

Proportion of Maternal Near Misses and Associated Factors in Referral Hospitals of Amhara Regional State, Northwest Ethiopia: Institution Based Cross Sectional Study

Mulugeta Dile^{1*}, Tatek Abate[#] and Tewodros Seyum[#]

Department of Midwifery, College of Medicine and Health Sciences, University of Gondar, Ethiopia

Abstract

Introduction: Maternal near misses are one of the quality indicators of obstetric care beside maternal deaths. According to United Nations Fund for Population Activity report in 2011, for each maternal death 20 others suffer due to maternal near misses in the world.

Objective: The study was aimed to assess the prevalence of maternal near misses and associated factors in Amhara Regional State Referral Hospitals, Northwest Ethiopia.

Methods: An Institution based cross sectional study was conducted from March 1, 2013 to August 30, 2013. During the study systematically selected 806 mothers who visited the maternal health care services at three Amhara Regional State Referral Hospitals were included. The data were collected through face to face interviews and direct concealed observations using pre-tested and structured questionnaires. We have used Epi Info 3.5.3 and SPSS for windows version 20 software for data entry and computing descriptive and analytical statistics respectively. To control the confounding factors, multiple logistic regression models were employed.

Results: The study revealed the overall proportion of maternal near miss was 23.3 % (95% CI = 20%, 26%). No formal education (AOR = 2.00, 95% CI: 1.09, 3.69), ≥ 7 days of hospital stay (AOR = 2.49, 95% CI: 1.46, 4.25), not booked (AOR = 2.51, 95% CI: 1.50, 4.20), presence of administrative related factors (AOR = 3.85, 95% CI 2.11, 7.03), personal factors (AOR = 4.02, 95% CI: 2.34, 6.90), community related factors (AOR = 3.28, 95% CI 1.67, 6.46) and medical personnel related factors (AOR = 7.02, 95% CI: 3.89, 12.65) were significantly associated with maternal near misses.

Conclusion and recommendations: This study indicates that the prevalence of maternal near miss is high. Reduction in maternal near miss might be best achieved through strengthening high-quality maternal health care services, designing a health program which attracts women with little or no education, and investing in health promotion, education and advocacy.

Keywords: Maternal near miss; Prevalence; Associated factors; Ethiopia

Introduction

The global maternal mortality ratio (MMR) in 2010 was 210 per 100,000 live births and the MMR in developing regions (240) was 15 times higher than in developed regions (16) [1]. This burden motivated world leaders to formulate the millennium declaration. In September 2010, the United Nations Secretary-General launched the Global Strategy for Women's and Children's Health calling for concrete actions towards the improvement of health of women and children around the world [2]. Unfortunately, several factors such as individual, social, health-system related, health personnel related and obstetric related problems aggravate the vulnerability of mothers to complications and deaths related to pregnancy and childbirth. However, timely and optimal treatment can largely improve survival [2,3]. The above evidences also explicated that high maternal mortality rates are associated with inadequate and poor quality health services. A study also showed that, explicit, evidence-based and cost effective packages of interventions can improve the processes and outcomes of health care when appropriately implemented [4].

Complications not recognized in a timely manner or not treated appropriately are likely to progress to organ dysfunction and deaths. Despite appropriate initial care, some women and newborn may develop organ dysfunctions, which constitute a common final pathway towards death [5,6]. At this stage, more specialized and expensive interventions would be necessary to revert life-threatening conditions related to pregnancy and childbirth.

The study of deaths is an approach commonly used for assessing

the quality of care and identifying opportunities for improvement [7]. However, women who survive life-threatening conditions arising from complications related to pregnancy and childbirth have many common aspects with those who die of such complications. This similarity led to the development of the near-miss concept in maternal health. Exploring clients who survived life-threatening conditions provide a more complete assessment of quality in maternal health care [8-10].

The maternal near-miss concept suggested to be routinely used in national programs as a tool for evaluating the quality of maternal health care [11]. In addition, the near-miss indicators are indicators of outcome and provide an overall evaluation of the performance of the health service or health system in reducing severe maternal short-term outcomes [12]. In order to produce a more complete and even more tangible evaluation of quality of care, a set of process indicators were adapted and developed based on the criterion-based clinical audit concept which considers a feasible and beneficial mode of auditing the quality of maternal health care [13].

***Corresponding author:** Mulugeta Dile, Department of Midwifery, College of Medicine and Health Sciences, University of Gondar, Ethiopia, Tel: +251918031883; E-mail: muliedile@gmail.com

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A country's level of maternal near misses is indirect evidence that the health system is functioning well, health institutions are well organized and equipped, there are competent providers, emergency obstetric services are highly responsive, the care given to mothers is of high standard, and the referral system is functioning well [12]. On the other hand, the main drawbacks that lead to maternal near misses in institutions in the developing world include: failure to supervise junior staff, failure of consultants to examine patients before prescribing treatment and allowing juniors to perform obstetric procedures in high-risk cases without monitoring [14-16].

Therefore, since MNM data are a relevant source of information for policy makers in the selection of maternal health care priorities, this study aimed to avail information on maternal near misses in ARS referral hospitals. By then serve as an important tool for some possible interventions aimed at improving the maternal health care services and it would be important to reduce maternal morbidity and mortality which is important to achieve millennium development goal five.

Methods

An Institution based cross sectional study was conducted. This study was conducted in Amhara Regional State Referral Hospitals, from March 1, 2012 to August 30, 2013.

Amhara regional state is one of the nine states in Ethiopia which is found between 11° 30' 00" N latitude and 38° 30' 00" E longitude on the northwestern part of Ethiopia and bordered by Tigray region to the north Sudan to the west, the Afar region to the east, and the Benishangul-Gumuz to the west and southwest, Oromia region to the south. This region has a population of 17,221,976 of whom 8,641,580 were men and 8,580,396 women; urban inhabitants were 2,112,595 (12.27%) of the population. With an estimated area of 159,173.66 square kilometers, this region has an estimated density of 108.2 people per square kilometer. For the entire Region 3,983,768 households were counted which results in an average of 4.3 persons of a household, with urban households having on average 3.3 and rural households 4.5 people [17].

This regional state has 19 hospitals, 220 health centers, and 2941 health posts; among them 5 are referrals which includes University of Gondar Teaching Referral Hospital (UOGTRH), Felege Hiwot referral hospital (FRH), Dessie referral hospital (DRH), Debre markos referral hospital (DMRH), and Debrebirhan referral hospital (DBRH). Each hospital is assumed to be served for 5 million people, have 100-200 beds, 2000-3000 deliveries per year and 5-8 deliveries per day.

The study population was all systematically selected women who came to AMRS Referral hospitals to obtain; obstetrics and gynecologic health care services; during antenatal, intrapartum or within 42 days after delivery from March 1, 2012 to August 30, 2013. Those women obstetric near miss complication due to accidental or incidental causes were excluded.

Maternal near miss is a severe life-threatening obstetric complication necessitating an urgent medical intervention in order to prevent the likely death of the mother; any pregnant or recently delivered woman, in whom immediate survival is threatened and who survives by chance or because of the hospital care she received.

Ethical clearance was obtained from the Ethical review committee of Department of Midwifery, University of Gondar, and college of medicine and health sciences. In addition, the official letter of cooperation was submitted to all referral hospitals and following the discussion of the study objectives verbal consent was obtained from

each study participants. Furthermore confidentiality was assured at all levels of the study.

Birth interval in this study means duration of months between the birth of the index child and the subsequent live births. The event for this study is live birth whereas the survival time is censored when women didn't give birth of the subsequent child before the end of the study period.

Results

Socio demographic characteristics

A total of 806 mothers from three hospitals were included in the study, making a response rate of 100%.

The mean age of the respondents was 27.8 (SD=6.09) years. Nearly one third (31.9%) of the mothers were in the age group of 25-29 years. Half (50.7%) of the mothers didn't have formal education. Out of the total mothers 721 (89.5%) were orthodox Christians and the majority were Amhara 749 (92.9%). The median distance they traveled was 40km with interquartile range of 71 km.

Three hundred fifty five (44%), were housewives and 765 (94.9%) were married. Two hundred seventy (33.5%) of the women's had monthly income / house hold of between 1001 to 2000 Birr per month with the median income of 2000 Birr (Table 1).

Obstetric characteristics

Of the total respondents 686 (85.1%) of women were visited Hospitals for the first time and 137 (35.7%) were admitted with a diagnosis of obstructed labor. Six hundred seventy three (79%) were 37 to 42 weeks pregnant and 604 (74.9%) were referred from health institutions. Labor stayed more than 24 hours in 167 (24.1%) mothers.

Two hundred one (24.9%) of the women's stayed 07 or more days and the median duration of stay was 5 days and ranged from 1 to 97 days, and 268 (33.3%) of mothers delivered spontaneously. Women who had ANC follow up account 553 (68.6%). Whereas, 483 (53.1%) had visited from two to four times. Six hundred eighteen (76.7%) pregnancies were wanted and supported and 381 (47.3%) of the mothers were pregnant for the first time (Table 2).

Personal, community, information and administrative problems

Hundred and seventy eight (22.1%) of the total respondents had personal problems and 95 (53.4%) have been affected by maternal near misses. The types of personal problems that have been found were refused to medical help, advice and treatment 59 (33.1%) and delay in presentation to hospital 119 (66.9%). Similarly, 124 (15.4%) had community related problems, of them 67 (54%) were affected by maternal near misses. The reasons mentioned were, 81 (65.3%) were due to harmful traditional practices other than FGM like; dietary restrictions during pregnancy, feeding practices for women and girls, unclean delivery, unhygienic treatment of umbilical cord, and 43 (34.7%) were due to female genital cutting and its associated problems.

On the other hand, 163 (20.2%) of the total respondents had lacks of information and 76 (46.6%) were affected by maternal near misses. The types of information mentioned were, 97 (59.5%) due to lack of information where the service is given and 66 (40.5%) were due to lack of information who gives the service. Finally, 131 (16.3%) had faced administrative problems, of them 47 (35.9%) were faced maternal near misses. Majorities (34%) were due to lack/inefficient transport and communication (Figure 1).

Characteristics	Frequency (n)	Percent (%)
Age (in years)		
15 - 19	43	5.3
20 - 24	199	24.7
25 - 29	257	31.9
30 - 34	160	19.9
35 - 39	114	14.1
≥ 40	33	4.1
Marital status		
Single	24	3.0
Married	765	94.9
Divorced	17	2.1
Age at first marriage(n = 782)		
≤18 years	417	53.3
19 - 24 years	286	36.6
≥25 years	79	10.1
Religion		
Orthodox	721	89.5
Muslim	78	9.5
Others (Protestant, Catholic)	7	1.0
Ethnicity		
Amhara	749	92.9
Oromo	37	4.6
Others (Agew, Afar, Tigre)	20	2.5
Occupational status		
Farmer	219	27.2
Housewife	355	44.0
Government employee	104	12.9
Unemployed	128	15.9
Educational status		
No formal education	409	50.7
Grade 1-8	107	13.4
High school or more	290	35.9
Average monthly income per household		
< 1000 Birr	195	24.2
1001 - 2000 Birr	270	33.5
2001 - 3000 Birr	206	25.6
≥3001 Birr	135	16.7
Husband educational status of mothers		
Unable to write and read	283	36.2
Able to write and read only	60	7.7
Grade 1-6	89	11.4
Grade 7-12	153	19.6
Above grade 12	197	25.1
Residence		
Rural	502	62.3
Urban	304	37.7
Distance traveled		
< 10 kms	229	28.4
≥ 10 kms	557	71.6

Table 1: Distribution of mothers by their socio-demographic characteristic in ARS referral hospitals, Northwest Ethiopia, March 2013 to August 2013 (N = 806).

Characteristics	Frequency	Percent
ANC visits		
Not booked	253	31.4
Booked	553	68.6
Number of ANC visits		
None	253	31.4
One visit	74	9.2
Two to four visits	428	53.1
> Four visits	51	6.3
Visit type		
New visits	686	85.1
Repeat visits	120	14.9
Source of referral		
Health institution	604	74.9
self-referral	202	25.1
Type of current pregnancy		
Wanted & planned	618	76.7
Wanted but unplanned	31	3.8
Unwanted & unplanned	157	19.5
Gestational age		
≤28 weeks	72	8.9
29 to 36 weeks	79	9.8
37 to 42 weeks	637	79.0
> 42 weeks	18	2.2
Parity		
≤1 delivery	381	47.3
2 to 4 deliveries	272	33.7
≥5 deliveries	153	19.0
Duration of labor		
≤24 hours	526	75.9
≥25 hours	167	24.1
Obstetric complications		
Obstructed labor	137	35.7
HDP	102	25
Abortion	34	8.85
Hemorrhage	56	14.55
Sepsis	37	6.5
Others	27	9.6
Type of interventions		
SVD	268	33.3
CS	218	27.0
Hysterectomy	147	18.2
Destructive deliveries	108	13.4
MVA/D & C	65	8.1
Duration of hospital stay		
< 7 days	605	75.1
≥7 days	201	24.9

Table 2: Obstetric characteristics of respondents in ARS referral hospital, Northwest Ethiopia, March 2013 to August 2013 (N = 806).

Medical personnel problems

Hundred and twenty five (15.5%) of the total respondents had faced medical personnel related problems and of these, 68 (54.4%) were affected by maternal near misses (Figure 2). The average time between diagnosis of the primary determinant of near miss and definitive treatment was 17.57 (SD= 08.05) minutes and 36.11 (SD=14.48) minutes between diagnosis and attention by senior personnel.

Fifty two (27.66%) of near-miss were caused by uterine rupture and 99 (52.4%) of near misses were managed by gynecologists and

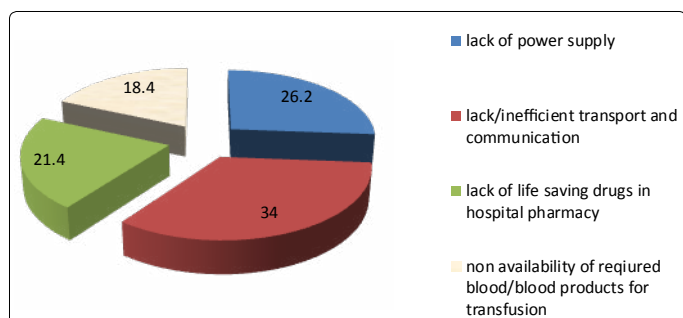


Figure 1: The types of administrative problems in ARS state referral hospitals, Northwest Ethiopia, March 2013 to August 2013.

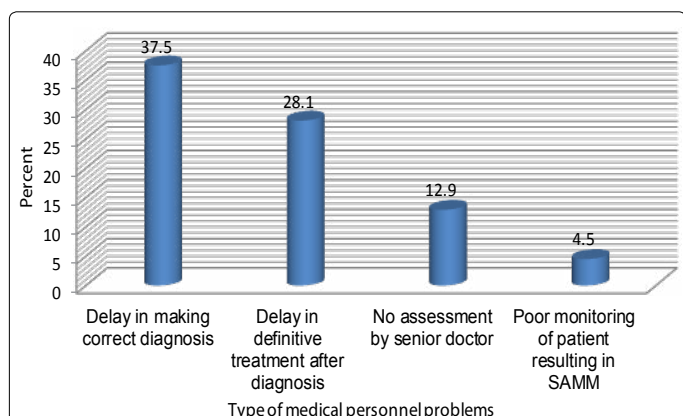


Figure 2: Type of medical personnel problems in ARS referral hospitals, northwest Ethiopia, March 2013 to August 2013.

obstetricians (Figures 3 and 4).

Proportion of maternal near misses

The overall proportion of maternal near misses in ARS referral hospitals was 23.3% (95% CI = 20%, 26%). Hundred and seventy (90.4%) were in critical condition upon arrival and 18 (9.6%) were diagnosed prenatally. Among the 188 women classified as a near miss, 186 (23.1%) had organ dysfunctions, 188 (23.3%) had severe complications and 187 (23.2%) had managed as critical.

Fifty two (27.66%) of near-miss were caused by uterine rupture and 99 (52.4%) of near misses were managed by gynecologists and obstetricians

Factors associated with maternal near misses

In the bivariate analysis, mother's occupational status, residence, husband educational status, mothers educational status, monthly income, type of the current pregnancy, distance from hospital, ANC follow up, duration of labor, number of ANC visits, duration of hospital stay, administrative problems, personal problems, information problems, community problems, gestational age, and medical personnel related problems were found independently associated with maternal near misses.

Multivariate logistic regression showed that the mother's lower educational status, long hospital stay, lack of ANC follow up, presence of administrative related factors, Community related factors, medical personnel related factors, and personal related factors had statistically associated with maternal near misses.

Mothers who had no ANC follow up were 2.51 times more likely

to develop maternal near misses than mothers who had ANC follow up (AOR= 2.51, 95% CI = 1.50, 4.20). In addition to this, mothers who stayed seven and more than seven days in the hospital were 2.49 times more likely to develop maternal near miss than mothers who stayed for less than seven days (AOR= 2.49, 95% CI = 1.46, 4.25).

Statistical association was also depicted that maternal educational status had significant association with maternal near misses, where mothers who had no formal education were 2 times more likely to develop maternal near misses than mothers who had educational status more than high school (AOR: 2.00, 95% CI: 1.09,3.69) (Table 3).

Discussion

Clear understanding of the prevalence and associated factors of maternal near misses is very useful for the planning of preventive measures and the development of policies.

The present study revealed the overall prevalence of maternal near miss in Amhara regional state referral hospitals is found to be 23.3%. The finding is in line with the prevalence of maternal near misses reported in Campinas, Brazil, 15.5 - 22.9% [18]. However, it is higher than studies done in Uganda (10.61%) [19], Nigeria (12%) [20], Brazil (15.8%) [21], Indonesia (17.3%) [22], and Pakistan (4%) [23]. The higher prevalence in this study might be due the fact that there is a high patient flow in referral hospitals in Amhara regional state which showed that there is a need to increase referral hospitals. Moreover, the finding in this study is higher may be because of the new strategy of the ministry of health of Ethiopia which is distribution of the ambulances per region, was effective and decreases the number of women who faced maternal near misses in the community and brought them to the hospitals [24]. The other possible explanation for this might be the increased awareness creation ability of health extension workers in rural areas related with maternal health care services [25, 26].

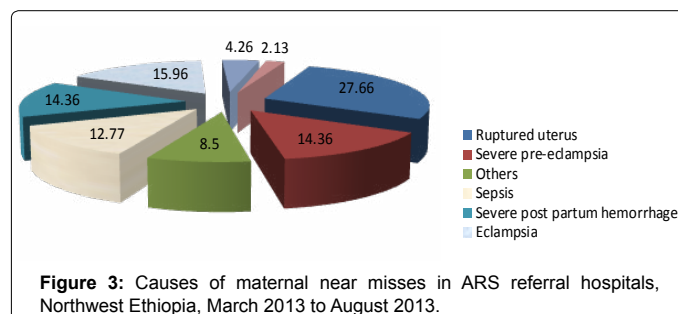


Figure 3: Causes of maternal near misses in ARS referral hospitals, Northwest Ethiopia, March 2013 to August 2013.

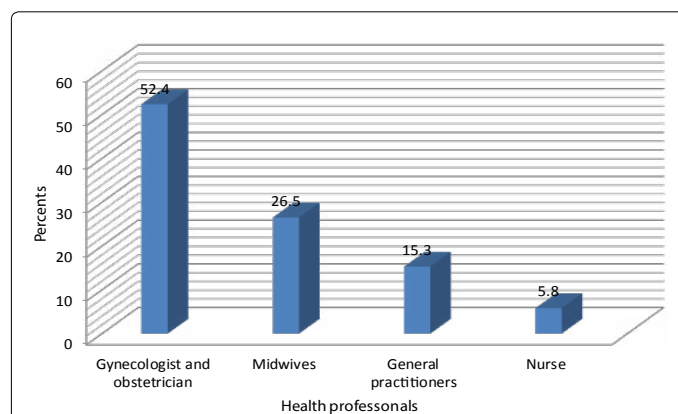


Figure 4: Type of health professionals who managed maternal near misses in ARS referral hospitals, northwest Ethiopia, March 2013 to August 2013.

Characteristics	Maternal near miss		COR (95%CI)	AOR (95%CI)
	Yes	No		
	Frequency	Frequency		
Mothers occupational status				
Farmer®	72	147	1.00	1.00
Housewife	75	280	0.55(0.37,0.80)	0.79(0.43,1.44)
Government employee	14	90	0.32(0.17,0.60)	1.14(0.39,3.36)
Unemployed	27	101	0.55(0.33,0.91)	1.84(0.73,4.64)
Residence				
Urban®	42	262	1.00	1.00
Rural	146	356	2.56(1.75,3.74)	1.32(0.59,2.96)
Husband educational status				
Unable to write and read	67	216	1.60(1.00,2.55)	0.84(0.40,1.73)
Write and read only	11	49	1.16(0.54,2.46)	0.38(0.12,1.23)
Grade 1-6	27	62	2.25(1.25,4.05)	1.62 (0.69,3.80)
Grade 7-12	43	110	2.02(1.20,3.38)	1.73 (0.81,3.69)
Above grade 12®	32	165	1.00	1.00
Woman's educational status				
No formal education	132	277	2.81(1.91,4.14)*	2.00(1.09,3.69)*
Grade 1-8	14	93	0.89 (0.46,1.70)	1.19 (0.50, 2.82)
>Grade 8	42	248	1.00	1.00
Monthly income				
< 1000 birr	60	135	1.70(1.01,2.84)	0.73(0.30,1.78)
1001 to 2000 birr	68	202	1.29(0.79,2.12)	0.49(0.21,1.12)
2001 to 3000 birr	32	174	0.70 (0.40,1.23)	0.54(0.23,1.26)
≥3001birr®	28	107	1.00	1.00
Type of current pregnancy				
Wanted & planned®	132	486	1.00	1.00
Wanted but unplanned	7	24	1.07 (0.45,2.55)	0.44 (0.10,1.93)
Unwanted & unplanned	49	108	1.67 (1.13,2.46)	0.72(0.37,1.40)
Distance from hospital				
≤ 10 kilometers	31	198	1.00	1.00
≥ 11 kilometers	157	420	2.39(1.57,3.64)	1.97(0.99,3.92)
Medical personnel problems				
No problems®	120	561	1.00	1.00
Have problems	68	57	5.58(3.73,8.35)**	7.02 (3.89,12.65)**
ANC follow up				
Not booked	96	157	3.06 (2.18,4.30)***	2.51 (1.50,4.20)***
Booked ®	92	461	1.00	1.00
Gestational age				
≤28 weeks®	26	46	1.00	1.00
29 to 36 weeks	26	53	0.87(0.44,1.70)	0.40 (0.06,2.79)
37 to 42 weeks	133	504	0.47(0.23, 0.78)	0.33 (0.06,1.91)
> 42 weeks	3	15	0.35 (0.09,1.34)	0.14 (0.01,1.59)
Duration of labor				
≤ 24 hours®	97	429	1.00	1.00
≥ 25 hours	52	115	2.00 (1.35,2.97)	1.03(0.56,1.88)
Number of ANC visits				
None	96	157	3.84 (1.66,8.88)	2.76(0.86,8.90)
One visit	16	58	1.73 (0.66,4.58)	1.35(0.32,5.66)
From two to four visits	69	359	1.21(0.52,2.79)	1.17(0.38,3.62)
More than four visits®	7	44	1.00	1.00

Duration of hospital stay				
< 7 days	113	492	1.00	1.00
≥ 7 days	75	126	2.59 (1.82,3.68)**	2.49(1.46,4.25)***
Administrative problems				
No problems®	141	534	1.00	1.00
Face problems	47	84	2.12(1.42,3.17)**	3.85 (2.11,7.03)**
Personal problems				
No problems®	93	535	1.00	1.00
Have problems	95	83	6.58 (4.56,9.51)**	4.02(2.34,6.90)**
Information problems				
Lack of information®	112	531	1.00	1.00
Have information	76	87	4.14 (2.86,5.99)	1.77(0.93,3.37)
Community related problem				
No problems®	121	561	1.00	1.00
There is problem	67	57	5.45 (3.64,8.16)**	3.28(1.67,6.46)***

Table 3: Factors associated with maternal near misses in ARS referral hospitals, Northwest Ethiopia, March 2013 to August 2013. (N = 806)

This study found that those mothers who stayed 7 days or more were 2.49 times more likely to develop maternal near misses than those who stayed less than 7 days. The finding is consistent with previous studies conducted in Brazil [27] and Latin America [28]. The reason might be those women who had a longer hospital stay would be at high risk for developing infections. It could be also due to the various factors which contribute to an increased risk of infection among hospitalized mothers, including decreased client immunity due to illness, invasiveness of medical procedure, overcrowding and poor infection control practices of the hospitals. Additionally, It could be also due to the surgical site infections which commonly occur from the first week to the fourth week after operation, and infections from blood products like, cytomegalovirus, hepatitis virus, and human immunodeficiency virus [29].

Educational status of the mother had a significant association with maternal near misses. Those mothers who had no formal education were 2 times more likely to be affected by maternal near misses than mothers who had high school or more education. The result of this study is contradicted with the multicenter cross sectional studies that were conducted by WHO in Latin America [28] and at University of Campinas, Brazil [30] and Bolivia [31]. This could be due to the fact that, lower education decreases knowledge and autonomy of women which would give them the ability to decide to own and family health issues [32]. It might be also uneducated women seek out lower quality services and have lesser ability to use health care inputs that offer better care.

Not booked was found to be an exposing factor for maternal near misses where those mothers who had no ANC follow up were 2.51 times more likely affected by maternal near misses than mothers who have ANC follow up. This is consistent with the study done in Bolivia [31] and Ayder hospital Ethiopia [33]. This might be due to the fact that ANC interventions are generally regarded as having little effect on severe morbidity and mortality on a group level. These study results suggest that routine ANC has an indirect effect on severe obstetric morbidity, possibly by acting as an enabler of timely arrival for emergency obstetric care. Furthermore, such ongoing contact with the healthcare system during pregnancy seems to be especially important for women with several social-demographic disadvantages. Apart from the detection and treatment of illness during pregnancy, ANC offers an opportunity to discuss childbirth planning and danger signs in

pregnancy. Perhaps most important, ANC can increase confidence in the system of professional delivery and emergency obstetric care [31].

This study also depicted that health system related factors were strong predictors of maternal near misses; in which, those women who had been managed in the presence of administrative problems like; lack of power supply, lack or inefficient transport and communication, lack of life saving drugs in hospitals pharmacy and non-availability of blood or blood products for transfusion in the hospitals were 3.85 times more likely to develop maternal near misses than those mothers who had been managed in the absence of administrative problems. This finding is consistent with the studies conducted in Gambia's main referral hospital [34] and at the University of Illinois, Chicago [5]. This might be due to the economic constraints of the hospitals to have medical commodities and adequate number and quality of skilled professionals. Moreover, it could be also due to the poor communication, care process, equipment and medications and staff development.

Mothers who faced community related problems like harmful traditional practices other than female genital mutilation like; dietary restrictions during pregnancy, feeding practices for women and girls, unclean delivery, unhygienic treatment of umbilical cord, and female genital mutilation were 3.28 times more likely to develop maternal near misses than those who didn't face community related problems. This might be due to the effects of the community where the woman lives on her behavior and the cultural taboos related to labor and delivery complications and related superstitions of the community in Amhara region. Moreover, about 5% of pregnancies in the present study were out of marriage. The stigma associated with out-of-wedlock pregnancies could be severe in societies like Amhara region. It therefore seems reasonable that most such pregnancies were unwanted or unintended. In addition, women with unwanted pregnancies may initially attempt to deny their pregnancies to themselves and to conceal them from others. As a result such women became affected by maternal near misses compared with their married counterparts.

Women who had personal problems like, refusal of medical help, advice or treatment and delay in presentation to the hospital were 4.02 times more likely to develop maternal near misses than those who had no personal problems. The finding of this study is consistent with studies conducted in different countries like China, and Nigeria [35,36]. However, the finding of this study is different from the study conducted at the University of Illinois at Chicago [5]. This difference

is explained by the fact that the present study is both urban and rural population based. Despite having strategies, the rural women in this study areas tend to lack access to health facilities, education, and information about maternal health care services that showed to have an effect on the preference to institutional deliveries [37].

In addition, health promotion programs, which use urban, focused mass media, may not work to the advantage of the rural residents [38]. Due to this, large numbers of women are delivering at home being assisted by untrained traditional birth attendants and had bleeding, lack of consciousness due to eclampsia, obstructed labor which will lead to uterine rupture, and others [39]. Moreover, this might be due to underestimating the severity of various pregnancy-related conditions, lack of available transport particularly for problems occurring in the night as well as first seeking care from a facility that is ill-equipped to provide emergency obstetric care. Poor knowledge of risk associated with various pregnancy warning signs as well as the failure to identify health facilities well equipped for the provision of emergency obstetric services.

Mothers who had been managed in a condition at the presence of provider related problems like delay in making the correct diagnosis, delay in making definitive treatment after diagnosis, no assessment by a senior doctor, and poor monitoring of patients having maternal near misses were 7.02 times more likely to develop maternal near misses than mothers who had been managed in the absence of those problems. This strong association is critically important because it means that changes in provider decision making could reduce maternal near misses. The finding of this study is consistent with the study conducted at the University of Illinois at Chicago [35]. This might be due to the fact that the low number of health personnel per patient flow, the technologies for diagnosis, the communication means of health professionals and a variety of health professionals specialized in specific fields in each referral hospital in Amhara regional state referral hospitals. Moreover, it could be due to the behavior of the health professionals in both Chicago and Amhara region. Generally, these results unveil a fragmented care network, inefficient offices for regulation of obstetric beds and/or lack of hospital beds for the management of complex cases and also a model of care that disrespects scientific evidence on what is beneficial to maternal near misses.

Conclusions

The study revealed that the proportion of maternal near miss is high in Amhara regional state referral hospitals. The situation is worst both in urban and rural resident women, and the most important factors which make mothers to develop maternal near misses were multidirectional in nature. Lack of formal education, long hospital stay, lack of ANC follow up, presence of administrative related problems, community related problems, personal related problems and medical personnel related problems need greater attention.

Authors' contributions

MD wrote the proposal, participated in data collection, analyzed the data and drafted the paper. TA and TS approved the proposal with some revisions, participated in data analysis and revised subsequent drafts of the paper. All authors read and approved the final manuscript.

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