



Maternal and fetal outcomes in high-risk pregnancies: A retrospective study

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Abstract

High-risk pregnancies contribute disproportionately to maternal illness, stillbirth, preterm birth and neonatal intensive care admission, and India carries a heavy share of this burden. This paper synthesises recent evidence, drawn mainly from retrospective hospital-based studies, a national survey analysis and systematic reviews published between 2023 and 2026, on maternal and fetal outcomes in high-risk pregnancies. The literature was located through structured web-based searches and appraised narratively rather than pooled statistically. Indian reports place the proportion of pregnancies classed as high-risk anywhere between roughly 18% and 65%, depending on the definition applied and the setting studied. Across settings, hypertensive disorders, gestational diabetes, adolescent pregnancy, multiple gestation and nulliparity were repeatedly linked with higher rates of caesarean delivery, antepartum bleeding, preterm birth, low birth weight, poor Apgar scores and neonatal unit admission. Maternal deaths were rare in tertiary-care records, which may reflect timely referral and specialised care. Barriers include inconsistent risk definitions, incomplete screening, socioeconomic disadvantage, uneven access to diagnostics and the inherent limits of record-based designs. Standardised risk stratification, early detection of gestational diabetes and hypertension, and stronger follow-up of women flagged as high-risk are recommended, along with prospective multicentre studies that use harmonised definitions.

Keywords: High-risk pregnancy, maternal outcomes, fetal outcomes, retrospective study, antenatal care, India

Introduction

A high-risk pregnancy is generally understood as one in which the health or life of the mother, the fetus, or both is threatened to a greater degree than in an average pregnancy. Biradar et al. (2024) describe such pregnancies as being linked with miscarriage, antepartum haemorrhage, surgical delivery, preterm birth, low birth weight, intrauterine death and a greater need for neonatal intensive care. In India, where maternal mortality has fallen but still sits above the Sustainable Development Goal target of 70 deaths per 100,000 live births, early identification of these pregnancies is widely seen as one of the most practical routes to preventing avoidable deaths (Kuppusamy et al., 2023).

The scale of the problem is large but difficult to pin down. A national analysis of survey data classified nearly half of currently pregnant Indian women as having at least one high-risk factor (Kuppusamy et al., 2023), whereas hospital-based reports give figures from under one in five to more than six in ten pregnancies, depending on how risk is defined (Biradar et al., 2024; Hossain et al., 2024; Sharma et al., 2023). Retrospective designs, which draw on records hospitals already hold, are a common way to describe outcomes because they are quick and inexpensive.

This paper brings together recent evidence on maternal and fetal outcomes in high-risk pregnancies, with emphasis on retrospective studies from India.

Review Approach

This work is a narrative evidence synthesis and does not report new patient data. Searches were run in October 2026 through web-based queries that combined terms such as high-risk pregnancy, maternal and perinatal outcomes, retrospective study, India, hypertensive disorders of pregnancy, gestational diabetes and adolescent pregnancy. Publications from 2023 to 2026 were preferred. Priority

went to peer-reviewed retrospective hospital studies from India, a national survey analysis, and systematic reviews or meta-analyses. Key articles were opened in full to confirm design, sample and findings. Because the search was not run across several bibliographic databases with independent screening, relevant studies may have been missed, so conclusions are indicative rather than exhaustive.

Approaches to Identifying High-Risk Pregnancies

Risk Scoring and Classification

Studies identify high-risk pregnancy in different ways, and the method strongly shapes the reported prevalence. Biradar et al. (2024) reviewed 300 antenatal records from a secondary-level private facility in Tamil Nadu, covering December 2018 to December 2021, and applied the modified Cooplund scoring system, which weights age and obstetric history, pre-existing illness and complications of the current pregnancy. They classified 18.3% of women as high-risk. In a one-year record review of 3,887 patients at a tertiary hospital in Himachal Pradesh, Sharma et al. (2023) found 28.96% to be high-risk. A cross-sectional study at a PMSMA clinic in rural West Bengal reported 65.3% (Hossain et al., 2024), and the national survey analysis, which applied PMSMA-based criteria to survey variables, arrived at 49.4% (Kuppusamy et al., 2023). This spread reflects real population differences as well as differences in definitions and case mix.

Biradar et al. (2024) argue that PMSMA clinics screen mainly for a short list of current-pregnancy conditions, such as anaemia, diabetes, hypothyroidism and pre-eclampsia, and may therefore overlook risk arising from demographic and past obstetric history. They add that official reporting reportedly captures fewer than 15% of high-risk pregnancies, and suggest low-cost scoring tools could strengthen identification.

Common Clinical Categories

Beyond composite scores, certain conditions recur. Kuppusamy et al. (2023) found short interpregnancy intervals, prior adverse birth outcomes, previous caesarean delivery and earlier preterm birth among the leading contributors, while having no education (adjusted odds ratio 2.02) and belonging to the poorest wealth quintile (1.33) raised the odds of being high-risk. In the Tamil Nadu series, nulliparity was significantly associated with high-risk status (Biradar et al., 2024). Adolescent pregnancy forms a further category: in a 2025 tertiary-hospital series from Gujarat, teenagers accounted for 6.0% of 3,058 deliveries (Shrivastava et al., 2026). Hypertensive disorders and gestational diabetes mellitus (GDM) are the best-studied medical categories, and their outcome profiles are considered below.

Maternal and Fetal Outcomes in High-Risk Pregnancies

Maternal Outcomes

Retrospective studies report more obstetric complications among women classed as higher risk. In the Tamil Nadu series, miscarriage and antepartum haemorrhage were significantly more frequent in the moderate- and high-risk groups, whereas postpartum haemorrhage did not differ significantly and no maternal deaths occurred (Biradar et al., 2024). The Himachal Pradesh review likewise recorded no maternal mortality despite nearly 29% of admissions being high-risk (Sharma et al., 2023). In the Gujarat comparison, teenage and adult mothers did not differ significantly in postpartum haemorrhage, sepsis, transfusion or intensive care admission; anaemia (31.0% versus 22.3%) and pre-eclampsia (23.4% versus 17.4%) were numerically commoner among teenagers without reaching significance, and caesarean delivery was in fact more frequent among adults (46.7% versus 35.9%) (Shrivastava et al., 2026).

Condition-specific syntheses add detail. A meta-analysis of five Indian observational studies found that women with GDM had higher odds of caesarean section, postpartum haemorrhage, gestational hypertension, premature rupture of membranes and delivery of large-for-gestational-age infants (Singh et al., 2026).

Fetal and Neonatal Outcomes

The neonatal burden is more visible. In the Tamil Nadu records, low birth weight and neonatal respiratory distress were significantly associated with higher maternal risk category, while preterm birth, intrauterine death and NICU admission showed a similar direction without reaching significance, probably because events were few (Biradar et al., 2024). In Gujarat, babies of teenage mothers had more preterm births (20.7% versus 12.0%), more low Apgar scores at one minute (32.1% versus 15.8%) and five minutes (15.2% versus 4.9%), and more NICU admissions (26.1% versus 10.9%), while low birth weight, stillbirth and early neonatal death did not differ significantly (Shrivastava et al., 2026).

Pooled evidence points the same way for specific conditions. Among Indian women with GDM, the odds of preterm birth, macrosomia, stillbirth, neonatal hypoglycaemia, hyperbilirubinaemia, congenital malformations and shoulder dystocia were all raised, with an overall odds ratio of about 3.0 for adverse fetal outcomes (Singh et al., 2026). In twin pregnancies, a meta-analysis of twelve studies covering 355,129 gestations showed that

hypertensive disorders increased the odds of preterm birth (OR 1.86), low birth weight (OR 1.30), small-for-gestational-age birth (OR 1.30) and NICU admission (OR 1.77), although neonatal death was paradoxically lower (OR 0.39) and heterogeneity was very high (Wu et al., 2023).

Evidence on Effectiveness

Most of the retrospective literature describes outcomes rather than testing interventions, so evidence on effectiveness must be read cautiously. Scoring systems have been proposed as a low-cost way to direct scarce specialist attention, and the Tamil Nadu study showed that women in higher score categories did experience more complications (Biradar et al., 2024). However, none of the studies reviewed here examined whether using such scores actually changed outcomes.

Stronger evidence exists for management within specific conditions. A 2025 meta-analysis of studies in women with GDM found that prenatal exercise was associated with lower odds of caesarean delivery (OR 0.91), preterm birth (OR 0.49) and macrosomia (OR 0.58), and with reductions in fetal growth restriction and birth trauma (Cui et al., 2025).

Tertiary-level care itself may protect women and newborns. The absence of maternal deaths in two hospital series (Biradar et al., 2024; Sharma et al., 2023), and the lack of a significant difference in stillbirth or early neonatal death between teenage and adult groups in Gujarat, were attributed by the authors, tentatively, to timely referral, resuscitation and intensive care (Shrivastava et al., 2026). These interpretations are plausible but untested.

Barriers and Challenges to Implementation

The first barrier is conceptual: there is no single operational definition of a high-risk pregnancy. Prevalence figures from 18.3% to 65.3% across the studies above make it difficult to compare findings or to plan services (Biradar et al., 2024; Hossain et al., 2024). Screening criteria that rely on a limited set of current-pregnancy conditions can miss women whose risk lies in their history (Biradar et al., 2024), and Hossain et al. (2024) note that many pregnancies remain unclassified as high-risk.

Social and economic inequity is a second barrier. High-risk status was more common among women with no education and those in the poorest households (Kuppusamy et al., 2023), and the Gujarat teenage mothers were more often from lower socioeconomic groups with limited schooling, which may have shaped access to timely antenatal care (Shrivastava et al., 2026).

Methodological limits also constrain what can be concluded. Retrospective single-centre studies depend on the completeness of records; Shrivastava et al. (2026) excluded incomplete files, applied no multivariable adjustment, and acknowledged selection bias and small event numbers. The national analysis excluded GDM and multiple gestation and relied partly on self-reported illness (Kuppusamy et al., 2023), and the Indian GDM meta-analysis rested on only five studies (Singh et al., 2026).

Discussion and Implications

Taken together, the evidence shows a consistent pattern: higher obstetric risk is accompanied by more complications, but the clearest differences are in neonatal indicators such as low birth weight, respiratory distress, low Apgar scores and

NICU admission, whereas severe maternal outcomes were infrequent in referral-level records. The pattern is not confined to India. An umbrella review of systematic reviews from Ethiopia, covering 621,146 women, estimated the pooled prevalence of hypertensive disorders of pregnancy at 16.56% and identified age above 35 years and a previous history of pre-eclampsia as important risk factors (Geltore et al., 2025), echoing Indian series.

For practice, the findings support combining history-based scoring with screening for current-pregnancy conditions, so that neither source of risk is overlooked. Early blood pressure monitoring and GDM screening, together with lifestyle support such as supervised exercise where appropriate, are reasonable priorities. Women flagged as high-risk need clear follow-up and referral pathways, and delivery units should be ready with neonatal resuscitation and intensive care.

For policy, the association of risk with low education, poverty and short birth spacing suggests that antenatal services alone are insufficient; female education, contraception counselling and adolescent health services also matter (Kuppusamy et al., 2023; Shrivastava et al., 2026). For research, prospective multicentre studies with harmonised definitions, multivariable adjustment and separate reporting of maternal and neonatal outcomes by risk category would allow far firmer conclusions than the present patchwork of single-centre records.

Conclusion

High-risk pregnancies in India are common, defined inconsistently, and associated with a measurable excess of maternal complications and, above all, neonatal morbidity. Retrospective studies describe this burden usefully, but their design limits causal inference. Standardised risk identification, early detection and management of gestational diabetes and hypertensive disorders, dependable follow-up and attention to social disadvantage are the most defensible priorities. Better-designed prospective evidence is needed to show which of these measures most improve outcomes for mothers and babies.

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