Retrospective assessment of maternal near miss cases and risk factors

[1]KAMALA GUMETE Bienvenu Nkissi, [2]Lukong Hubert

[1]PhD student in Public Health, [2]PhD
Faculty of Health Science of Bamenda
UINTED NATIONS VOLUNTEERS MIDWIFE at UNFPA - Foumbot District Hospital
Foumbot, Cameroon.

***Abstract*- A maternal near miss case is defined as a woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days after the termination of pregnancy. In 2009, World Health Organization (WHO) has developed new system based on organ system dysfunction which incorporates clinical, laboratory and management-based criteria for identifying maternal near miss. Hence, this study was conducted with the objective to determine the trend of maternal near misses' cases at Dschang District hospital from 1er January 2013 to December 2020. A hospital-based descriptive and qualitative study was conducted in Dschang District Hospital from February 2021 to July 2021. In this study we recorded 166 cases of MNM from the January 2013 to December 2020; the majority of women with potentially life-threatening conditions were referred (57.2%) from private clinic. During this period there were 10271 births. One hundred and twenty-three (123) women developed severe maternal outcomes, 166 were maternal 'near miss' morbidity and 15 were maternal deaths. This study concludes hypertensive disorders (42.8%), haemorrhage disorders (28.9%) and pregnancy with abortive outcome (21%) was the leading causes for maternal near miss.**

***Keywords*: Maternal "near miss", Retrospective, Maternal mortality, pregnancy.**

INTRODUCTION

Worldwide more than half a million women between age 15-49 die each year from the complication of pregnancy and childbirthh[1]. In recent years, the concept of maternal near miss is adopted by health-care systems worldwide and has received growing attention to assess severe maternal morbidity potentially leading to maternal death, the maternal near miss is frequently used as a standardized outcome to evaluate and improve the quality of obstetric care. In developing countries, complications during pregnancy and childbirth remain a leading cause of critical illness and death among mothers [1]. The developing regions accounted for approximately 99% of the global maternal deaths in 2015[2]. In the present time, severe maternal morbidity or maternal near miss has been suggested as a better indicator for the quality of maternity care as compared to maternal mortality [2] . In developing countries, complications during pregnancy and childbirth remain a leading cause of critical illness and death among mothers. The developing regions accounted for approximately 99% of the global maternal deaths in 2015[2]. According to the WHO, "Near miss" describes a patient with an acute organ system dysfunction which, if not treated appropriately, could result in death [2]. It has also been described as a situation of lethal complication during pregnancy, labour, or puerperium in which the woman survives either because of quality medical care or just by chance [1]. In many developed countries, maternal mortality has fallen to single digits, whereas maternal near miss cases are more and hence useful in evaluation of the present health system [3]. It is worthy of note that, in 2015, roughly 303 000 women died during and following pregnancy and childbirth [3]. Between 1990 and 2015, the global maternal mortality ratio declined by only 2.3% per year [4]. Prevalence of maternal near miss varies across global regions. It ranges from 0.6 to 14.98% by disease specific criteria and 0.04 to 4.54% by management-based criteria [5]. The magnitude of maternal near miss is high among African and Asian middle- and low-income countries [6]. Women who survive severe acute maternal morbidities/near miss have many characteristics in common with maternal death events particularly on risk factors [1]. Maternal near miss is also called severe maternal morbidity hence these terms are used interchangeably [7]. Some studies reported maternal near miss is 15 times more frequent than maternal death [8]. Another study in low resource setting showed that maternal near miss occurred 26 times more frequent than maternal death [7].A systematic review done by WHO also showed that prevalence of severe maternal morbidity (near miss) varies between 0.80–8.23% among studies which used disease specific criteria and 0.01–2.99% among studies that used management-based criteria [8]. For every woman who dies, 20 more women experience acute and chronic complications [9]. The concept of "near miss" has recently been introduced with regard to maternal mortality [10].

METHODOLOGY

Our study was carried out at Dschang District Hospital. This study was qualitative retrospective descriptive design. Six months from April 2021 to September 2021. The study population was made up of women who had given birth at Dschang District Hospital during the period set for the study. Medical record of women having given birth at Dschang District Hospital during the period set for the study. This study included all maternal 'near misses' and deaths at DDH. During this period, all data regarding women admitted to DDH during pregnancy or within 42 days of its termination were eligible for inclusion. This study excluded all pregnant women who didn't have complete information inside the register book at the Dschang District Hospital. Data was collected using close ended data collection index tool developed for maternal near miss criteria according to Sub-Africa tool Tura [11]. Data collection was made from questionnaires serving as a survey sheet, the mother's health record, the delivery register, the hospitalization register, the operating room register, and support materials. Data like diagnosis of obstetric complications, data regarding socio-demographic characteristics of study subjects, received health care and other background factors was also collected. A data extraction from patient records was done by the data collectors. Data collection process was supervised by a trained gynecologist working at the hospital. Once harvested, data was introduced into a Microsoft Excel 2019 spreadsheet and analyzed using the statistical software developed by the Center for Disease Control and Prevention Epi info 7.0

RESULTS

As illustrated in Table 1, The majority of participants were between 25-35 years of age with the highest percentages of 53, 4% meanwhile the lowest percentage was at 18% was between 36-49 years old. On antenatal care booking for ≥4 was at 69.3%, booking for ≤4 was at 18.7% and that Unbooked was 12.0% respectively. the level of education 56.0% of the participants were in the primary school level, 28.3% were in the secondary school level and 15.7% were in higher education. For marital status 66.3% of the clients were married or in union, 37.7% were single and 0.6% was divorced. The majority of participant was referred admission (57.2%) and the minority was self-admission (42.8%). the highest gestational ages ranged from, 37-45 weeks (63.3%). Findings revealed lower gestational percentages of 5.4% for 13-29 weeks.

Table 1: Distribution of participants according to socio-demographic

Characteristics	**Frequency**	**Percent**
Age		
16-24	47	28.2
25-35	89	53.4
36-49	30	18
Total	**166**	**100.0**
Antenatal Care		
Unbooked	20	12.0
Booked<4	31	18.7
Booked>4	115	69.3
Total	**166**	**100.0**
Level of Education		
Primary	93	56.0
Secondary/High	47	28.3
Higher	26	15.7
Total	**166**	**100.0**
Marital Status		
Married/in union	110	66.3
Single	56	37.7
Divorced	1	0.6
Total	**166**	**100.0**
Type of admission		
Referred	95	57.2
Self	71	42.8
Total	**166**	**100.0**
Gestational Age		
3-12	21	12,6
13-29	9	5,4
30-36	31	18,6
37-45	104	63.3
Total	**166**	**100.0**

Source: Auteur
As shown in Figure 1, The majority of the participants were housewives with 54.8%, 38.6% were for other occupation; 6.0% were employees, 4.8% were merchants and 1.8% was farmers.

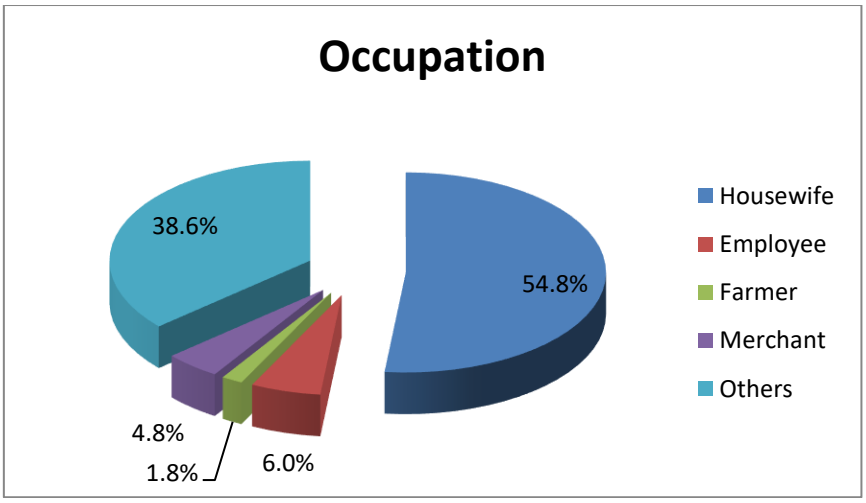

Figure 1: Distribution of women according to occupation
Source: Auteur

According to Table 2 the clinical criteria, 28.3% was for uterine rupture, 22.3% for severe preeclampsia, 21.1 % for severe complication of abortion and 20.5% was eclampsia was as the highest clinical criterion according to the Dschang District Hospital.
Findings for management criteria revealed that 54.2% was for blood transfusion of unit of blood or red cells, 12.0% was for hysterectomy following infection or haemorrhage, 10.8% was for Laparotomy other than C/S, 1.8% was for cardiopulmonary resuscitation and 0.6% for Intubation and ventilation not related to anaesthesia and 20.5% was none of them.

Table 2: Distribution of participants according to Clinical Criteria and Management Criteria

Characteristics	Frequency	Percent
Clinical Criteria		
Gasping	0	00
Shock	0	00
Oliguria non responsive to fluids or diuretics	0	00
Loss of consciousness lasting more than 12 hours	1	0.6
Jaundice in presence of preeclampsia	0	00
Eclampsia	34	20.5
Ruptured uterine	47	28.3
Sepsis or severe systemic infection	09	5.4
Severe complication of abortion	35	21.1
Severe malaria	3	1.8
Severe preeclampsia	37	22.3
Total	**166**	**100.0**
Management Criteria		
Hysterectomy following infection or haemorrhage	20	12.0
Transfusion of unit of blood or red cells	90	54.2
Intubation and ventilation not related to anaesthesia	1	0.6

Cardiopulmonary resuscitation	3	1.8
Laparotomy other than C/S	18	10.8
None	34	20.5
Total	**166**	**100.0**

Source: Auteur

This study revealed that the majority of participant give birth through the caesarean section 54.22%, 18.07 was for vaginal delivery, 12.05% was for Laparotomy for uterine rupture, 10.84% was for Laparotomy for ectopic pregnancy and 4.82% was for curettage /vacuum aspiration. From the table above the majority of the participants were alive and normal 91% and 9% of the participants' deaths. From the table above in was revealed that 42.8% of the underlying causes of maternal near-miss death were hypertensive disorders, 28.9 % was obstetric haemorrhage, 21% was pregnancy with abortive outcome, 5.4% was pregnancy related to infection and 1.8% was other obstetric diseases or complications. According to associated condition of maternal near misses this table showing that, majority of associated factor was other 28.3% (praevia, abruption, accreta etc…), 9.6% for previous caesarean section were identified as contributory and associated conditions, 7.8% was for prolonged/obstructed labour and 6% for anaemia.

Table 3: Distribution of participants according to the final mode of delivery and maternal outcome

Characteristics	**Frequency**	**Percent**
Final Mode of Delivery		
Vaginal	30	18.07
Caesarean section	90	54.22
Curettage /vacuum aspiration	8	4.82
Laparotomy for ruptured uterus	20	12.05
Laparotomy for ectopic pregnancy	18	10.84
Woman discharged or died still pre	0	0
Total	**166**	**100**
Outcome of the mother		
Death	15	9.0
Alive and normal	151	91
Total	**166**	**100.0**
Underlying causes of maternal near-miss/death		
Pregnancy with abortive outcome	35	21
Obstetric haemorrhage	48	28.9
Hypertensive disorders	71	42.8
Pregnancy related infection	9	5.4
Other obstetric disease or complication	3	1.8
Total	**166**	**100.0**
Anaemia	10	6
Previous caesarean section	16	9.6
Prolonged / obstructed labour	13	7.8
Others	47	28.3
Total	**86**	**51.8**
None	80	48.2
Total	**166**	**100.0**

Source: Auteur

DISCUSSION

In this chapter, the researcher will be dealing with the discussion of the findings giving meaning to research objectives and hypothesis. This study was designed with the objective of determine the trend of MNM at Dschang district hospital from January 2013 to December 2020.

To respond to the above objectives, we carried out a qualitative retrospective descriptive design. Total number of live births from January 2013 to December 2020 was10271 births. Maternal near miss cases were 166 and maternal deaths

were 15. From the 166 maternal near miss cases 95 cases (57, 2%) were referred from another health facility and 71 (42, 8%) were identified at hospital arrival or during first 24 hours of stay

Keys results of this study showing that out of all women that came and delivery in DDH with register 166 cases of MNM from the January 2013 to December 2020. Those results was showing according to the age that the majority of the participants was between the age of 25-35 years old (53.4 %) , according to the occupation the majority of the participants was housewife (54.8%), concerning the gestational age in weeks the majority of participants was between 37-45 weeks pregnancy (63,3%), according to the level of education we noticed that majority of the participants was in primary school (56%) , the majority of the participants was living at the urban residence (72,3%), the majority of the participant was married (66,3%) and majority of the participants was admitted by referred 57.2%.

According to clinical criteria we noticed that the pathology with the greatest number of near misses was uterine rupture (28.3%), follow by eclampsia (20, 5%), and severe preeclampsia (22.3%).

Majority of participants according to the management-based criteria was transfused unit of blood or red cells (54.2%), follow by hysterectomy following infection or haemorrhage (12%).

According for organ system dysfunction the majority of participants was having coagulation /haematological system dysfunction (33,3%), follow by neurological system dysfunction (26,3%), follow by cardiovascular dysfunction (21.5%).

According to maternal outcome, the majority of participant was alive and normal (91%) and the minority of participants deaths (9%)

According to fetal outcome the majority of healthy baby pass through the C/S (46), 17 for prematurity/lower birth and 20 deaths.

According to the causes of MNM the majority of participants were having hypertensive disorders (42.8%) follow by obstetric haemorrhage (28.9%).

From all the pregnant who came and delivery in DDH from the January 2013 to December 2020 we recorded 166 MNM cases. In this study, the majority of women with potentially life-threatening conditions were referred from private hospitals (57.2%). The high referral is supported by a study carried in Iraq ***Jabir et al.*** [12] and **Syria** ***Almerie et al*** [13], as the private system used to transfer the complicated cases to the tertiary level hospitals for emergencies and critical care.

The majority of Maternal near miss cases gave birth by Caesarean section (54.22%), this was because of the severity of these patients' obstetric conditions usually requires urgent action. This finding runs in agreement with study of ***Almerie et al*** [13] in which Caesarean section was the main delivery method among Maternal near miss and severe maternal outcome, (54.3%) of maternal near miss women gave birth by CS and (66.7%) of maternal deaths gave birth by CS.

The main life-threatening conditions among women in this study were hypertensive disorders of pregnancy 42.8% (22.3% Pre-eclampsia, 20.5% Eclampsia). This conclusion agrees with that of a Brazilian study which reported hypertensive disorders as the most commonly associated causes with severe maternal morbidity. Near miss, as much as 57% was reported in the study of ***Souza et al.*** [14] and ***Adisasmita et al.*** [15]. In Indonesia, it was found that 57.3% of women had hypertension disorders as a primary cause of maternal near miss, while results of ***Goldenberg et al.*** [16] indicated that the main cause of near miss event was obstetric haemorrhage followed by hypertensive disorders of pregnancy. The high percentage of maternal near miss and maternal mortality due to hypertensive disorders of pregnancy may be explained by:

- Lack of proper antenatal care with absence of screening and early detection of preeclampsia.
- Delayed notification for medical advice by the mother after development of symptoms as headache or blurring of vision.
- Poor management of severe preeclampsia or eclampsia in the primary and secondary health care units due to absence of experience or qualified personnel with more liability to the occurrence of the complications.
- Delayed decision from the staff about rapid termination of the preeclamptic patient that exposes her to the serious complications as cerebral haemorrhage or sub-capsular hematoma of the liver.

The 2nd most common cause of maternal near miss and maternal deaths after hypertensive disorders of pregnancy was obstetric haemorrhage (28.9%) may be explained by:

- Poor antenatal care with high rate of anaemia and placenta praevia with pregnancy.
- Absence of monitoring of progress of labour at home or private clinic delivery.
- Lack of blood supply in the general hospitals and absence of efficient equipped life support teams and procedures.
- Delay of referral of the cases from the primary place of delivery to DDH.
- Delay in decision regarding atonic postpartum haemorrhage with delayed surgical interference.

It was noted that the majority of life-threatening conditions were at arrival or delivered within 3 hours of arrival (81.3%). The study result is similar to that reported in the study done in Iraq by ***Jabir et al.*** [12] and in Syria by ***Almerie et al.*** [13] this is because the other healthcare facilities were referring cases with life threatening conditions to DDH hospital for better emergency and critical care.

All maternal near miss cases in this study developed organ dysfunction, 33.3% of near miss cases had coagulation / hematologic dysfunction. These results are consistent with those reported by ***Tuncalp et al. (***63.8%) and in ***Goldenberg et al. (***38.3 %) because postpartum haemorrhage was the main cause of maternal near miss in these studies, while cardiovascular dysfunction was the most frequently identified problem among near miss cases (55.8%) in ***Jabir et al.*** [12].

According to the WHO process and outcome indicators related with specific conditions among maternal near miss and maternal deaths. The effective interventions were adequately applied for the target populations, uterotonics were used for the prevention of postpartum haemorrhage, oxytocin 49.4%. In treatment of postpartum haemorrhage oxytocin 29.6%, Misoprostol 17.5 %, Ergometrine15.1%. Other treatment modalities included hysterectomy 6.1% and blood products 27.2%.

Magnesium sulphate for eclampsia 42.8%. Prophylactic antibiotics during caesarean section 12% and 54.2% of cases of parenteral antibiotic. Our study findings are in agreement with other study carried out by ***Tuncalp et al.*** [16], where oxytocin was used for the management of postpartum haemorrhage in (96.6) and in (62%) of cases for prevention of postpartum haemorrhage, magnesium sulphate for the treatment of eclampsia in (97.1%), prophylactic antibiotics during Caesarean section (96.6%).

In the study of ***Jabir et al*** [12], oxytocin was used for the prevention of postpartum haemorrhage in (83.36%) and in (67.86%) for treatment, magnesium sulphate for the treatment of eclampsia in (67.44%), prophylactic antibiotics during Caesarean section in (60.75%) and (100%) of cases in treatment of sepsis.

From the participants that we recorded the major causes of MNM cases was hypertensive disorder (42.8%); follow by obstetric haemorrhage (28.9%).

According to the Gravida and parity the most participants who experienced the MNM cases was primigravida 38 participants, followed by the Multigravida 36 participants. According to age the majority of the participant was between 25-35 years old (53.4%).

According to the occupation the majority of participants were housewife (54.8%). Based on the statistic concerning gestational age in weeks the majority of participants was between the ages of 37-45 weeks pregnancy.

Literature from the study reveals that a maternal near miss (**MNM**) is an event in which a pregnant woman comes close to maternal death, but does not die [17]. In 2009 the WHO introduced the concept of 'maternal near miss (MNM) for evaluating the quality of care for severe pregnancy complications [17]. The prevalence of severe maternal outcomes is estimated to be 7.5 cases /1000 deliveries [17]. It has been then recommended that WHO near miss approach for maternal death be uniformly used in analyzing the cases of near miss maternal mortality[18]. It includes the following:

Severe maternal complications

- Severe postpartum haemorrhage
- Severe pre-eclampsia
- Eclampsia
- Sepsis or severe systemic infection
- Ruptured uterus
- Severe complications of abortion

This study reveals that 21.1% was for severe preeclampsia with ICU admission, 19.3% were ruptured uterine, and 14.5% was eclampsia as the highest clinical criterion according to the Dschang District Hospital findings. There is a statistically significant association between the MNM risk factors and MNM at the Dschang District hospital.

This study was aimed at determining the trend of MNM at Dschang District hospital from 1er January 2010 to December 2020. The study still revealed that as for maternal outcome 9.03% of deaths were registered.

Findings revealed that the final mode of delivery for vaginal the fetal outcome for stillbirth the frequency was at 1, for the baby being healthy 12, premature/low birth 1, birth asphyxia stood at 2 and 10 deaths respectively. Data collected revealed from caesarean section that the fetal outcome stood at a frequency of 2 for live birth, 46 for those being healthy, 17 premature/low births, 5 for birth asphyxia and 20 deaths. The final mode of delivery for Curettage/vacuum aspiration, the fetal outcome stood at a frequency of 8 for abortion. The final mode of delivery for Laparotomy for ruptured uterus, the fetal outcome for the baby being healthy stood at a frequency of 2, 2 for birth asphyxia and 16 deaths. As for Laparotomy for ectopic pregnancy as the final mode of delivery, the fetal outcome frequency stood at 18 for ectopic pregnancy. For the final mode of delivery for Woman discharged or died still pre.

LIMITATIONS

An important limitation of the study was lack of a sufficient recording system. This study will be limited to the Dschang District hospital, and will only have to do with data collected for the period of study, involving pregnant women that came for delivery at the study site, during the study period.

CONCLUSION

This study was designed to determine the trend of MNM at Dschang District hospital from 1er January 2013 to December 2020. We set out with a hypothesis that there is a statistically significant association between the MNM risk factors and MNM at the Dschang District Hospital. In the present study there were 166 cases of maternal near miss. This study concludes haemorrhage and hypertensive disorders to be the leading causes of maternal near misses' cases. Hence, evaluation of the circumstances surrounding near miss can give us an idea to know the exact etiology, treat it in its early stage and prevent death. It can be done by proper and efficient management of haemorrhage, hypertensive disorders and anaemia. Proper training of the health care personnel, even at primary level, to handle these life-threatening events and timely referral to a higher center whenever necessary is very important in preventing maternal death. Also creating awareness among the women regarding the importance of routine antenatal check-up is quintessential.

Funding

The study was not supported financially by any institutions or organizations.

Contribution of authors

I contributed to conception and design of the study, analyzed data, manuscript preparation, editing. Lukong Hubert contributed to conception and design of the study, data collection, analyzed data, manuscript preparation. Both authors read and approved the final manuscript.

REFERENCES:

1. Say L, Pattinson RC, Gulmezoglu AM. WHO systematic review of maternal morbidity and mortality: the prevalence of severe acute maternal morbidity (near miss). Reproductive Health 2004; 17:3
2. WHO, UNICEF, UNFPA, World Bank group, united nation population division. Trends in maternal mortality from 1990 to 2015 accessed at http:// www.who.int/reproductivehealth/publications/monitoring/maternalmortality-2015/en/: WHO; 2015.
3. Adisasmita A, Deviany PE, Nandiaty F, Stanton C, Ronsmans C. Obstetric near miss and deaths in public and private hospitals in Indonesia. BMC Pregnancy Childbirth 2008;12; 8:10)
4. Nashef SA. What is a near miss? Lancet 2003, 361(9352):180-181].).
5. Nashef SA. What is a near miss? Lancet 2003, 361(9352):180-181]
6. Minkauskien M, Nadisauskiene R, Padaiga Z, MakariS.Systematic review on the incidence and prevalence of severe maternal morbidity. Medicina 2004; 404:299-309..
7. WHO: World Health Organization Evaluating the quality of care for severe pregnancy complications. In: The WHO near-miss approach for maternal health; 2011. Report No.: 978 92 4 150222 1. Accessed at: http://apps.who.int/iris/bitstream/10665/44692/1/9789241502221_eng. pdf. 2011).
8. Say L, Souza JP, Pattinson RC. Maternal near miss — towards a standard tool for monitoring quality of maternal health care. Best practice & research. 2009;23(3):287–96.)
9. WHO: World Health Organization: Strategic Framework for Malaria Control during Pregnancy in the WHO African Region, Brazzaville. WHO Regional Office for Africa; 2004b, AFR/MAL/04/01.).
10. (WHO: World Health Organization. Regional Office for Europe. Conducting a maternal near-miss case review cycle at the hospital level manual with practical tools. http://www. euro. who. int/ en/ health- topics/ Life-stages/ maternal- and- newborn- health/ publications/ 2016/ conducting- a- maternal- near- miss- case- review-cycle- at- hospital- level- 2016 (accessed 29 Nov 2016) ,
11. Tura,Abera K. Tura1,2* , Jelle Stekelenburg3,4, Sicco A. Scherjon2, Joost Zwart5, Thomas van den Akker6, Jos van Roosmalen6,7 and Sanne J. Gordijn BMC Pregnancy and Childbirth (2017) 17:445 DOI 10.1186/s12884-017-1640-x
12. Jabir M, Abdul-salam I, Suheil DM, Al-Hilli W, Abul-Hassan S, Al-Zuheiri A *et al*. (2013): Maternal near miss and quality of maternal health care in Baghdad, Iraq. BMC Pregnancy and Childbirth, 13(1):11.)
13. (Almerie Y, Almerie MQ, Matar HE, Shahrour Y, Al Chamat AA and Abdulsalam A (2010): Obstetric near-miss and maternal mortality in maternity university hospital, Damascus, Syria: a retrospective study. BMC pregnancy Childbirth, 10(1):65.)
14. *Souza et al.* (Souza JP, Cecatti JG, Parpinelli MA, Serruya SJ and Amaral EI (2007): Appropriate criteria for identification of near-miss maternal morbidity in tertiary care facilities: A cross sectional study. BMC Pregnancy and childbirth, 11; 7:20.)

15. (Adisasmita A, Deviany PE, Nandiaty F, StantonC and Ronsmans C (2008): Obstetric near miss and deaths in public and private hospitals in Indonesia. BMC pregnancy Childbirth, 8(1):10.).
16. *Goldenberg et al.*Goldenberg RL, Saleem S, Ali S, Moore JL, Lokangako A, Tshefu A *et al.* (2017): Maternal near miss in low-resource areas. Int J Gynecol Obstet., 138(3):347-55.
17. Moussa A. Etude de la mortalité maternelle dans les services de gynécologie obstétrique de CHU Gabriel Touré : de l'épidémiologie à l'audit. 2008:15. 4.
18. Souza JP, Cecatti JG, Parpinelli MA, Serruya SJ, Amaral E. Appropriate criteria for identification of near-miss maternal morbidity in tertiary care facilities: A cross sectional study. BMC Pregnancy Childbirth. 2010; 7:20.