

DOI: <https://dx.doi.org/10.18203/2320-1770.ijrcog20253534>

Original Research Article

A study of maternal near miss cases at tertiary care centre, Rajkot

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Received: 25 August 2025

Revised: 07 Octo 2025

Accepted: 08 October 2025

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ABSTRACT

Background: A maternal death is one of the most serious complications in obstetrics, with major impact on family members and staff involved. For every woman who dies from pregnancy or childbirth-related causes, it is estimated that twenty more suffer from pregnancy-related illness or experience other severe complications, these are considered as near-miss cases. The aim is to study the prevalence and clinical profile of maternal near miss in a tertiary care centre and assess the underlying socio-demographic variables, complications and contributing factors among near miss cases.

Methods: A hospital based prospective observational study was carried out at department of obstetrics and gynaecology at P.D.U medical college and hospital, Rajkot for the period of 18 months. The study population were the patients admitted in the department of obstetrics and gynaecology at P.D.U medical college and hospital, Rajkot. Selection of patients was according to WHO near miss criteria published in 2011. Demographic details, obstetric history along with past medical and surgical history were the main components in patient interview.

Results: 12916 live births occurred during the study period. Maternal near miss incidence was 15.79 per 1000 live births; Maternal near miss to mortality ratio was 4.34; Severe maternal outcome ratio was 19.43 per 1000 live births. Anaemia followed by hypertensive disorders in pregnancy were most common disorders seen in our study.

Conclusions: In order to decrease maternal mortality, awareness among general public, timely antenatal visits and early detection of complication and timely management is required.

Keywords: Maternal mortality, Maternal near miss, Severe maternal outcome, Mortality index

INTRODUCTION

Mother and child constitute a large, vulnerable, and priority group as the risk is involved with child bearing in women and of growth and development in children. In India they constitute 57.7% of total population.¹ A maternal death is one of the most serious complications in obstetrics, with major impact on family members and staff involved. For every woman who dies from pregnancy or childbirth-related causes, it is estimated that twenty more suffer from pregnancy-related illness or experience other severe complications, these are considered as near-miss cases. It has been defined as “A mother who was almost on verge of death but survived a life-threatening complication that might have occurred during either antenatal period or during delivery or within 42 days post-

partum/post-abortion/ ectopic/ molar pregnancy (Termination of pregnancy).”²

At present maternal mortality ratio of India is 97/lakh live births³; this ratio has been declined significantly in last decades but still need to achieve the target of sustainable goal to reduce MMR to <70/lakh live births by 2030.⁴ In 2007, WHO established a technical working group comprising obstetricians, midwives, epidemiologists and public health-care professionals to develop a standard definition and uniform identification criteria for maternal near-miss cases.

The major causes behind maternal death and maternal near-miss cases remained same so the concept of maternal near miss audit and review was brought forward. It is well

known that complications during pregnancy and child birth can occur at any point of time, and it is important to ensure that readiness in terms of infrastructure, Human Resources, equipment etc. for timely management of complications are available at all the basic and emergency obstetric care health facilities. It is important to manage such life-threatening complication on time to prevent death of mother. The review that captures the experiences of those pregnant women who suffered complications during pregnancy but survived a major fatality due to timely intervention provides a lot of learning opportunities, which is available more easily due to the availability of the mother as well as the willingness of health professionals who are eager to share their 'success' stories.

The aim is to study the prevalence and clinical profile of maternal near miss in a tertiary care centre and assess the underlying socio-demographic variables, complications and contributing factors among near miss cases.

METHODS

A hospital based prospective observational study was carried out at department of obstetrics and gynaecology at P.D.U medical college and hospital, Rajkot for 18 months from February 2023 to July 2024. The study sample was collected from patients admitted in hospital, who fulfilled the selection criteria. Ethical approval was taken from institutional ethical committee prior to commencement of study. Informed consent was obtained from each patient. Detailed history of patient like name, age, education status, socioeconomic class, duration of hospital stay and referral status were noted. History of previous pregnancy and labour, complications during present pregnancy, past and present medical problems were recorded in obstetric history. The primary obstetric complication leading to MNM was evaluated for each patient.

There are several criteria to define maternal near miss but here WHO near miss criteria published in 2011 has been taken into consideration.⁵ The study included near miss cases under 3 major headings. First was on the basis of clinical criteria which includes acute cyanosis, gasping-respiratory rate >40/min or <6/min, shock, oliguria, loss of consciousness lasting >12 hours, cardiac arrest, stroke, uncontrollable fits, total paralysis, jaundice in presence of pre-eclampsia. Secondly, on the basis of laboratory findings which include creatinine ≥ 3.5 mg/dl, bilirubin >6.0 mg/dl, pH <7.1, oxygen saturation <90% for more than 60 minutes, lactate >5 mEq/ml, acute thrombocytopenia <50,000 platelets/ml, ketoacidosis in urine. And thirdly, on the basis of management which includes continuous use of vasoactive drugs, hysterectomy following infection or haemorrhage, >5 units of red-cell concentrate transfusion, intubation or mechanical ventilation for >60 mins not related to anaesthesia, dialysis for acute renal failure and cardio-pulmonary resuscitation. Maternal near miss due to non-obstetrics cause such as trauma and poisoning, those >42 days of delivery or

termination of pregnancy and those who died were not included in this study.

Primary outcome

Near miss ratio (Number of maternal near miss cases per 1000 live births): It refers to the number of maternal near-miss cases per 1000 live births (MNMR=MNM/LB). Maternal near miss mortality ratio (It refers to the ratio between maternal near miss cases and maternal deaths): It refers to the ratio between maternal near miss cases and maternal deaths. Mortality index: maternal deaths/(maternal near miss+ maternal deaths) $\times 100$ (It refers to the number of maternal deaths divided by the number of women with life threatening conditions expressed as a percentage): It refers to the number of maternal deaths divided by the number of women with life threatening conditions expressed as a percentage [MI=MD/(MNM+MD)].

Secondary outcomes

Study also evaluated socio-demographic variables, underlying complications and contributing factors among near miss cases.

Statistical analysis

Data was entered in Microsoft excel software and analysed using SPSS (version 26). Quantitative data (like age, duration of hospital stay, number of blood products used) $\rightarrow$ analysed using mean and standard deviation. Qualitative data (like education status, socio-economic class, parity, booking status, causes of near miss, referral status, outcomes) $\rightarrow$ analysed using frequency and percentages. Study relied on descriptive statistical analysis and maternal health indicators. Results were also shown with tables, bar graphs, and charts. In addition, important maternal health indices were calculated: maternal near miss incidence ratio, maternal near miss to mortality ratio, severe maternal outcome ratio, mortality index, etc.

RESULTS

A total of 204 cases fulfilling the selection criteria were recruited for the study. During the study period, there were 12,916 live births and 47 maternal deaths. The maternal near miss incidence in our study was 15.79 per 1000 live births. Also, maternal near miss mortality ratio was 4.34:1; which showed that with one maternal death 4-5 cases were saved. These indicates good quality of service provided to patient. Severe maternal outcome ratio is the incidence of high-risk pregnancies irrespective of their outcome, whether survived or resulted in mortality, was high 19.43 per 1000 live births (Table 1).

Data was analysed using SPSS (version 26). The assumption of normality was assessed using the Shapiro-Wilk test. The result indicated that the data significantly violated the assumption of a normal distribution

($p < 0.001$). However, a review of the distribution's shape using descriptive statistics suggested only a minor departure from normality. The skewness value was 0.623 and the kurtosis value was -0.151. Given the large sample size ($n=204$), the Shapiro-Wilk test's high statistical power likely led to the rejection of the null hypothesis despite a visually and descriptively minor deviation from normality.

Table 1: Frequency and characteristics of maternal near miss cases and maternal death.

General data	Total
Total no. of deliveries	13441
Total no. of live birth	12916
Maternal death	47
Maternal near miss	204
Maternal near miss incidence ratio	15.79
Maternal near miss mortality ratio	4.34
Severe maternal outcome ratio	19.43
Mortality index	18.72

The demographic data of study has been given in Table 2.

Table 2: Demographic data.

Characteristics	Near miss cases, N (%)
Age (in years)	Mean age (26.5)
18-25	98 (48)
25-35	86 (42)
>35	20 (10)
Educational status	
Uneducated	73 (36)
Primary	88 (43)
Secondary	25 (12)
Higher secondary	18 (9)
Socio-economic status (Modified Kuppuswamy scale)	
Lower	165 (80.88)
Upper-lower	39 (19.11)
Lower-middle	0
Upper-middle	0
Upper	0

Various parameters like parity, booking status, gestational age and mode of delivery are mention in Table 3.

In our study the most common cause was anaemia, 2nd hypertensive disorders of pregnancy, 3rd most common cause thrombocytopenia, and then antepartum and postpartum haemorrhage. Other causes are DIC, AKI, Jaundice, cardiac diseases, previous caesarean section leading to complication such as uterine rupture or PAS spectrum, uterine inversion, HELLP syndrome, HUS, etc. In a single patient there were more than one high-risk factor (Figure 1). Anaemia and hypertension were found to be most common co-morbidities found in my study. Other co-morbidities were cardiac diseases, jaundice, thyroid diseases, diabetes mellitus.

Table 3. Obstetric parameters.

Antenatal care	Near miss cases, N (%)
Booking status	
Booked	114 (56)
Un-booked	90 (44)
Gestational age (in weeks)	
<20	26 (13)
20-24	8 (4)
24-28	12 (6)
28-32	27 (13)
32-34	24 (12)
34-37	49 (24)
>37	58 (28)
Parity	
Primigravida	64 (31)
2 nd para	50 (25)
Multigravida	90 (44)

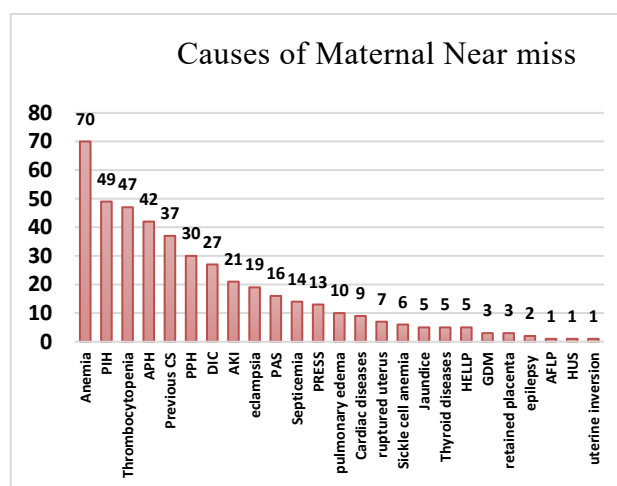


Figure 1: Maternal near miss and causes.

Majority of patients who became near miss were post LSCS 36% (Table 4), may be due to post-partum haemorrhage or AKI, eclampsia, etc.

Table 4: Distribution of patient based on mode of delivery/termination.

Procedure conducted	N	Percentages (%)
LSCS	75	36.76
ND	50	24.50
Outside delivery	43	21.07
Undelivered	13	6.37
D and E	9	4.41
laparotomy	8	3.92
Hysterotomy	6	2.94

Distribution of near miss cases according to 3 WHO criteria lead to distribution of patient given in (Table 5). Majority of the patients fall under management criteria. Majority of patients which became near miss needed blood transfusion, 35% (Figure 2). Total blood products required

in these 204 patients was 2418 and total RCC required were 695.

Table 5: Near miss categorization acc. to WHO criteria.

Near miss criteria	N	Percentages (%)
I	8	4
II	48	23
III	97	48
I+II	4	2
II+III	24	12
I+III	9	4
I+II+III	14	7
Total	204	100

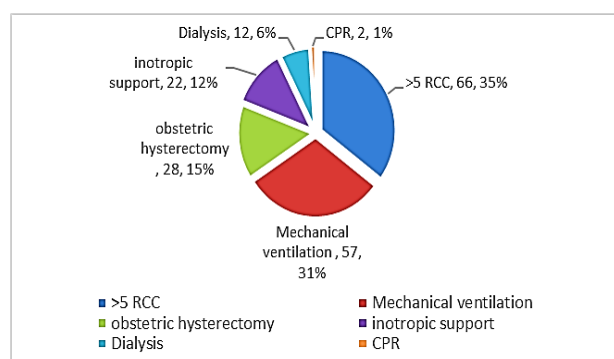


Figure 2: Management criteria and near miss cases.

Majority have live births which accounts 125, 32 were IUFD, also there were ectopic pregnancy and abortions which were 16 (Table 6).

Table 6: Outcome of pregnancy.

Outcome	N	Percentages (%)
Live birth	125	61
IUFD	32	16
Outside delivered	14	7
Undelivered	12	6
Abortion	9	4
Ectopic	7	3
Neonatal death	5	3

DISCUSSION

In this study, maternal near miss incidence ratio was 15.79 per 1000 live births, and maternal near miss mortality ratio was 4.34. In systemic review study, of October 2021 the maternal near miss incidence varied from 3.9-379.5 per 1000 live births, and maternal near miss mortality ratio varied from 1.7:1 to 21.8:1.⁶ In meta-analysis study of world done across 56 countries, near miss estimate was 1.2% with 95% CI 0.4% to 2.5%.⁷

In our study, majority 48% of near miss cases were found in the age group <25 years. Also, in that too majority between age group 21-23 yrs, so these age groups are more

likely to survive pregnancy complications. In systematic review study of October 2021 on maternal near miss events, 25 studies were conducted; in which Purandare et al was a prospective study in which 64% near miss cases were between 20-29 years, another study was Sujata et al which was also prospective study showing 71.9% near miss cases between age group 25-35 years, similarly Abha et al study showed 70.6 % near miss cases between 21-30 years.⁷⁻⁹ Bansal et al study is a retrospective study showing 41% cases between age group 18-24 years.¹⁰

In our study, 43% patients had education up to primary level and 36% patients were uneducated. A facility-based unmatched case-control study was conducted in four tertiary hospitals in Mogadishu from May 1 to July 31, 2021 which showed that 58% were uneducated and 22% had primary level education.¹¹ In our study, majority 80% patients were falling in lower socio-economic class and 19% were falling under upper-lower class. A facility-based unmatched case-control study was conducted in Mogadishu from May 1 to July 31, 2021 at four tertiary hospitals which showed that 88% patients were with family income less than 500 USD (low), 7.5% patients were with >500 USD (high).¹¹

In our study, 44% were multi-gravida, 31% were primi-gravida and 25% were 2nd gravida patients. In Sujata et al 50% were primi and 30% were multi-gravida, in Abha et al 38.8% were primi and 61.1% were multi-gravida, in Patankar et al 26.5% were primi and 39.1% were multi-gravida, in Chaudhari et al 87% were primi and 13% were multi-gravida, in Pandey et al 34.4% were primi and 65% were multi-gravida, in Bansal et al 5.4% were primi and 65% were multi-gravida; these were the results of one of the multicentric systemic review study in October 2021.^{7,9,10,12,14,15}

In our study, most common cause of near miss cases was S. anaemia, 2nd most common cause hypertensive disorders of pregnancy, followed by thrombocytopenia, ante-partum haemorrhage in abruptio placenta, placenta previa; followed by previous scar cases leading to PAS spectrum, ruptured uterus; then post-partum haemorrhage, acute kidney injury, disseminated intravascular coagulation, jaundice, ruptured ectopic pregnancy, abortion, sepsis, etc. In Purandare et al hypertension orders 26.5%, 46.9% had haemorrhage, 8.6% had S. anaemia, 4.4% had sepsis, 16% had ruptured uterus; in Sujata et al 38.5% had hypertension disorders, 29.8% had haemorrhage, 7% had sepsis, 3.5% had ruptured uterus, 41.2% has previous LSCS; in Abha et al 33% had hypertension disorders, 57.0% had S. anaemia, 27.5% had haemorrhage, 4.3% had sepsis, 6.6% had ruptured uterus, 4.2% had septic abortions; in Bansal et al 12.8% had hypertension disorders, 15.4% had S. anaemia, 43.5% had haemorrhage, 5.12% had sepsis, 15.4% had ruptured uterus; these were the findings in multicentric systematic study of October 2021.⁷⁻¹⁰ A facility-based unmatched case-control study was conducted in four tertiary hospitals in Mogadishu from May 1 to July 31, 2021. The study has

identified that the most common cause of maternal near misses was severe anaemia (32.4%) followed by severe pre-eclampsia (19.6%), severe ante-partum haemorrhage (15.0%), abortion complications (8.4%) and eclampsia (6.1%).¹¹

In our study, most of the near miss cases 28% were having gestational age of >37 weeks, followed by 24% cases were between 34 and 37 weeks, 12% were between 32-34 weeks, 13% between 28-32 weeks and 13% <20 weeks. So, 78% patients had gestational age >28 weeks in our study. In Sujata et al 65.7% were having gestational age >28 weeks, in Patankar et al 57.9% had >28 weeks gestational age, in Kulkarni et al 59.5%, in Chaudhari et al 80.2%, in Pandey et al 71.9%, in Bansal et al the 56.4%; these were results of October 2021.^{7,10,12-15}

In our study, outcome in near miss cases were 36.7% had C-section, 24.5% had vaginal delivery, laparotomy and hysterotomy accounts 5.34%. In one retrospective cross-sectional study done in tertiary care centre, Hassan, Karnataka, in the year 2020 showed that mode of delivery was vaginal delivery in 41.17%, C-section in 35.29%, and Laparotomy in ruptured ectopic pregnancy in 5.2%.¹⁶

In our study, distribution of near miss cases was done according to WHO near miss criteria in which category I consists clinical criteria, II consists laboratory criteria and III consists management criteria. Most of the cases falls under more than one criterion. Majority 48% falls under management criteria followed by 23% cases falls under laboratory criteria, 12% falls under both II+III, 7% cases fall under all three criteria and 4% falls under only clinical criteria. In our study, management required was 35% required >5 RCC, 31% required mechanical ventilation for >60 minutes, 15% required obstetric hysterectomy, 12 % required inotropic support, 6% required dialysis, 1% required CPR. This distribution was according to WHO near miss management criteria.

In our study, foetal outcome was observed and showed that 61% were live births, 16% were IUFD, 3% neonatal death, 3% ectopic, 4% abortions. In retrospective study at Hassan, 64% were term babies, 17.6% were IUFD and rest were ectopic and abortions. In Chandran et al 67.4% were live births and 32% were IUFD, in Mustafa et al 22.5% were still births and 9.6% were neonatal death.¹⁷

Limitations

The main limitations of a single-centre study at a tertiary care centre like in Rajkot primarily go through selection bias and data generalizability. As tertiary referral centre, a study population becomes pre-selected, including women who are severe enough to be referred at tertiary care centre and can survive long to reach tertiary centre and get managed at facility. As a result, the actual incidence of maternal near miss cases can't be estimated in wider community as it excludes patient who died before reaching hospital and those who got treated in lower-level facility.

Also, the data obtained can't be generalised to wider community or private sector as the findings obtained are limited to infrastructure.

CONCLUSION

Maternal near miss study at tertiary care centre revealed that anaemia, pregnancy induced hypertension and haemorrhage were the leading cause of maternal near miss which indicate that a vigorous monitoring of Haemoglobin(regular) and BP measurement should be done at every antenatal visits and early measures should be taken to prevent and treat them so that one can avoid adverse event to occur during pregnancy and at the time of delivery. Also, danger signs should be explained to mother and need for urgent visit to hospital if at all it occurs. Regular maternal near miss and maternal mortality audit are useful to find out the strength and weakness of facility, to devise strategies to overcome the shortcomings and to review the success of the interventions done.

ACKNOWLEDGEMENTS

Authors would like to acknowledge the contributions of all the doctors of the Department of Obstetrics and Gynaecology at tertiary care centre, Rajkot, Gujarat.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee Human, P.D.U Medical College, Rajkot, Gujarat. (Regd.no-ECR/635/INST/GJ 2014/RR- 20)

REFERENCES

1. Sample registration system (SRS)-Bulletin 2014 volume 50-IIIndia, 2016. Available at: https://censusindia.gov.in/nada/index.php/catalog/42707/download/46377/SRS_Bulletin_2014_Vol_50_No_1.pdf. Accessed on 25 July 2025.
2. Maternal Near Miss Operation Guideline: National Health mission, December 2014. Available at: [Maternal_Near_Miss_Operational_Guidelines.pdf](#). Accessed on 25 July 2025.
3. The Special Bulletin on Maternal Mortality in India, 2019-21 based on SRS 2019-21. Available at: <https://censusindia.gov.in/nada/index.php/catalog/45561>. Accessed on 25 July 2025.
4. World Health Organization from MDGs to SDGs: A New Era for Global Public Health. 2016-2030. Available at: <https://unric.org/en/sdg-3/#>. Accessed on 25 July 2025.
5. World Health Organization (WHO). Evaluating the quality of care for severe pregnancy complications: the WHO near-miss approach for maternal health. Geneva: WHO, 2011. Available at: <https://iris.who.int/server/api/core/bitstreams/76b74bd5-af94-49d1-a538-ab989faba6bf/content>. Accessed on 25 July 2025.

6. Visi V, Akoijam BS. A Review of Maternal Near Miss Cases in Selected Hospitals in North-East India. *Indian J Community Med.* 2021;46(3):421-4.
7. Maternal mortality: Near-miss events in middle-income countries, a systematic review. *Bulletin of the World Health Organization.* 2021;99(10):693-707F.
8. Purandare C, Bhardwaj A, Malhotra M, Bhushan H, Chhabra S, Shivkumar P. Maternal near-miss reviews: lessons from a pilot programme in India. *BJOG.* 2014;121(4):105-11.
9. Singh A, Shrivastava C, Dube S. Maternal Near Miss: A Valuable Contribution in Maternal Care. *J Obstet Gynaecol India.* 201;66(1):217-22.
10. Bansal M, Lagoo J, Pujari K. Study of near miss cases in obstetrics and maternal mortality in Bastar, Chhattisgarh, India. *Int J Reproduct Contracept Obstet Gynecol.* 2017;5(3):620-3.
11. Dahie HA. Determinants of maternal near miss events among women admitted to tertiary hospitals in Mogadishu, Somalia: a facility-based case-control study. *BMC Pregnancy Childbirth.* 2022;22:658.
12. Patankar A, Uikey P, Rawlani N. Severe Acute Maternal Morbidity (Near Miss) in a Tertiary Care Center in Maharashtra: A Prospective Study. *Int J Sci Stud.* 2016;4(1):134-40.
13. Kulkarni R, Chauhan S, Fidvi J, Nayak A, Humane A, Mayekar R, et al. Incidence and factors influencing maternal near miss events in tertiary hospitals of Maharashtra, India. *Indian J Med Res.* 2023;158(1):66-74.
14. Chaudhari S, Nath S. Life-threatening Complications in Pregnancy in a Teaching Hospital in Kolkata, India. *J Obstet Gynaecol India.* 2019;69(2):115-22.
15. Pandey A, Das V, Agarwal A, Agrawal S, Misra D, Jaiswal N. Evaluation of obstetric near miss and maternal deaths in a tertiary care hospital in north India: shifting focus from mortality to morbidity. *J Obstet Gynaecol India.* 2014;64(6):394-9.
16. Doreswamy N, Sudha TR, Tejaswari. Prevalance and outcome of maternal near miss in a tertiary care centre a cross-sectional study at Hassan, Karnataka, India. *Int J Clin Obstet Gynaecol* 2020;4(3):209-12.
17. Mustafa R, Hashmi H. Near-miss obstetrical events and maternal deaths. *J Coll Physicians Surg Pak.* 2009;19(12):781-5.

Cite this article as: Darbar AM, Dudharejia K, Goswami K. A study of maternal near miss cases at tertiary care centre, Rajkot. *Int J Reprod Contracept Obstet Gynecol* 2025;14:3884-9.