.5	7	87.5	0.82 (0..007,0.926)*	0.08(0.008,1.02)
1-8	15	14.3	90	83.7	0.095 (0.025,0.365)*	0.06(0.01,0.27)*
9-12	7	63.6	4	36.4	1.00	1.00
Distance of HI--- 0-1	28	18.2	126	81.8	1.00	1.00
1-2	5	3.8	126	96.2	0.17 (0.06,0.47)*	0.53(0.11,2.47)
>2	6	6.3	89	93.7	0.30 (1.31,8.29)*	0.37(0.03,3.60)
ANC attendance-- Yes	31	14.0	191	86	3.04 (1.35,6.81)*	1.00(1.12,8.32)
No	8	5.1	150	94.9	1.00	1.00
Marital status – Single	1	50.0	1	50	0.64 (0.04,1.08)	0
Married	11	6.0	173	94.0	1.00	1.00
Diseased husband	5	27.8	13	72.2	0.165 (0.05,0.54)*	2.27(0.24,21.53)
Separated	22	13.3	144	86.7	0.416 (0.195,0.887)*	0.83(0.21,3.19)
Divorced	0	0	10	100	1.027(0)	0
Mother's occu.-House wife	30	8.5	324	91.5	1.00	1.00
Merchant	9	36.0	16	60.0	6.07 (2.47,14.91)*	0.52(0.43,6.37)
Other	0	0	1	100	0(0)	0
Husband occu.--Farmer	20	6.5	290	93.5	0.19 (0.06,0.59)*	1.03(0.09,11.64)
Merchant	14	28.0	36	72	1.08 (0.33,3.59)	1.08(0.09,5.37)
Civil servant	5	26.3	14	73.7	1.00	1.00
Other	0	0	1	100	0(0)	0
Family size--- 1-2	1	5.0	19	95.0	0.58 (0.07,4.63)	0

Variables	Place of Delivery				COR (95% CI)	AOR (95CI)
	HI		Home			
	N	%	N	%		
2-4	18	15.5	98	84.5	2.05 (1.04,4.05)*	2.57(0.83,7.92)
>5	20	8.2	224	91.8	1.00	1.00
Monthly income -- <100	6	13.0	40	87.0	0.34 (0.11,1.03)	0.13(0.01,1.23)
100-499	22	7.4	276	92.6	0.18 (0.07,0.41)*	0.22(0.05,0.82)*
>500	11	30.6	25	69.4	1.00	1.00

Note. Mom. Edu. = Mothers educational status

Husband/mother Occu. = Husband or maternal educational status

HI= health institution

*= Significant values

+= Reference category

5. Discussion

The utilization of institutional delivery service in the sub-woreda was 25% for urban and 6.3% for rural. The overall magnitude of utilization of safe delivery in Egela is about 10.3%. This finding is higher than the Ethiopian demographic and health survey (EDHS, 2005) in which the utilization for nationally and for Tigray region were 6% and 6.1% [14], respectively. The reason for better utilization could be due to the efforts exerted to increase utilization of safe delivery within the last five years. This finding is a little bit lower than the result for delivery service utilization indicted by health and health related indicators 2006/2007 prepared by ministry of health [20]. However, it is consistent with the other studies done in 2010 & 2008 [11, 21]. Possibly the reason for this could be the annual report prepared by the Ministry of Health (MOH) is institution based report. On the contrary, our study was community based, thus looking this much difference is likely.

Women's age during interview was found to be important indicator of utilization of safe delivery services. The utilization of safe delivery service increases as we go down from higher age to lower age. Women who were at higher age had the experience to deliver at home and may reduce their tendency to deliver at health institution. In addition to that, relatively they are less educated and less in modernity than the lower age groups. On contrary, the women at lower age have the tendency to apply modern way of life; they have better educational background than the women who are above 35 year. This result is consistent with other studies done on maternal health care seeking behaviors [14, 22].

The results of the current study revealed that utilization of safe delivery service is significantly influenced by residency. Women who reside in rural areas were 0.2 times less likely to deliver at health institution than those who reside in urban (OR=0.20, 95% CI: 0.102, 0.403). This study is in line with finding in North Gonder zone although a little bit lower, where the rural women were 0.03 times less likely to deliver at health institution than the urban [22]. Other studies also support this fact that rural women lower odds in the utilization of institutional delivery than urban [11, 23]. The reason may be the urban women are nearest to media, health institution and relatively economically better than the rural counterparts [24].

Educational status of the mothers was shown to be significantly associated with delivery service utilization in the bivariate analysis. The illiterate women were about four times less likely to deliver at health institution than the literate counterparts (OR=3.41, 95% CI: 1.73-6.73). The level of education the women had was seen to determine delivery in health institution. The women whose educational level was read and write and elementary school were less likely to deliver at health institution than the women whose educational level were secondary school (OR=0.82, 95% CI: 0.007, 0.92) and (OR=0.09, 95% CI: 0.02, 0.36), correspondingly. This result is aligned to the findings in North Gonder zone and (EDHS, 2005) [14, 22, 25]. Educational status had shown to be independent predictor of place of delivery while the effects of other variables were controlled in the multivariate logistic regression model. Those participants whose educational levels were elementary school were less likely to deliver at health institution than secondary school level (AOR=0.06, 95% CI: 0.0,1 0.27).

Maternal occupation was seen to affect institutional delivery service utilization. Merchant women were six times more likely to deliver at health institution than women who were housewives (OR=6.07, 95% CI: 2.47, 14.91). This is consistent with other study done in Metekel Zone [20].

Husband occupation was significantly associated with utilization of institutional delivery service. Women who had partner farmers were less likely to deliver in health institution than those women whose husband was civil servants (OR=0.19, 95% CI: 0.06, 0.59). This study were supported by the another study, where women who had partner skilled worker had about 1.8 times higher odds of with professional assistance than women who were not skilled professional [11].

Family size had showed significant association with place of delivery. the women who had 2-4 family were about two times more likely to deliver at health institution than those who have >5 family size(OR=2.05,95% CI:1.04, 4.05). This study was in line with other studies done in developing countries [23, 26]

Monthly income of the women also showed statistically significant association with place of delivery. Thus, the women whose monthly income was 100-499 were about three times less likely to deliver at health institution than those women whose monthly income was >500 (OR=0.18,

95% CI: 0.07, 0.41). Though not statistically significant, the women whose monthly income was <100 were also less likely to deliver in health institution than the women whose monthly income was >500. This may be due to the reason that the women in this category were (<100) less in frequency. This variable was to be another independent predictor of place of delivery. The respondents whose monthly income was 100-499 were less likely to deliver at health institution than those participants whose income >500 birr (AOR=0.22, 95% CI: 0.05, 0.82) [14].

Distance of the health institution was also another determinant factor for utilization of safe delivery services, the women who reside 1-2 and >2 hours far from the health institution a foot were less likely to deliver in health institution than those who reside less than 1 hour far from the HI a foot. This finding was supported by other findings [23, 25, 27].

Antenatal care (ANC) visit positively predicts use of safe delivery services and it is more effective in preventing adverse pregnancy outcome if continued throughout the pregnancy [11, 22, 23]. In the current study ANC was associated significantly with institutional delivery. The women who attend ANC were more likely to deliver in health institutions than those who did not. The more the exposure the women have for the health institution, the more the probability of utilizing.

6. Conclusion and Recommendation

The most important factors influencing utilization of safe delivery service were obstetric, demographic and socio-economic characteristics. The participants with higher economic status was found to be more liable to deliver at health institution than those who with lower income.

Number of previous pregnancies and parities were found to be positive predictors for choice of delivery site while distance of health institution from home, age of the women >35 years were found to be barriers of institutional delivery care services.

As mothers' educational status is an important factor for the institutional delivery, improving education among girls, beyond the primary school, needs to be strongly encouraged. Awareness of the women should be boost, so as to make them recognize that institutional delivery is cost free.

Multi-gravidity and higher maternal age where less likely to utilize safe delivery service, implying that these group should be one of the priorities criteria for targeting education campaigns on the benefits of safe motherhood programs in general and institutional delivery in particular. Since pregnancy related complications are the main reasons for utilization of health facilities, community awareness program must focus on the danger signs surrounding pregnancy and childbirth.

Distance from health institution, was found to be important factor for not utilizing safe delivery service, establishing centers for emergency obstetric care in accessible areas are used to tackle the problem by the concerned bodies.

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