ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCE SCHOOL OF PUBLIC HEALTH

Assessment of magnitude and factors associated with Maternal Near Miss in Public Hospitals of Addis Ababa

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I The Under signed declare that this thesis is my original work, has not been Presented for a degree in this or any other university and all source materials used for the thesis have been duly acknowledged.

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ABSTRACT

Back ground: Causes of maternal near miss can be classified as direct and indirect causes. The major direct causes of maternal near miss are obstructed or prolonged labor, postpartum hemorrhage, infections, ruptured uterus, severe preeclampsia, eclampsia and unsafe abortion. Among the indirect causes of maternal morbidity and mortality anemia, malaria, hepatitis, tuberculosis and cardiovascular disease account for the highest number of maternal deaths.

Objective: To assess magnitude and factors associated with maternal near miss in selected public hospitals of Addis Ababa.

Methodology: A retrospective cross-sectional study design was used .A total of 497near miss cases were identified from January 2014 to December 20014 from four selected public hospitals in Addis Ababa. Out of these 321 near miss cases were selected based on proportionally allocated sample size for each hospitals data was collected using data extraction format adopted from WHO. Data was entered into Epi data version 3.1 and transferred to SPSS version 20 and analyzed. To establishes associations between dependent and independent variables and determine possible Association, P values, logistic regression and odds ratio at 95% confidence interval were used, Statistical significance was considered at P-value less than 0.05.

RUSELT The reviewed near miss cases were admitted with different diagnosis. The most common types of near-miss events fall under the diagnostic categories of hemorrhage, sevier pre-eclampsia, Eclampsia, ruptured uterus, sepsis and obstructed labor. Heammorrhage was the major 179(55.8%) diagnosis at admission followed by sever preeclampsia 116(36.1%) . The least diagnosis was uterine rupture which accounts for 4 (1.2%).

On logistic regression and bivaret multivariate analysis with hemorrhage and SPE; age, parity, gestational age and ANC were significantly associated with OR.

Conclusion. There is a high frequency of maternal near miss at the level of these facilities therefore maternal health policy needs to be concerned not only with averting the loss life, but also with preventing maternal near events or factors hemorrhage, hypertension, infection, ruptured uterus at all care levels including primary health care levels and community based level.

Recommendation. Therefore maternal health policy needs to be concerned not only with preventing loss of life but also with preventing maternal near miss events like hemorrhage and hypertension disorder and other all health care levels including primary health care by developing management protocols.

Key words: Maternal near miss, complication, outcome maternal near miss events.

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ABBREVIATIONS

APH	Ante partum Hemorrhage
DM	Diabetes mellitus
DMN	Determinants of maternal near miss
HELLP	Haemolysis, elevated liver enzymes, low platelet count
HIV/AIDS	Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome
HPN	Hypertension
IBMN	Institutional based maternal near miss
ICU	Intensive care unit
MD	Maternal death
MDG	Millennium Development Goal
MNM	Maternal near miss
PPH	Post Partum Hemorrhage
REC	Research Ethics Committee
SMM	Sever maternal morbidity
SPE	Severe pre-eclampsia
WHO	World Health Organization
CI	Confidence interval
DHS	Demographic health survey
AA	Addis Ababa
AAHB	Addis Ababa Health Bureau
OR	Odds ratio
TFR	Total Fertility Rate

1. INTRODUCTION

1.1 Background

Maternal near-miss cases of women who nearly died but survived from complications occur during pregnancy, childbirth or postpartum (Maternal near miss) is increasingly identefied as useful means to examine equality of obstetric care since pregnancy complications occur in 15%of women worldwide. The practical implementation of maternal near miss concept should provide an important contribution to improving quality of obstetric care to reduce maternal deaths and improve maternal health (1-4).

Maternal morbidity and mortality maternal near miss has a high contribution .which is resulted from direct and indirect causes. The direct causes are obstructed or prolonged labor, postpartum hemorrhage, infections, ruptured uterus, severe preeclampsia, eclampsia and unsafe abortion are the major direct causes of maternal near miss. Among the indirect causes of maternal morbidity and mortality anemia, malaria, hepatitis, tuberculosis and cardiovascular disease account for the highest number of maternal deaths. (5)

As indicated that the maternal mortality remains high in developing countries in which 99% of the death occur in sub Saharan African. Risk of maternal mortality is 1 in 30 in Sub-Saharan Africa while it is 1 in 5,600 in developed countries (6.7, 8).

Pregnant women develop severs acute morbidity during pregnancy, delivery and postpartum period in any setting. Some of these women die and a proportion of them narrowly escape death. In order to device appropriate strategy to curb maternal mortality in these countries, knowing only the statistics on levels of maternal mortality and morbidity is not enough. Understanding causes and underlying factors which lead to maternal morbidity and mortality including complications are important (9).
According to Ethiopian demographic and health survey 2011, the maternal mortality ratio was 676/100,000live births. In Ethiopia 20,000 women die each year from complications during pregnancy, child birth and postpartum period (10).

World Health organization (2004), and Waterston et al.set the following criteria to diagnose sever maternal morbidity. If a mother presents with any of the condition described below during pregnancy, childbirth or within 42 days of termination of pregnancy and survives it is considered as a maternal near miss case. Cardiovascular dysfunction; shock, cardiac arrest, sever hypo perfusion

(lactate greater than 5mmol or greater than 45mg/dl, sever acidosis (pH less than 7), use of continuous vasoactive drugs, cardio-pulmonary resuscitation. Respiratory rate dysfunction: Acute cyanosis, gasping, Sevier tachypnea, renal dysfunction. Coagulation dysfunction, hepatic dysfunction, neurologic dysfunction, Uterine dysfunction: - hysterectomy due to uterine infection or hemorrhage.

In case of Waterston et al. criteria sever preeclampsia is considered when the blood pressure is 170/110mmHg when it is measured twice four hours difference or when blood pressure is greater than 170/110mmHg associated with 24 hour protein urea greater than 0.3g or ++ on stick. Accordingly eclampsia, HELLP syndrome Severe hemorrhage (blood loss >1,500mL). Severe sepses, Uterine rupture (11).

1.2. Statement of the problem

Globally, More than half a million women die annually as a result of pregnancy. In the developing countries the unacceptably high maternal mortality overshadows Sevier maternal morbidity. However, near-miss events occur more frequently than maternal deaths (5, 11, and 12).

For every maternal death, there are close to 100 women with severe maternal morbidity referred to as maternal near miss. In Sub-Saharan Africa the magnitude of maternal near miss varies from 20 to 920/100,000 live births resulting in life time risk of death of one per 16 (7,12).

Ethiopia is one of the countries with the highest estimated number of maternal mortality. According to EDHS 2011, around 200,000 Ethiopian women and girls miss out on skilled healthcare during pregnancy, child birth and postpartum period (10). In addition from 1355 maternal admission case notes reviewed 403 (29.7%) of them were near miss cases (15).

Maternal near miss is a major public health problem of all pregnant mothers across globally and in Addis Ababa too which cannot be tackled unless we identified its associated factors: socio demographic and obstetric data of the near miss cases (12).

Addis Ababa is one of that currently strive to avoid maternal mortality caused by severe maternal morbidity. Though the city has different health service and medical equipments to reduce maternal deaths, still there exists maternal death emanated from complications of pregnancy and child birth (14). , the main aim of the study is to assess the magnitude and the associated factors of maternal near miss in public hospital of Addis Ababa.

1.2. Significance of the study

It is worthy while to note the fact that investigation of near miss could furnish more details about factors contributing to severe maternal morbidity. Furthermore, a critical examination of near miss may be used as a reference for quality assessment of obstetric care. In tackling such problem and designing intervention having evidence is crucial. Therefore, this study will generate evidence based information which enhances the ministry of health, policy makers and stakeholders working in the programs of maternal health with aforementioned benefits and reference. The finding or results obtained from this research could be used as a baseline for researchers who are interested to examine further on this area.

2. LITERATURE REVIEW

2.1, Definition of Near miss

World health organization defined near miss as a women who nearly died but survived complication that occurred during pregnancy, child birth or within 42 days of termination of pregnancy. There is certain degree of controversy regarding the definition of near miss. This is mainly due to the fact that near miss is a recent and abstract concept. Three different kinds of definitions have been used to describe near miss maternal morbidity: the definitions based on the admission of women to intensive care units during the pregnancy-puerperium cycle; those based on the occurrence of certain diseases or complications such as preeclampsia, hemorrhage or severe sepsis and those based on evidence of organic dysfunction. Several studies adopted definitions of near miss based on the admission of women to intensive care units.

On this part, defined maternal near miss as gets the cases in which women present with potentially fatal complications during pregnancy, delivery or during the puerperium, and who survive merely by chance or by good hospital care. World health organization, on its, defined ne

ar miss as a women who nearly died but survived complication that occurred during pregnancy, child birth or within 42 days of termination of pregnancy (4,9).

2.2. Magnitudes of Near Miss

Globally, about eight million women suffer from pregnancy complication. Near miss cases have similar pathways as maternal deaths. Hence, the maternal mortality ratio (MMR) is used to track its trends, and constitutes the most sensitive indicator for social inequalities, the magnitude of maternal near miss globally varies from 20 to 920/100,000 live births, resulting in a lifetime risk of death of one per 16 women in Sub-Saharan Africa, contrasting with one per 4,100 in developed countries(7).

Ethiopia is one of the countries with the highest estimated number of maternal near miss, As to the EDHS of 2011, 676 mothers per 100,000 death and besides death, around 200,000 Ethiopian women and girls who miss out on skilled healthcare during pregnancy, child birth and post partum period (10).A study done in Debremarkos referral hospital found403 (29.7%) were near miss cases from a total of 1355 case notes reviewed in five years period to the study (15).

2.3. Factors associated to Maternal Near miss

A cross-sectional study done in Tanzania revealed that there is a significant association between hypertensive disorders and postpartum hemorrhage with maternal near miss. They also found that most of maternal deaths in Tanzania were associated with eclampsia, abruption placenta and peripartum hemorrhage and cardiomyopathy. Filippi et al, study done in Africa, identified hemorrhage and hypertensive disorders as the most common conditions associated to sever acute maternal morbidityt (SAMM). There are major factors influencing maternal near miss such as women educational status, an effective and efficient health system, especially during pregnancy and delivery, low skill birth attendant, poor economies and poor health financing. Less developed regions have a higher proportion of preventable maternal mortality and a high risk of dying from pregnancy related factors (1, 12, 16, 17).

Most maternal near miss occurs during delivery and post-delivery period. Brazillian studies also reported hypertensive syndromes as the most commonly associated causes with SAMM Cases as much as 57% in Souza et al study (12). The high maternal near miss in Ethiopia is primarily due to the three delays: (i) delay in seeking skilled care (delay in recognizing the problem and making a decision to seek care)**;** (ii) delay in reaching care and (iii) delay in receiving timely and effective care (14).

2.4. Obstetric Cause of Maternal Near Miss

Identifying the primary causes of severe morbidity both by direct and indirect causes, Obstructed or prolonged labor, postpartum hemorrhage, infections, ruptured uterus, severe preeclampsia, eclampsia and unsafe abortion are the major direct causes of maternal near miss. Among the indirect causes of maternal morbidity and mortality anemia, malaria, hepatitis, tuberculosis and cardiovascular disease accounts the highest number of maternal deaths (5).

Multicenter study done in Brazil demonstrated that hypertensive disorders are the major factors associated with sever maternal morbidity in middle income countries (17). Another Study was done Waterstone's criteria identified greater number of SAMM cases and most of them had hypertensive disorders of pregnancy followed by complications of severe hemorrhage, mainly due to Post-Partum Hemorrhage which was also contributed by incomplete abortion and ruptured ectopic pregnancy (1).

Similarly the study on maternal near-miss and death and their association with caesarean section complications using a cross section study and their finding revealed that the major causes of maternal near miss were hypertensive disorders and postpartum hemorrhage. They also found the most maternal deaths in Tanzania were caused by eclampsia, abruption placenta and peripartum cardiomyopathy. They also detected nine maternal near miss events and five deaths from iatrogenic complications (16).

It was observed that hypertension occupied the main role, and this is in agreement with its position as the basic cause of maternal death most often found in Brazil. Non-obstetrical complications and hemorrhages were the other most common primary cause of severe morbidity (12), on their part, multi-center study conducted on maternal near miss and death among women with severe hypertensive disorders using cross sectional data revealed that hypertensive disorders represent the major cause of maternal morbidity in middle income countries (17).

Therefore, evidences from different studies identified that the major causes of maternal near miss are hypertensive disorders and postpartum hemorrhage. (Thus, this study will use chart on the magnitude and factors of maternal near miss based on the aforementioned causes of maternal near miss.)

The other important point that needs extraordinary attention is on the maternal near miss clinical criteria developed by world health organization. These are: acute cyanosis, gasping, respiratory rate greater than 40 or less than 6/minute, shock, oliguria non responsive to fluid or diuretics, failure to form clots, loss of consciousness lasting greater than 12 hours, cardiac arrest, stroke, uncontrollable fit/ total paralysis and jaundice in the presence of pre-eclamsia and according to Waterstone et al. Criteria **:**Severe pre-eclampsia: BP = 170/110 mmHgtwice,4-hours apart or; BP >170/110 associated with 24-hour proteinuria greater than 0.3 g or ++ on a stick, Eclampsia HELLP syndrome, Severe hemorrhage (blood loss >1,500 mL), Severe sepsis Uterine rupture (11,12).
This study could be used as a bench mark to take diagnosis to WHO maternal near miss diseases specific criteria (obstructed labor, hemorrhage, pregnancy induced hypertension, septic abortion and sepsis/infection these criteria used as benchmark to take diagnosis to attest the existence of maternal near miss.

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3. OBJECTIVES

3.1. General Objective

- ✓ To assess magnitude and factors associated with maternal near miss in selected hospitals of Addis Ababa.

3.2. Specific objectives

- ✓ To determine the magnitude of maternal near miss in selected public hospitals of Addis Ababa.
- ✓ To explore factors associated with maternal near miss in selected public hospitals of Addis Ababa

4. METHODOLOGY

4.1. Study area and period

Based on the 2007 population and housing census estimation the city's had 3,038,096 people. The rate of natural increase of a population is estimated be 2.6 nationwide and Addis Ababa (CSA 2007), considering the net migration of 1.29% the population growth rate is 2.8% and TFR 1.5 .The city administration has a total of 50 hospitals (11public; six are federal hospital and five of them were Addis Ababa city public hospitals and 39 private) and 37 health centers. Both the health center and hospitals have been offering different health service like gynecological, obstetric, medical and surgical service. This study was conducted in four public Hospitals of Addis Ababa, Ethiopia in March 2015.

4.2. Study design

A facility based retrospective cross- sectional study design was employed in selected public hospitals in Addis Ababa.

4.3 Source of population

All pregnant women who delivered or aborted and up to 42 days of postpartum period that had medical record of admission in obstetrics and gynecology unit in selected hospitals in the study period.

4.4 study population

Women who are pregnant, in labour, or who delivered or aborted up to 42 days arriving at the facility with any of the listed criteria for near miss diagnosis or those who develop any of those conditions during their stay at the selected hospitals in Addis Ababa from January 1 to December 31, 2014-,were an eligible for the study.

4.5. Inclusion criteria

All maternal near miss cases that were admitted during above mentioned period were included.

4.6. Exclusion criteria

All pregnant women were admitted to the study period not full fill the above mentioned near Miss criteria were excluded.

Incomplete notes in which important variables were not recorded were excluded.

4.7. Sample size determination

Sample size was determined assumptions using single population proportional formula considering 95% confidence interval and proportion of critically ill obstetric patients among total delivery. The total sample size was calculated using the following assumption to come up with final sample size.

Confidence level =95%

Margin of error (precision) = 5%

Prevalence of near miss =29.7, as study done in Debremarks refferal Hospital (15).

$N = (Z\alpha/2)^2 \underline{P\ (1-p)}\ /d^2 = 321$

$96^2 29.7(1-29.7)/0.05^2$

Hence, the maximum sample size that required for the study was 321.

4.8. Sampling technique and procedures

From the total of 11 public hospitals six hospitals are federal hospitals and five of them were Addis Ababa city hospitals. Among these four hospitals were selected by lottery method. After that, the calculated total sample size was redistributed to the selected health institutions proportionally.

The case notes of near miss pregnant mothers who were admitted to the selected Addis Ababa public hospital from January 1/2014 to December 30 2014 were selected and their records were reviewed. Client's case note list was obtained from registered log book and then case notes were selected from each year proportionally.

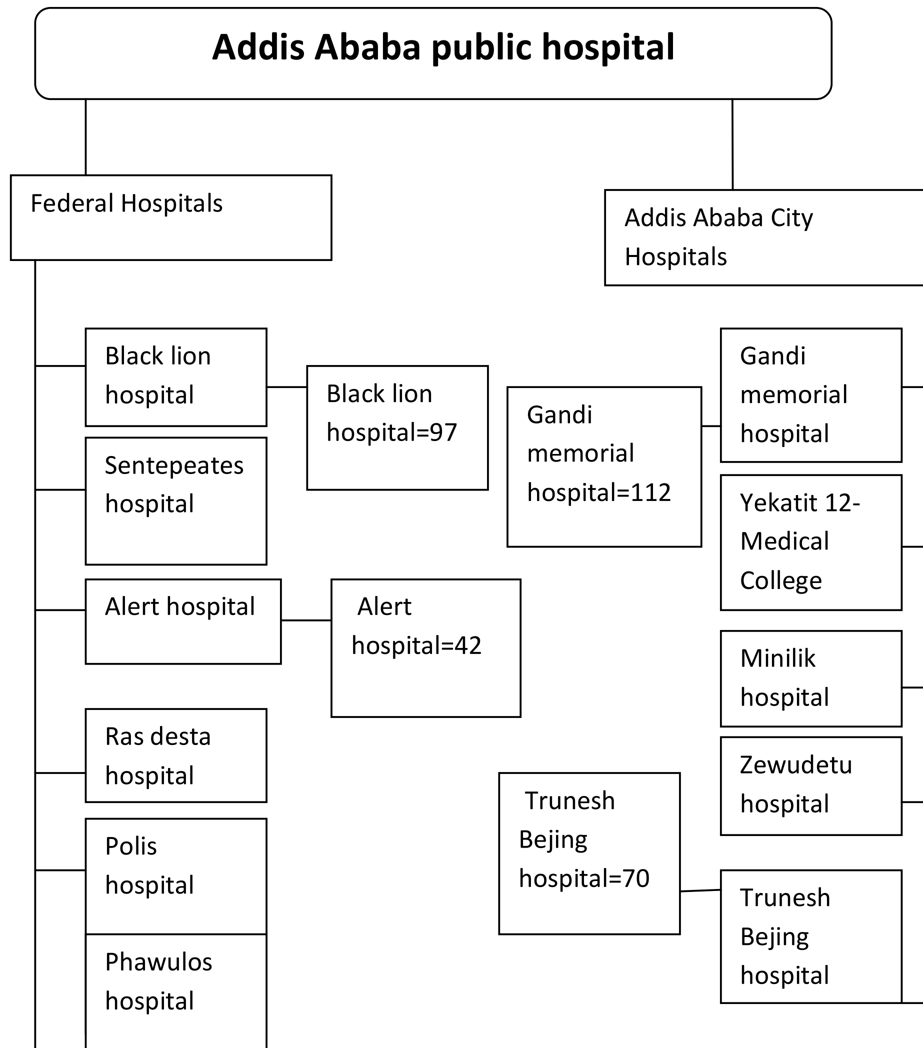


Figure 1.0 .Schematic presentation of sampling procedure

4.9. Data collection techniques and procedures

A structured data extraction chart adapted from WHO standard questions (9) was developed used as a data collection tool. It included all the necessary variables in accordance with the objective of the study and it was a written English version .Eight BSC nurses were recruited as a data collector and one supervisor was also recruited based on their previous experience on data collection and supervision carrier.

4.10. Operational definitions

- **PPH** necessitating urgent life saving intervention like blood transfusion, plasma expanders and laparatomy.
- **APH** (severe abruption, major degree placenta previa) with deranged vital signs and active bleeding necessitating life saving intervention (blood transfusion, plasma expanders and urgent delivery).
- **Severe preeclampsia and eclampsia** necessitating urgent stabilization and delivery.
- **Obstructed labour and/or uterine rupture** necessitating urgent life saving resuscitation and intervention (blood transfusion, plasma expanders , laparatomy, and destructive delivery)
- **Severe sepsis** (chorioamnionites, puerperal sepsis) with pelvic or generalized peritonitis necessitating urgent life saving resuscitation and intervention (colloids, blood transfusion, triple antibiotic, laparatomy).
- **Complicated unsafe abortion** necessitating urgent life saving intervention (blood transfusion, triple antibiotic, laparatomy).
- **Ruptured ectopic pregnancy** necessitating urgent life saving intervention (blood transfusion, triple antibiotic, laparatomy).
- Thromboembolism (DVT, pulmonary Thromboembolism),Amniotic fluid embolism
- Other indirect causes of maternal morbidity and mortality like Severe malaria, Severe anaemia, Hepatic failure and Renal failure

4.11. Data quality management

The data extraction chart was pre- tested on 10 % of the sample size in hospital which was not selected for the study (like Black lion and Gandi memorrial hospital). Later, necessary modification was taken based on the results of pretest. Training was given for both data collectors and supervisor on the objective of the study, procedure and technique that they should follow during data extraction before and during data collection. Repeated supervision was done during data collection period, and data entry.

4.12. Study Variables

Independent variable

Socio demographic factors e.g. age, marital status, religion, residence, ANC visit),

Characteristics of obstetric factors e.g. parity, gravidity, gestational age…)

Dependent variables

Maternal near miss

4.13. Data Analysis Procedures

Data were entered in to Epi-data version 3.1 and exported to SPSS version 20 for analysis. Descriptive statistics like frequency, percentage, mean, median with their respective measure of dispersion (i.e. dispersion for continuous variable) were calculated as bivariate analysis. Crude odds ratio and since the outcome variable was categorical type, adjusted odds ratio was calculated through multiple logistic regressions model. P- Value and 95% CI were used to test statistical significance of the association calculated for biviariate and multivariate analysis. All independent variables were tested with dependent variable independently during biviariate analysis and then, those independent variables that were significant at p- value of 0.05 or 95 % CI were used for multivariate analysis.

4.14. Dissemination of result

After the research is completed, the main finding of the research will be disseminated to the concerned body in the form of presentation, hard copy and publication.

The hard copy of the whole research paper will be submitted to School of public health of AAU and it will be presented to school of public health during thesis presentation.

4.15. Ethical consideration

The research proposal was submitted to Research and Ethics Committee of Addis Ababa University, School of Public Health and ethical approval was obtained from School of Public Health. Letters of permission was obtained from Addis Ababa Administrative Health Bureau. All concerned bodies were officially have been contacted through letters and permission has been obtained at all level.

5. RESULT

5.1 Socio demographic status of study population

A total of 10,050 delivers were conducted from January 2014 to December 2014 in four selected public hospitals in Addis Ababa. A total of 497 near miss cases were identified out of these 321 near miss cases selected based on proportionally allocated sample size for each hospitals Notes of selected cases for the study reviewed number of cases selected from each of the selected hospitals were: 70 from Tirunesh Bejing hospital, 112 from Ghandi hospital, 97 from Black Lion hospital and 42 from Alert hospital were selected. At the time of study in gynecology and obstetrics unit had 110 midwifes, 42 medical doctors, health officers, 6 gynecologist, and seven surgeon.

Of the highest proportion of the study participants in age group of 20 to 29.The mean age of the study participants was 28+5.5(SD) years. The proportion of married women was 306(95%) while the remaining 15(5%) were single. Two hundred seventy six (85.9%) of the near miss cases were residing in Addis Ababa and 45 (14.1%) of them residing out of Addis Ababa. The majority of study participant maternal near miss cases were orthodox, Muslim and protestant religion followers, 193(60.1 %), 89 (27.7%) and 39(12.1%) respectively(See table 1).

Table 1.0.Socio demographic status of maternal near miss cases in Addis Ababa, March, 2015

Variables	Frequency n=321	Percentage
Age group		
< 19	12	3.7
20 - 29	189	59.2
30 - 39	112	34.6
40 – 49	8	2.5
Residence		
Addis Ababa	276	85.9
Out of Addis Ababa	45	14.1
Marital status		
Single	15	95.3
Married	306	4.7
Religion		
Orthodox	193	85.4
Muslim	89	9.3
Protestant	39	5.3

5.2. Obstetric History

As indicated below on table 2, the highest number of women 158(49.2%) were between gravida 2 to 3 while prime gravid women accounts 114(35.5%) and the rest 43(15.3%) of them were greater than gravid 4. The number of women who had one to three children was 43(13.4%) and greater than or equal to four were 3(0.9%). Women who had one to four children accounts 49(15.3%) and greater than four were accounts 30(9.3%).Out of 321 revised data, 318(99.1%) of women had live birth and 3 (0.9%) had still birth . Of the total 321 study cases who had obstetric history 62(19.3%) of them had abortion, 3(0.9%) had still birth and the rest 79(24.6%) had live birth.

Table2. Obstetric history of maternal near miss in Addis Ababa March,2015

Variables	Frequency n=321	Percentage
Gravida		
2 to3	158	49.2
Premi	114	35.5
≥ 4	43	14.4
Parity		
None	275	85.7
1-3	43	13.4
≥4	3	0.9
Live children		
No children	242	75.4
1-4 children	49	15.3
>4 children	30	9.3
Still birth		
None	318	99.1
1-2	3	0.9
Abortion		
None	259	80.7
one	49	15.3
2-3	12	3.7
≥ 4	1	0.3

5.3. Current obstetric status

Out of 321 reviewed data 92(28.8%) of cases were admitted to the selected hospitals at the gestational age of 28 -37 weeks, followed less than 28 weeks 68(20.9%) then 155(48.4%) were at the gestational weeks of 37-42 weeks and 6(1.9%) of cases were at the gestational age of greater than 42.The majority 275(85.7%), near miss cases were occurred among null Para and prime Para women.

Among 321 revised medical documents of near misses women; 263 (95.6%) had antenatal care follow up and only 12 (4.4%) of them did not attended any antenatal care during their current pregnancy. One hundred fifty one (95.4%) of them had two to four times visit while 12 (4.6%) of them have one visit. Those women who had antenatal care 183 (69.6%) were attended at health center, 75 (28.5%) were attended at hospital and 5(1.5%) were attended at health post. Out of 321 revised near miss women's' medical record Eighty one (23.5%) had no antenatal attendance this is due to their gestational age not eligble for antenatal care follow up.

Table3. Current obstetric status of maternal near miss cases in Addis Ababa March, 2015

Variable	Frequency n=321	Percent
Gestational age		
<28weeks	68	20.9
28_37weeks	92	28.8
37_42weeks	155	48.4
>42weeks	6	1.9
ANC visit *		
Yes	263	81.9
NO	12	3.7
Number of ANC visit		
One times	12	4.6
2_4 time	251	95.4
Place of ANC		
Hospital	75	28.5
Health center	183	69.6
Health post	5	1.9

From total 321 women 275 of women were expected to attend ANC follow up 263 women were attended and the rest 12 of them were not attend ANC follow up, the rest 45(14.0%) were not elgeble to attened ANC folow up.the women had ANC follow up 263 women their place of ANC were hospital ,health center and health post..

One hundred five (32.8%) of women with near miss cases were in labour when admitted to the selected hospitals while 216 (67.2%) of them were not in labour. . About 291(90.7%) of near miss cases brought referal paper from governmental and private health institutions on arrival. They were stayed in labour for different hours.The majority (40%) of them were stayed for greater than 24 hours and the least were stayed for less than 12 hours (9.5%). Fifteen percent of them did not know the duration of their labour. Out of 321 near miss women 29(9%).of them were delivered within three hours of arrival in the selected health facility, 292 (92%) severely ill mothers managed after three hours arrival of the facility. Out of women admitted in obstetric units, 241 (75.1%) were admitted on the day of working day, 78 (24.3%) were admitted on weakened and 2(6%) of near miss women's were admitted on holyday .Majority of admitted near miss women were referred from health center 198(67.8%), 79(27.1%) were from Hospital, 14(4.8%) were from health post and 1(.3%) referred from home. The rest 29 near miss women not referred from other health facilities, that means they had antenatal follow up in study conducted hospitals .

Three hundred seven (95.6%) of cases were admitted with complication from the beginning and the rest 14(4.4%). women were admitted without complication. In case of their condition on admission 14(4.4%) of them were stable and 307(95.6%) were critically ill. Out of near miss cases the status of new born at birth were 203(63.2%) alive, 66(20.6%) were still birth and 52(16.2%) not applicable to say alive or dead i.e the status of the women were ectopic and abortion.

Table .4 Current obstetric statuses of near miss cases, Addis Ababa, March 2015

Variables	Frequency n=321	Percent (%)	Remark
Labour at admission			
Yes	105	32.8	
No	216	67.3	
Duration of labour			The denominator of duration of abour used were from those that had labour on admission (105)
<12 hrs	10	9.5	
12-24hs	37	35.2	
>24hrs	42	40.0	
Not known	16	15.2	
Delivery within 3hrs of arrival			
Yes	29	9.0	
No	292	91.0	
Referred			
Yes	291	90.7	
No	30	9.3	
Date of admission			
Working days	241	75.1	
Week end	78	24.3	
Holidays	2	.6	
Place of referral			
Home (TBA)	1	.3	
Health post	14	4.8	
Health center	198	67.8	
Hospital	79	27.1	
Admission with complication			
Yes	307	95.6	
No	14	4.4	

Condition on		
admission	14	4.4
Stable	307	95.6
Critical		
Outcome of		
pregnancy	203	63.2
Alive	66	20.6
Still birth (dead)		

The reviewed near miss cases were admitted with different primary diagnosis. The most common types of near-miss events fall under the diagnostic categories of sever preeclampsia, hemorrhage and pregnancy induced hypertension, ruptured uterus, sepsis and obstructed labor. Sever preeclampsia was the major 116 (36.1%) diagnosis at admission followed by incomplete abortion 6 (1.9%) and ante partum hemorrhage 62 (18.3%). The least diagnosis was uterine rupture 4 (1.2%) (See figure 2).

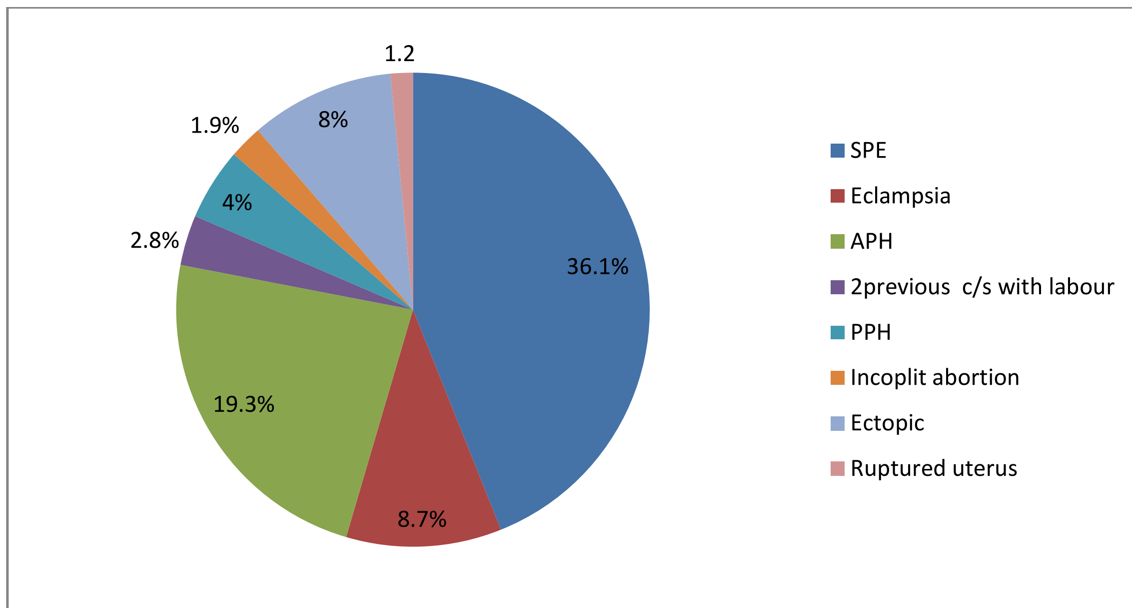
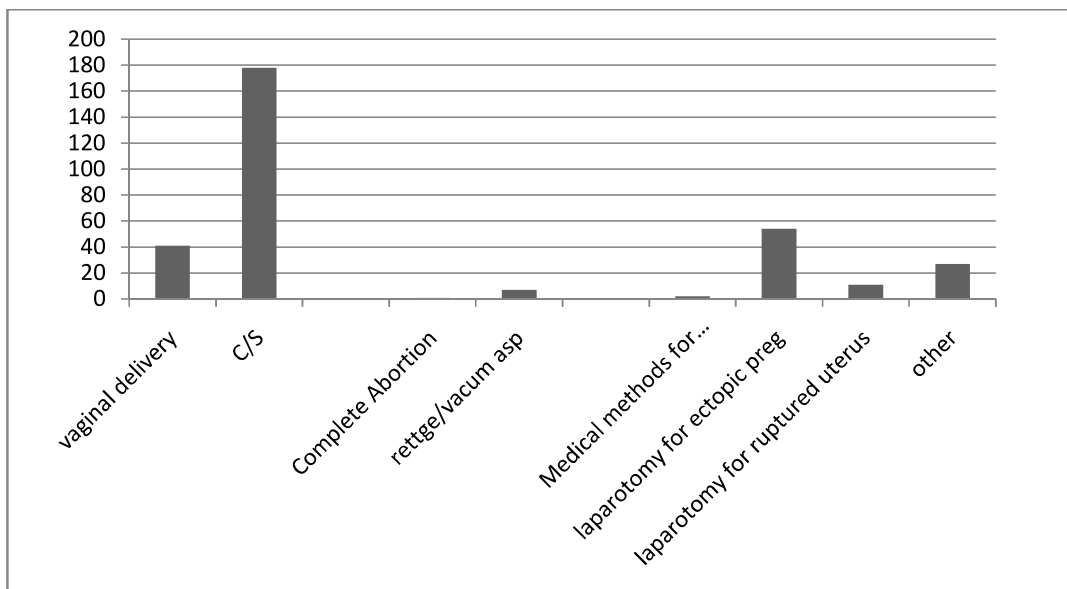


Figure.2.0.Primary diagnoses on admission of study population. In Addis A baba March, 2015

The reviewed cases of near miss were admitted in the selected hospitals the majority of cases 178(55.5%) were delivered by caesarean section. Laparotomy was done for 54(16.8%) of ectopic pregnancy and 11 (3.4%) of ruptured uterus. Forty one (12.8%) of near miss cases were delivered vaginally spontaneously., curettage or vacuum aspiration and medical method for uterine evacuation was done for 7(2.2%),,evacuation and 2(.6%) of cases respectively.(See. Figure3).

Figure.3. Mode of delivery or uterine evacuation of maternal near miss cases, Addis Ababa March, 2015.



5.4. Factors associated with sever preeclampsia

In the bivarite analysis, antenatal care visit, age, parity and gravidity were variables significantly associated with sever preeclampsia at shown in table 5.womens not had follow up were 0.6 times less likely developed sever preeclampsia than had antenatal care follow up (COR=0.57;95% CI =4.759,256.163). Pregnant women who had Para zero to one were 0.4 times less likely to the women were Para zero to one (COR =0.42; 95% CI =1.159, 3.144) and pregnant women who are Para three to six were 0.3 times less likely to the pregnant

women had not have children and women have one child (COR=0.30;95%CI=1.116,6.687). Pregnant women who are twenty five to thirty four age groups were0.5times less likely to the pregnant women who had sever preeclampsia in the age groups of fourteen to twenty four (COR=0.524;95% CI=0.296,0.926)

In the multivariate analysis after controlling possible confounders in the age groups of from twenty four to thirty five the women who had pregnant and the pregnant women who were Para one to two remained significant. those pregnant women who were develop sever preeclampsia in the age groups of 25-34 were 0.5 times less likely to develop sever preeclampsia than the pregnant women who were in the age groups of 14-24 AOR=0.524;95%CI=0.296,0.926).women who develop sever preeclampsia were Para one to two 3.4 times more likely to develop sever preeclampsia who were the women had para zero (AOR = 3.438;95% CI=1.106,10.694) and the pregnant women who were para three to six 6.2 times more likely to develop sever preeclampsia who were the women had Para zero (AOR=6.236;95%CI=1.062,36.628).

Table.5. Factors affecting sever preeclampsia among Addis Ababa public hospitals, Addis Ababa Ethiopia, 2015.

Variables	Sever preeclampsia			
	Number (Percent) Yes	Number (percent) No	COR (CI 95%)	AOR (CI 95%)
Age group				
14-24	21(20.6%)	67(30.6%)	1	1
25-34	73(71.6%)	122(55.7%)	0.524(0.296,0.926)*	0.487(0.248,0.958)*
35-44	8(7.8%)	30 (13.7%)	1.175(0.468,2.953)	0.976(0.335,2.844)

Marital status				
Married	95(93.1%)	196(89.5%)	0.6289(0.260,1.515)	0.549(0.192,1.571)
Un married	7(6.9%)	23(10.5%)	1	1
Gravidity				
1	5(4.9%)	10(6%)	1	1
2-3	56(54.9%)	61(36.5%)	0.54(1.035,2.894)*	0.754(0.238,2.390)
4-5	41(40.2%)	94(56.3%)	1.15(0.814,3.753)	0.563(0.122,2.607
Para 0				
1	59(33%)	79(55.6%)	1	1
1-2	95(53.1%)	53(37.4%)	0.42(1.159,3.144)*	3.438(1.106,10.694)*
4-6	25(13.9%)	10(7 %)	0.30(1.116,6.687)	6.236(1.062,36.628)*
Gestational age				
12-28	12(11.8%)	21	1	1
29-37	49(48%)	50	0.58(0.369,3.551)	0.784(0.214,2.871)
38-43	41	94	1.31(0.072,13.868)	1.537(0.422,5.592)
				2.625(0.168,41.066)*
ANC visit				
Yes	96(94.1%)	167(97.1%)	1	1
No	6(5.9%)	6(2.9%)	0.57(4.75,256.16)*	3.36(1.033,3.92)*

5.4. Factors associated with Hemorrhage

In the bivarite analysis frequency of the antenatal care, gestational age and parity were variables significantly associated with hemorrhage table 6 -women one had follow up were 0.6 times less likely developed hemorrhage than had antenatal care follow up (COR=;95% CI =4.759,256.163).

Pregnant women who had Para zero were 0.4 times less likely to the women were Para 5and 6 (COR =0.39; 95%CI=0.22, 0.65) and pregnant women who were Para one to two were 0.44 times less likely to the women had Para 5 and 6 (COR=0.44; 95%CI=0.24,0.80).and pregnant who had Para 3-4 were 0.8 times less likely to the women had no children (COR=0.83;95%CI=0.8,0.9).

Pregnant women who had the gestational age of the pregnant were 29 to 37weeks 2 times more likely to gestational age of the pregnant were12 to 28 weeks (COR=1.88;95 % CI =6.85,36.22).the pregnant women who had the gestational age of 37 to 42weeks 2.5 times more likely to gestational age of the pregnant were 12 to 28weeks (COR=2.5;95% CI=2.15,10.1).

In the multivariate analysis after controlling possible confounders, gestational age in between 37 to 42 weeks, Neuilly Para pregnant women and frequency of antenatal care remained significant. Those pregnant women who had in the gestational age between 37 to 42 weeks 8.6times more likely to gestational age of the pregnancy were 12 to 28 weeks (AOR=8.6; 95%CI=1.34,54.9).women who were develop hemorrhage the Neuilly Para 10 times more likely to develop hemorrhage the women had Para 5 to 6(AOR=10.2;95%CI=2.29,45.4). and the pregnant women who had not antenatal care follow up 7.9 times more likely to risk for hemorrhage than who had antenatal care follow up (AOR=7.9;95%C1.31,47.1).

Table.6. Factors affecting Heamorrhage among Addis Ababa public hospitals, Addis Ababa Ethiopia, 2015

Variables	Hemorrhagic shock			
	Number (Percent) Yes	Number (percent) No	COR (CI 95%) Crude	AOR (CI 95%) Adjusted
Age group				
<19	6(3.3%)	6(4.2%)	1	1
20-29	105(58.7%)	84(5.9%)	0.800(0.249,2.571)	0.126(0.10,1.639)
30-39	62(34.6%)	47(3.3%)	0.76(0.249,2.571)	0.321(0.045,2.312)
>40	6(3.3%)	5(3.5%)	0.83(0.269,10.334)	0.339(0.048,2.390)
Marital status				
Married	162(90.5%)	129(90.8%)	1	1
Un married	17(9.5%)	13(9.2%)	0.960(0.450,2.050)	1.110(0.352,3.502)
Religion				
Orthodox	109(60.9%)	84(59.2%)	1	1
Muslim	48(26.8%)	41(28.9%)	1.11(0.669,1.836)	1.718(0.708,4.165)
Protestant	22(12.3%)	(17)(11.9%)	1.003(0.501,2.007)	2.364(0.886,6.307)

Residence				
Addis Ababa	159(88.2%)	116(81.7%)	0.56(0.298,1.052)	1.816(0.777,4.246)
Out Addis Ababa	20(11.2%)	26(18.3%)	1	1
Gestational				
12-28	42(23.4)	20(14.1%)	1	1
29-37	67(34.4)	60(42.2%)	1.88(6.850,36.228)*	6.679(0.585,76.281)
38-42	35(19.6%)	42(29.6%)	2.52(2.152,10.065)*	8.585(1.342,54.915)*
43-45	35(19.6%)	20(14.1%)	1.2(0.513,20.226)	2.462(0.401,15.126)
Parity				
0	84(59.2%)	54(38.0%)	0.39(0.226,0.653)*	10.195(2.289,45.400)*
1-2	26(18.3%)	26(18.3%)	0.60(0.238,0.802)*	3.054(0.710,13.145)
3-4	16(11.3%)	36(25.4%)	0.83(0.82,0.895)*	2.324(0.548,9.861)
5-6	12(8.5%)	20(14.1%)	1	1
Frequency of ANC				
1	125	136	1	1
2-4	53	6	2.34(0.923,13.2010)	7.863(1.312,47.117)*

6. DISCUSSION

A total of 10,050 delivers and 497 near miss cases were recorded from January 2014 to December 2014 in four selected public hospitals in Addis Ababa. From the total near miss cases 321 near miss events were assessed for causes and contributory factors.

The near miss ratio obtained from this research is 49 maternal near miss cases per 1000 live births. This result ratio is much lower than the ratio of near miss which was obtained from Debre Markos Referral Hospital that was 297 cases per 1000 live births (15) but it is comparable with near miss case ratio in Addis Ababa hospitals which was 33 cases per 1000 live births (19).

More than half 59% of near miss cases were in the age group of 20 to 29. And this result is comparable with the study done in ten public hospitals of Ethiopia that showed 49% of the near miss cases were occurred in this age group (19).

From the total near miss cases about 36% were prime gravida. A study from DebreMarkos also showed that about 43% of near miss cases were prime gravida mothers (15).

More than 95% of the mothers had at least one antenatal care follow up in contrary a study from ten public hospitals of Ethiopia showed only 44% of the mothers who developed maternal near miss events had antenatal care follow up (19). And this difference could be explained by difference in the region and study population characteristics. This study also revealed that, 32.8% of women with near miss cases were in labor during admission to the selectedhospitals. This finding was similar with the study done in Brazil (8).

About 91% of near miss cases were referral and this proportion is comparable with the result from DebreMarkos Hospital (15).

Three hundred seven (95.6%) of cases were admitted with complication while the rest 14(4.4%) women were developed complications after admitted to the hospitals this result is similar with the study done in DebreMarkos Hospital where 90% of women were admitted with near miss event and the remaining 10% of cases became near miss after admission(15).

The most common types of near-miss events were resulted from sever preeclampsia116 (36.1%) followed by incomplete abortion 6 (1.9%) and ante partum hemorrhage 62 (18.3%) and the least events of near miss cases were caused by uterine rupture 4 (1.2%). The commonest causes of near miss cases identified from the study done in ten public hospitals

agree with the current study in the first two major causes of maternal near miss events, hypertensive disorders of pregnancy and obstetric hemorrhage (19) but this result is different with the commonest near miss events in DebreMarkos Hospital where the major causes of near miss case events fall under obstructed labor and hemorrhage and the least near miss events were from septic abortion and sepsis. This difference could be resulted from case definition of near miss events (15).and also similar study in the first two causes of near miss events hemmohrge and hypertension disorder in pregnancy in the study of Nigeria (21).

The study also showed that there is a statistically significant association between antenatal care visit and the occurrence of near miss events. Mothers who didn’t have antenatal care during pregnancy more likely to develop near miss events than those mothers who had antenatal care follow up. This result is in line with other researches done in Ethiopia (15) and a study in Sudan also showed that lack of antenatal care service is one of the predictor for the development of maternal near miss events (20). This could be due to mothers who have antenatal care follow up got the opportunity to have information about the danger signs and about the importance of utilizing maternal health care services. And it is also allows early detection and management of obstetric problems.

In addition to antenatal care service utilization, parity and gravidity were also significantly assoctiated with the occurrence of maternal near miss events. Women who had higher gravidity and parity were more likely to develop near miss events than those primi gravida and para zero women. This result also agrees with the studies done in Debre Markos (15) and Nigeria (21).

Age of the woman is also one of the predictor for the development of maternal near miss events. Pregnant women who were twenty five to thirty four age groups less likely to develop maternal near miss events than those women in the age group between fourteen and twenty four. This could be due to lack of knowledge about pregnancy and physical immaturity pregnancy of the woman.

Pregnant women whose gestational age 28 to 37weeks were 2 times less likely to develop maternal near miss events than those whose gestational age were12 to 28 weeks. This could be due to inability to detect the presence of pregnancy itself and failure to attend antenatal care services during early stages of pregnancy and inability to detect complications and danger signs early.

7. STRENGTH AND LIMITATION

7.1. Strength OF the Study

The used of standardized questioner from different literature .All causes and factors of maternal near miss were assessed and the selected hospitals are representatives of Addis Ababa city.

7.2. Limitation of the study

One of the limitations of this study is weakness of retrospective method of those records, the availability of all records and the correctness of diagnosis

8. CONCLUSIONS

There is a high frequency of maternal near miss at the level of these facilities. This study found that hemorrhage, sever preeclampsia, eclampsia, ectopic pregnancy, abortion, sepsis and ruptured uterus were complications for cause of maternal near miss. Sever preeclampsia was associated with age of women, gestational, parity and antenatal use. Hemorrhage was associated with antenatal care frequency, gestational age and parity.

9. RECOMMENDATION

A. Health Provider

- For prevention of sever preeclampsia and hemorrhage attention should be given for women
  - who had less than two deliveries to prevent sever preeclampsia
  - Antenatal care visit
  - Encourage pregnant women to having standard frequency of antenatal visit

B. Policy makers

- Maternal health policy needs to give attention to causes of maternal near miss to reduce maternal mortality
- Attention should be for factors associated with maternal near miss at all health care levels

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11. ANNEXES

Annex I. Data extraction chart

Section 1: Health facility characteristics:

1.1 Facility name………………………………………

1.2 Type of facility (x):

1.Refereral hospital	2.General hospital

1.3 Number of personnel working in Gynecology and maternity unit (write number)…….

1. Gynecologist and Obstetrsions in maternity and Gyni ward	2.Medical Doctors covering maternity and Gyni ward	3. Midwife	4. Others

1.4 Availability of services (x)

1. Basic services	2.save abortion care service	3.Cesereian section	4.Blood transfusion	4. Availability of instrumental deliveries.

1.5 Total deliveries and maternal near miss (write number)………

1.Number of deliveries	2.Total number of maternal near miss	3.Maternal near miss ratio

Section 2.Socio demographics and obstetric conditions of near miss women

201.Age (in year)	202.Residence	203. Religion	204.Marital status

205. Gravida…………………………………

206.Para…………………………………

207. Gestational age (weeks) (At the time of near miss before, after and during delivery) Days since delivery or end of pregnancy through Abortion, ectopic, miscarriage, \………………………………

208. Number of Abortion ………………….

209. Number of still birth--------------------

210. Number of live children------------------

Q211	ANC visit	1. Yes 2. No ➡	Skip to Q209
Q212	Number of ANC visit	1. One visit 2. 2 to 4	
Q213	Place of ANC visit	1. Hospital 2. Health Center 3. Health Post 4. Other (Specify)…………………..	
Q214	Did labour occur	1.yes 2.No	
Q215	Was a parthograph used	1.Yes 2.No	
Q216	If" yes "was correctly a partograp filled?	1 .yes 2. No	
Q217	Duration of lobur	1,<12hrs 2,12-24 3,>24hrs 4,Not known	

Q218	Gestational age at the time of near miss (For those develops the complication during pregnancy/ before delivery)	1. <28 weeks 2. <37 weeks 3. 37-42 weeks 4. > 42 weeks	
Q219	Time of near miss development	1. At home 2.Referred from government health facility 3. Referred from private health facility 4.others (specify)	
Q220	Time interval between admission and near miss.	1,within 24 hrs of interval 2,After 24 hrs 3,Not known	
Q221	Delivery or abortion occurred before arrival at this hospital	1. Yes 2.No	
Q222	Delivery within 3 hours of arrival in the health facility	1. Yes 2. No	

Section3. Time and Morbidity conditions of near miss

Code	Questions	Coding Categories	Skip
Q301	Date of admission(write)	DD,MM,YY	
Q302	Day of admission(x)	1,Working days 2, weekends 3,Holidays	
Q303	Referred(x)	1,yes 2,No	
Q304	If" yes ",referred from (x)	1,TBA 2,health post 3,health center 4,Hospital 5,other (specify)	
Q305	Admission with complication(x)	1,yes 2,no 3,not known	
Q306	Primary diagnosis on admission(write)		
Q307	Condition on admission (x)	1,stable 2,critically ill	