International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Rathwa JH et al. Int J Reprod Contracept Obstet Gynecol. 2026 May;15(5):1748-1755
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20261280

Original Research Article

The prevalence and risk factors for severe maternal morbidity at a tertiary care centre in western India

Jyotika Himmatsinh Rathwa*, Purvi Kanubhai Patel, Neha Kumari Soni

Department of Obstetrics and Gynecology, Baroda Medical College, S.S.G. Hospital, Vadodara, Gujarat, India

Received: 23 March 2026
Accepted: 09 April 2026

***Correspondence:**
Dr. Jyotika Himmatsinh Rathwa,
E-mail: drjyotikarathwa97@gmail.com

ABSTRACT

Background: Severe maternal morbidity (SMM) is an important indicator of maternal health, especially as maternal mortality declines. For every maternal death, 20-30 women experience significant pregnancy-related complications. SMM includes serious, potentially life-threatening conditions during pregnancy, labor, or the postpartum period. Although maternal near miss (MNM) has been widely studied, data on SMM remain limited. This study aimed to determine the prevalence of SMM and identify associated risk factors among women delivering at a tertiary care hospital in Vadodara, Gujarat.

Methods: This hospital-based cross-sectional study was conducted in the labor room of S.S.G. Hospital, Vadodara. Women aged 18 years or older undergoing delivery and fulfilling at least one CDC-defined SMM criterion were included. Socio-demographic characteristics, antenatal care details, obstetric history, pregnancy complications, mode of delivery, and maternal outcomes were recorded and analyzed descriptively.

Results: The prevalence of SMM was 72.38% (185 women). Most were aged 20-29 years (59.46%), and 87.03% were referred cases. Inadequate antenatal care (<4 visits) was observed in 36.76%. Hypertensive disorders (31.85%) and severe anemia (10.95%) were common complications. Caesarean section was performed in 40% of cases. Blood transfusion was required in 45.41%, and 5.41% had hospital stays exceeding 14 days.

Conclusions: SMM was markedly higher than MNM, underscoring its value as a tool for improving maternal healthcare. Hemorrhage, hypertensive disorders, anemia, inadequate antenatal care, and previous caesarean section were key contributors.

Keywords: Antenatal care, Caesarean section, Maternal near miss, Pregnancy complications, Severe maternal morbidity

INTRODUCTION

Severe maternal morbidity (SMM) is a composite outcome measure representing serious, potentially life-threatening maternal health problems, including unexpected outcomes of labour and delivery that result in significant short- or long-term health consequences.[1] The prevalence of SMM has been steadily increasing in recent years and is associated with increased healthcare costs and prolonged hospital stays.[1] Monitoring trends in SMM and implementing quality-improvement interventions are therefore crucial for enhancing maternal healthcare.[1]

Pregnancy and peripartum-related critical illness occurs at a frequency of 0.7-7.6 per 1,000 live births in developed countries and results in death in 3-14% of affected women.[1] Approximately two-thirds of these cases arise from obstetric causes such as haemorrhage, pre-eclampsia, eclampsia, amniotic fluid embolism, and septic abortion, while one-third result from medical or surgical conditions

including cardiac disease, pneumonia, hepatic or renal failure, and sepsis.[2-4]

Women's reproductive health exists along a continuum from healthy pregnancy to maternal morbidity, severe maternal morbidity, maternal near miss (MNM), and maternal death. SMM lies between maternal morbidity and MNM and represents cases from which near-miss events may evolve. Although MNM has been widely studied, data on SMM remain limited.

Maternal mortality is often described as the "tip of the iceberg," while maternal morbidity forms the larger hidden burden; for every maternal death, an estimated 20-30 women experience significant maternal morbidity.[2,3] Several factors have been associated with SMM, including inadequate antenatal care, low socioeconomic status, multiple pregnancy, unsafe abortion, hypertensive disorders, anaemia, pre-existing medical conditions, and previous caesarean section, although findings for some risk factors remain inconsistent across studies.[5-14]

Globally and in India, reported prevalence of SMM varies widely due to differences in definitions, study settings, and case-identification methods, with higher rates observed in tertiary referral centres and low- and middle-income countries.[19-23] Data from Gujarat, using standardised SMM criteria, are limited.

Given the significant health, social, and economic consequences of SMM for women, families, and healthcare systems, this study was undertaken to determine the prevalence of severe maternal morbidity and its associated risk factors at our institution.[25-30]

METHODS

This hospital-based cross-sectional study was conducted in the labour room and maternity wards of Sir Sayajirao General (SSG) Hospital, Vadodara, a tertiary care referral centre. The study duration was six months following approval from the Institutional Ethics Committee for Biomedical and Health Research (IECBHR).

Inclusion criteria

All women aged ≥18 years admitted for delivery or post-delivery care and fulfilling at least one Centers for Disease Control and Prevention (CDC) defined severe maternal morbidity (SMM) indicator were included.

Exclusion criteria

Women who did not provide informed consent were excluded.

This was a time-bound study, and all eligible SMM cases during the study period were enrolled. Based on previous hospital records, approximately 4,000 deliveries and 250-300 SMM cases were expected during the study period.

Severe maternal morbidity was defined according to CDC criteria and included complications or procedures occurring during delivery-related hospitalisation. The presence of one or more SMM indicators was considered an adverse maternal outcome. Morbidities were reported as the number of women with each SMM indicator or any SMM per 1,000 deliveries. The 21 CDC SMM indicators were categorised into seven indicator groups (Table 1).

Table 1: SMM indicators as defined by the Centers for Disease Control and Prevention (CDC).

SMM indicator groups	SMM indicators
Haemorrhage complications	Disseminated intravascular coagulation, shock, hysterectomy
Respiratory complications	Adult respiratory distress syndrome, temporary tracheostomy, ventilation
Cardiac complications	Acute myocardial infarction, aneurysm, cardiac arrest/ventricular fibrillation, conversion of cardiac rhythm heart failure/arrest during surgery or procedure, pulmonary edema/acute heart failure
Renal complications	Acute renal failure
Sepsis complications	Sepsis
Other obstetric complications	Amniotic fluid embolism, eclampsia, severe anaesthesia complications, air and thrombotic embolism
Other medical complications	Puerperal cerebrovascular disorders, sickle cell disease with crisis

Written informed consent was obtained from the patient or, when the patient was unable to consent, from the attendant. All enrolled women were managed as per standard departmental protocols and followed from admission until discharge or death. Socio-demographic details, antenatal care, obstetric history, current pregnancy complications, mode of delivery, and maternal outcomes were recorded using a structured case record form.

Statistical analysis

Data were analysed using SPSS or Microsoft Excel. Descriptive statistics were used, with numerical variables and categorical variables expressed as frequencies and percentages. The outcome variable was the presence of severe maternal morbidity.

RESULTS

Severe maternal morbidity indicators

During the 6-month study period, 185 cases of severe maternal morbidity (SMM) were identified among 2,723 deliveries, giving an SMM ratio of 67.9 per 1,000 deliveries.

Distribution of CDC-defined SMM indicator groups

The distribution of SMM indicators according to CDC classification is shown in Table 2. The most frequent SMM indicator group was other obstetric complications, accounting for 34.59% of cases, largely driven by eclampsia. This was followed by respiratory complications (22.16%) and hemorrhage-related complications (17.29%).

Table 2: Distribution of Severe Maternal Morbidity (SMM) by clinical complication categories.

Variables	Number	Percentage (%)
Haemorrhage complications	32	17.29
Respiratory complications	41	22.16
Cardiac complications	9	4.86
Renal complications	12	6.48
Sepsis complications	2	1.08
Other obstetric complications	64	34.59
Other medical complications	25	13.51

Hemorrhage complications, including disseminated intravascular coagulation, shock, and hysterectomy, affected 32 women (17.29%), underscoring the continued importance of prompt recognition and management of obstetric haemorrhage. Respiratory complications were observed in 41 women (22.16%), primarily due to acute respiratory distress syndrome and the need for mechanical ventilation. A significant proportion of these cases were associated with severe eclampsia and haemorrhagic complications, necessitating intensive respiratory support. Other obstetric complications, predominantly eclampsia, constituted the largest group, affecting 64 women (34.59%), highlighting hypertensive disorders as a major contributor to severe maternal morbidity in the study population. Other medical complications, mainly sickle cell disease with crisis, were reported in 25 women (13.51%), reflecting the burden of pre-existing medical conditions in this tertiary care referral setting. Renal complications, in the form of acute renal failure, occurred in 12 women (6.48%), indicating severe multisystem involvement in these patients. Cardiac complications, though less frequent, were observed in 9 women (4.86%) and included pulmonary oedema and acute heart failure, conditions associated with high maternal risk. Sepsis-related complications were reported in 2 women (1.08%). No cases of amniotic fluid embolism were recorded during the study period.

Severe maternal morbidity and maternal health indicators

During the 6-month study period (November 2024-April 2025), 2,748 women were admitted, resulting in 2,723 births, including 2,556 live births and 167 stillbirths/IUFDs. A total of 185 women experienced severe maternal morbidity (SMM), 40 maternal near-miss (MNM) cases, and 17 maternal deaths were recorded.

Table 3: Indicators of severe maternal morbidity and maternal outcomes.

Indicator	Value
Maternal Mortality Ratio (MMR)	665.10 per 100,000 live births
Severe Maternal Morbidity (SMM) ratio	72.38 per 1,000 live births
Maternal Near-Miss (MNM) ratio	15.65 per 1,000 live births
Severe Maternal Outcome (SMO) ratio	22.30 per 1,000 live births
Severe maternal mortality index	29.82%
Near-Miss to Mortality Ratio	2.35: 1
Proportion of SMM cases by caesarean section	40.0%
Proportion of SMM cases by normal vaginal delivery	60.0%
Incidence of SMM among all admissions	6.73%
Incidence of MNM among all admissions	1.46%
Maternal mortality rate	618.78 per 100,000 admissions
Maternal near-miss incidence ratio	1.46 per 100 admissions
Severe maternal outcome incidence ratio	2.07 per 100 admissions

The maternal mortality ratio (MMR) was 665.10 per 100,000 live births, while the severe maternal morbidity ratio was 72.38 per 1,000 live births. The maternal near-miss ratio was 15.65 per 1,000 live births, and the severe maternal outcome ratio (maternal deaths plus near-miss cases) was 22.30 per 1,000 live births.

The severe maternal mortality index was 29.82%, indicating that nearly one-third of women with life-

threatening conditions died. The near-miss to mortality ratio was 2.35:1, suggesting that for every maternal death, just over two women survived a life-threatening complication.

The incidence of SMM among all admissions was 6.73%, and the incidence of MNM was 1.46%. The maternal mortality rate was 618.78 per 100,000 admissions, and the severe maternal outcome incidence was 2.07 per 100 admissions (Table 3).

Association of severe maternal morbidity with risk factors

Among the 185 women with severe maternal morbidity (SMM), the majority were aged 20-29 years (59.46%), followed by 30-39 years (18.38%). Adolescents (11.89%) and women aged ≥40 years (10.27%) also contributed substantially. Most women were Hindu (90.81%) and had secondary education (58.38%), while 9.19% were illiterate.

A normal BMI was observed in 80% of cases; however, 15.14% were underweight. Inadequate antenatal care (<4 visits) was present in 36.76% of women. A large proportion were referred cases (87.03%), reflecting the tertiary referral nature of the institution.

Most SMM cases were delivered at term (36-40 weeks, 88.65%). Primiparas accounted for 38.92%, while multiparas constituted 31.35%. A history of previous LSCS was present in 14.05%, and 12.43% had a history of abortion.

The most common current obstetric complications associated with SMM were hypertensive disorders (31.85%), respiratory complications (20.39%), haemorrhage (15.92%), and severe anaemia (10.95%). Renal (5.97%) and cardiac (4.48%) complications were less frequent.

Regarding delivery, 60% had vaginal delivery and 40% underwent LSCS, most commonly for foetal distress (28.37%) and previous LSCS (21.62%). Nearly 45.41% required blood transfusion, and 5.41% had a prolonged hospital stay (>14 days) (Table 4).

Table 4: Socio-demographic, obstetric and clinical characteristics of women with severe maternal morbidity (n=185).

Variables		Number (%)
Age group (years)	18-19	22 (11.89)
	20-29	110 (59.46)
	30-39	34 (18.38)
	40-49	19 (10.27)
Religion	Hindu	168 (90.81)
	Muslim	17 (9.19)
Education level	Illiterate	17 (9.19)
	Primary	57 (30.81)
	Secondary	108 (58.38)
	Graduate	2 (1.08)
BMI classification	Underweight	28 (15.14)
	Normal	148 (80.00)
	Overweight	8 (4.32)
	Obese	1 (0.54)
ANC visits	<4 visits	68 (36.76)
	4-8 visits	105 (56.76)
	>8 visits	12 (6.48)
Referral status	Referred	161 (87.03)
	Not referred	24 (12.97)
Gestational age	<28 weeks	2 (1.08)
	28-36 weeks	16 (8.65)
	36-40 weeks	164 (88.65)
	>40 weeks	3 (1.62)
Parity	Primipara	72 (38.92)
	Second para	55 (29.73)
	Multipara	58 (31.35)
History of abortion	Yes	23 (12.43)
	No	162 (87.57)
Previous LSCS	Yes	26 (14.05)

Continued.

Variables		Number (%)
	No	159 (85.95)
Previous delivery complication	None	178 (96.22)
	Pre-eclampsia	3 (1.62)
	Severe pre-eclampsia	2 (1.08)
	GDM	2 (1.08)
Current obstetric complication	Hypertensive disorder	64 (31.85)
	Respiratory complication	41 (20.39)
	Haemorrhage	32 (15.92)
	Severe anaemia	22 (10.95)
	Renal disorder	12 (5.97)
	Cardiac complication	9 (4.48)
	Sepsis	2 (1.00)
	Uterine rupture	1 (0.50)
	Liver disorder	1 (0.50)
	GDM	1 (0.50)
Mode of delivery	Normal vaginal delivery	111 (60.00)
	LSCS	74 (40.00)
Indication for LSCS (n = 74)	Fetal distress	21 (28.37)
	Previous LSCS	16 (21.62)
	Breech	9 (12.16)
	Twin pregnancy	6 (8.10)
	APH	4 (5.40)
	Placenta previa	3 (4.05)
	Obstructed labour	3 (4.05)
	NPOL	3 (4.05)
	Severe oligohydramnios	3 (4.05)
	Failed induction	2 (2.70)
	AEDF	2 (2.70)
	CPD	1 (1.35)
	Transverse lie	1 (1.35)
Place of delivery	Tertiary hospital	158 (85.41)
	CHC	15 (8.11)
	PHC	3 (1.62)
	Private hospital	3 (1.62)
	Home	2 (1.08)
	District hospital	2 (1.08)
	GVK EMRI	1 (0.54)
Blood transfusion	Yes	84 (45.41)
	No	101 (54.59)
Length of hospital stay	<7 days	8 (4.32)
	7-14 days	167 (90.27)
	>14 days	10 (5.41)

DISCUSSION

The present study highlights that severe maternal morbidity (SMM) predominantly affects women in the reproductive age group, with a notable contribution from adolescents and women of advanced maternal age. Biological immaturity, social vulnerability, and limited access to care increase risk among adolescents, while advancing age is associated with hypertensive and placental disorders contributing to morbidity.[10,31,36] Religion reflected the local population distribution and was not an independent determinant of SMM, although sociocultural practices may influence health-seeking behaviour and antenatal care utilisation.[37]

Educational status showed an inverse relationship with SMM, emphasising the protective role of female education in improving awareness, antenatal attendance, and timely recognition of complications. Similar associations between low educational status and adverse maternal outcomes have been documented in Indian and international studies.[15,24] Nutritional status also influenced

morbidity, with undernutrition contributing to anaemia and increased transfusion requirements. Both underweight and obesity have been associated with severe maternal complications in previous studies, highlighting the importance of nutritional optimisation before and during pregnancy.[32,33,35]

Inadequate antenatal care emerged as a major modifiable risk factor, indicating missed opportunities for early diagnosis and prevention of complications. Studies from low- and middle-income countries consistently report increased SMM among women with fewer antenatal visits.[6,13,17] The high proportion of referred cases reflects delays in recognition, referral, or transport from peripheral facilities, a pattern also observed in national audits and international settings.[16,18]

Previous caesarean section was associated with increased morbidity, supporting evidence that prior uterine surgery elevates risk in subsequent pregnancies.[12,33] Hypertensive disorders, haemorrhage, and anaemia remained the principal contributors to SMM, consistent with WHO multicounty data identifying these conditions as leading causes of severe maternal outcomes.[3,34] The high requirement for blood transfusion further underscores haemorrhage as a critical marker of severe morbidity.[34]

Overall, most SMM cases arise from preventable or manageable conditions. Strengthening quality antenatal care, improving nutritional support, ensuring timely referral, optimising intrapartum care, and promoting judicious use of caesarean delivery are essential strategies to reduce severe maternal morbidity and advance progress toward sustainable development goals.[2,3]

The study is strengthened by the use of standardised CDC criteria, a comprehensive evaluation of maternal risk factors, and robust data from a tertiary-care referral centre in Gujarat.

This study has few limitations. The study was done at a single referral hospital, so results may not reflect the general population; referral and record-based data may have introduced bias, rare risk factors may be under-detected due to sample size, and the cross-sectional design does not allow causal conclusions.

CONCLUSION

Severe maternal morbidity (SMM) at SSG Hospital, Vadodara, was high, with an SMM ratio of 72.38 per 1,000 live births, substantially exceeding the maternal near-miss ratio (15.65 per 1,000). The SMM-to-maternal death ratio of 10.8:1 indicates that most women with severe complications survived with timely tertiary care, underscoring SMM as a more sensitive indicator of maternal health than near miss alone.

Haemorrhage requiring transfusion, eclampsia, and respiratory complications were the leading contributors to SMM. Key factors associated with SMM included inadequate antenatal care (<4 visits), hypertensive disorders and anaemia, blood transfusion, prolonged hospital stay (>14 days), and previous caesarean section. Younger age, illiteracy, and undernutrition identified vulnerable subgroups, though associations were not statistically significant.

Strengthening quality antenatal care, early detection and management of complications, skilled institutional delivery, and timely referral with emergency obstetric services is essential to reduce severe maternal morbidity and improve maternal health outcomes.

Recommendations

Strengthening antenatal care with early registration and adequate visit coverage is essential to reduce severe maternal morbidity. Early identification and prompt management of high-risk conditions, particularly hypertensive disorders and anaemia, should be reinforced at all levels of care. Improved haemorrhage control and timely access to blood transfusion services are critical for reducing morbidity related to obstetric bleeding. Promotion of institutional deliveries and efficient referral systems is necessary to ensure timely care for high-risk pregnancies. Community-based awareness programs targeting adolescents and socioeconomically disadvantaged women may improve health-seeking behaviour. Multicentric longitudinal studies are recommended to further elucidate causal factors and validate findings across diverse populations.

ACKNOWLEDGEMENTS

Authors would like to thank the Department of Obstetrics and Gynaecology, Medical College, and S.S.G. Hospital, Vadodara, for providing the necessary facilities and support to conduct this study.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee for Biomedical and Health Research, Medical College, and S.S.G. Hospital, Vadodara

REFERENCES

1. Callaghan WM, Creanga AA, Kuklina EV. Severe maternal morbidity among delivery and postpartum hospitalisations in the United States. Obstet Gynecol. 2012;120(5):1029-36.
2. Ryan HM, Sharma S, Magee LA, Ansermino JM, MacDonell K, Payne BA, et al. The usefulness of the APACHE II score in obstetric critical care: a structured review. J Obstet Gynaecol Can. 2016;38(10):909-18.
3. Say L, Souza JP, Pattinson RC; WHO Working Group on Maternal Mortality and Morbidity Classifications.

Maternal near miss-towards a standard tool for monitoring quality of maternal health care. Best Pract Res Clin Obstet Gynaecol. 2009;23(3):287-96.
4. Lapinsky SE, Kruczynski K, Seaward GR, Farine D, Grossman RF. Critical care management of the obstetric patient. Can J Anaesth. 1997;44(3):325-9.
5. Lewis G. Beyond the numbers: reviewing maternal deaths and complications to make pregnancy safer. Br Med Bull. 2003;67(1):27-37.
6. de Moraes AP, Barreto SM, Passos VM, Golino PS, Costa JE, Vasconcelos MX. Severe maternal morbidity: a case-control study in Maranhão, Brazil. Reprod Health. 2013;10(1):11.
7. Lindquist A, Knight M, Kurinczuk JJ. Variation in severe maternal morbidity according to socioeconomic position: a UK national case-control study. BMJ Open. 2013;3(6):e002742.
8. Liu S, Joseph KS, Hutcheon JA, Bartholomew S, León JA, Walker M, et al. Gestational age-specific severe maternal morbidity associated with labour induction. Am J Obstet Gynecol. 2013;209(3):209.e1-8.
9. van Mello NM, Zietse CS, Mol F, Zwart JJ, van Roosmalen J, Bloemenkamp KW, et al. Severe maternal morbidity in ectopic pregnancy is not associated with maternal factors but may be associated with the quality of care. Fertil Steril. 2012;97(3):623-9.
10. Norhayati MN, Nik Hazlina NH, Aniza AA, Sulaiman Z. Factors associated with severe maternal morbidity in Kelantan, Malaysia: a comparative cross-sectional study. BMC Pregnancy Childbirth. 2016;16(1):185.
11. Oliveira FC Jr, Costa ML, Cecatti JG, Pinto e Silva JL, Surita FG. Maternal morbidity and near miss associated with maternal age: Brazilian demographic health survey 2006. Clinics (Sao Paulo). 2013;68(7):922-7.
12. Grey KE, Wallace ER, Nelson KR, Reed SD, Schiff MA. Population-based study of risk factors for severe maternal morbidity. Paediatr Perinat Epidemiol. 2012;26(6):506-14.
13. Roost M, Altamirano VC, Liljestrand J, Essen B. Does antenatal care facilitate utilisation of emergency obstetric care? Acta Obstet Gynecol Scand. 2010;89(3):335-42.
14. van Dillen J, Zwart JJ, Schutte J, Bloemenkamp KW, van Roosmalen J. Severe acute maternal morbidity and mode of delivery in the Netherlands. Acta Obstet Gynecol Scand. 2010;89(11):1460-5.
15. Geddes-Barton D, Baldelli S, Karthikappallil R, Bentley T, Omorodion B, Thompson L, et al. Association between socioeconomic disadvantage and severe maternal morbidity and mortality in high-income countries: a systematic review. J Epidemiol Community Health. 2025;79(3):207-15.
16. Lindquist A, Knight M, Kurinczuk JJ. Variation in severe maternal morbidity according to socioeconomic position: a UK national case–control study. BMJ Open. 2013;3(6):e002742.
17. Beyuo TK, Lawrence ER, Oppong SA, Kobernik EK, Amoakoh-Coleman M, Grobbee DE, et al. Impact of antenatal care on severe maternal and neonatal outcomes in pregnancies complicated by preeclampsia and eclampsia in Ghana. Pregnancy Hypertens. 2023;33:46-51.
18. Eshetu D, Aschalew Z, Bante A, Negesa B, Gomora D, Ejigu N, et al. Delay in reaching health facilities for emergency obstetric care and associated factors among postpartum mothers in Bale zones, Ethiopia. PLOS Glob Public Health. 2024;4(2):e0002964.
19. Say L, Pattinson RC, Gülmezoglu AM. WHO systematic review of maternal morbidity and mortality: the prevalence of severe acute maternal morbidity (near miss). Reprod Health. 2004;1(1):3.
20. Hawkins SS, Harper S, Baum CF, Kaufman JS. Associations between state-level changes in reproductive health services and indicators of severe maternal morbidity. JAMA Pediatr. 2023;177(1):93-95.
21. Alluvala SA, Aziz N, Tumkur A, Boorugu HK. One-year follow-up of women with severe acute maternal morbidity (SAMM): a cohort study. J Obstet Gynaecol India. 2019;69(3):211-7.
22. Rajbanshi S, Norhayati MN, Nik Hazlina NH. Severe maternal morbidity and its associated factors in Morang district, Nepal. PLoS One. 2021;16(12):e0261033.
23. Minkauskiene M, Nadisauskiene R, Padaiga Z, Makari S. Incidence and prevalence of severe maternal morbidity: a systematic review. Medicina (Kaunas). 2004;40(4):299-309.
24. Desai GS, Ghosh K, Pandya SV. Prevalence and associated risk factors of reproductive morbidity in Gujarat: evidence from NFHS-IV. Int J Community Med Public Health. 2022;9(6):2493-2500.
25. Jayawardane IA, Jayasundara DMCS, Weliange SDS, Jayasingha TDKM, Madugalle TMSSB, Nishshanka NMCL. Long-term morbidity following peripartum hysterectomy: a systematic review. Int J Gynaecol Obstet. 2025;170(3):988-1000.
26. National Research Council (US). The consequences of maternal morbidity and maternal mortality: report of a workshop. Washington (DC): National Academies Press; 2000.
27. Koblinsky M, Chowdhury ME, Moran A, Ronsmans C. Maternal morbidity and disability and their consequences: neglected agenda in maternal health. J Health Popul Nutr. 2012;30(2):124-30.
28. Say L, Barreix M, Chou D, Tunçalp Ö, Cottler S, McCaw-Binns A, et al. Maternal morbidity measurement tool pilot: study protocol. Reproduct Heal. 2016;13(1):69.
29. Mantel G, Buchmann E, Rees H, Pattinson RC. Severe acute maternal morbidity: a pilot study of a definition for a near miss. BJOG. 1998;105(9):985-90.
30. de Moraes AP, Barreto SM, Passos VM, Golino PS, Costa JE, Vasconcelos MX. Severe maternal

morbidity: a case-control study in Maranhao, Brazil. Reproduct Heal. 2013;10(1):11.
31. Attali E, Yogev Y. The impact of advanced maternal age on pregnancy outcome. Best Pract Res Clin Obstet Gynaecol. 2021;70:2-9.
32. Galvão LP, Alvim-Pereira F, de Mendonça CM, Menezes FE, Góis KA, Ribeiro RF Jr, et al. The prevalence of severe maternal morbidity and near miss and associated factors in Northeast Brazil. BMC Pregnancy Childbirth. 2014;14(1):25.
33. Dias MA, Domingues RM, Schilithz AO, Nakamura-Pereira M, Diniz CS, Brum IR, et al. Incidence of maternal near miss in hospital childbirth and postpartum: Birth in Brazil study. Cad Saude Publica. 2014;30(Suppl 1):S1-12.
34. Halder A, Jose R, Vijayselvi R. Maternal mortality and derivations from the WHO near-miss tool: an institutional experience over a decade in Southern India. J Turk Ger Gynecol Assoc. 2014;15(4):222-7.
35. Kayem G, Kurinczuk J, Lewis G, Golightly S, Brocklehurst P, Knight M. Risk factors for progression from severe maternal morbidity to death: a national cohort study. PLoS One. 2011;6(12):e29077.
36. Conde-Agudelo A, Belizán JM, Lammers C. Maternal-perinatal morbidity and mortality associated with adolescent pregnancy in Latin America. Am J Obstet Gynecol. 2012;206(1):45.e1-8.
37. Singh A, Jain K, Soni RK. Impact of religion on health practices in India. J Family Med Prim Care. 2018;7(2):244-9.

Cite this article as: Rathwa JH, Patel PK, Soni NK. The prevalence and risk factors for severe maternal morbidity at a tertiary care centre in western India. Int J Reprod Contracept Obstet Gynecol 2026;15:1748-55.