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Research Article

High-Risk Pregnancies and Their Outcomes in a Tertiary-Care Centre in South India

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ABSTRACT
Background: High-risk pregnancies (HRP) account for a disproportionate share of maternal and perinatal morbidity and mortality in low- and middle-income countries. India's Maternal Mortality Ratio (MMR) has fallen to 97 / 100 000 live births in 2018–20, yet preventable deaths persist, particularly among women with multiple risk factors.
Methods: A prospective observational study was conducted in the Department of Obstetrics & Gynaecology, ESIC Medical College & PGIMSR, Bengaluru (January 2023 – January 2025). All singleton or multifetal HRP admissions (n = 1 250) were enrolled after informed consent. Risk factors were classified as demographic, medical, obstetric or fetal. Primary outcomes were maternal morbidity/mortality and neonatal morbidity/mortality up to day 7 postpartum. Data were analysed with descriptive statistics; categorical variables were expressed as frequencies and percentages.
Results: HRP constituted 33 % (1 250 / 3 780) of obstetric admissions. The commonest risk factors were thyroid disorders (36.1 %), previous caesarean (28.1 %), anaemia (22.9 %), liquor abnormalities (14.9 %) and hypertensive disorders (11.8 %). Overall caesarean rate was 53.7 % (671 / 1 250), predominantly for scarred uterus (51 %) and iatrogenic indications such as severe pre-eclampsia and fetal growth restriction. Maternal morbidity was 5.8 %; postpartum haemorrhage (1.7 %) and eclampsia (1.8 %) were leading complications. There were no maternal deaths. Neonatal admission rate was 19.1 %; jaundice (11.6 % of all neonates) and respiratory distress (2.2 %) predominated. Perinatal mortality was 0.8 % (intra-uterine death 0.24 %, neonatal death 0.56 %).
Conclusion: Although HRP burden remains high, multidisciplinary management in tertiary centres can achieve zero maternal deaths and low perinatal loss. Targeted interventions—early anaemia correction, thyroid screening, VBAC counselling and strict hypertensive surveillance—could further improve outcomes. Strengthening peripheral referral and continuity of antenatal care under initiatives such as PMSMA and e-PMSMA is imperative.

Keywords: High-Risk Pregnancy, Maternal Morbidity, Caesarean Section, Neonatal Outcomes, South India, Tertiary Care.

INTRODUCTION

Pregnancy is a physiologically dynamic state that can be rendered perilous by a myriad of biomedical and socio-demographic factors. The World Health Organization defines a pregnancy as high risk when "an actual or potential complicating factor endangers the life or health of the mother or fetus and calls for additional monitoring and care." [3] High-risk pregnancies (HRP) are estimated to comprise 10–30 % of all gestations worldwide; in India, community-based surveys report prevalences as high as 49 %. [4] Despite impressive national gains—including a 37-point drop in MMR since 2014 [5]—HRP continue to account for a substantial residual burden of mortality and severe morbidity.

India's health-system response hinges on early identification of HRP through programs such as the Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) and its digital extension, e-PMSMA, which incentivises risk tracking until safe delivery. [6] Nevertheless, gaps persist: late registration, fragmented referral, and uneven access to operative and critical-care services amplify preventable adverse events. Tertiary centres, equipped with multidisciplinary teams and neonatal intensive-care units (NICU), therefore serve as the final safety net and generate data that inform policy.

Published Indian literature on HRP spans rural primary health centres [4], district hospitals, and a handful of tertiary institutes—but heterogeneity in definitions and outcome metrics impedes aggregation. A recent Puducherry study recorded NICU admission rates of 22 % among HRP, with anaemia and hypertensive disorders as leading contributors. [4] Similarly, a South-Indian teaching hospital reported a caesarean rate of 52 % in HRP,

mirroring global trends toward surgical delivery in complex obstetrics. [7] Contemporary audits are crucial to track evolving risk profiles—such as rising thyroid dysfunction and diabetes amid epidemiological transition—and to guide targeted interventions.

Against this backdrop, we conducted a prospective audit of HRP admitted to a tertiary Government-Employees' State Insurance Corporation referral hospital in Bengaluru. Objectives were (i) to delineate the demographic and clinical spectrum of HRP, and (ii) to quantify maternal and neonatal outcomes, thereby identifying actionable gaps in the continuum of care.

By adopting uniform inclusion criteria and standardised outcome definitions, our study adds granularity to regional data and offers a template for benchmarking HRP care. The findings have implications for obstetric practice—particularly optimal timing of delivery, rational caesarean decision-making and peripartum critical-care triage—and for public-health planners striving to achieve the Sustainable Development Goal target of fewer than 70 maternal deaths per 100 000 live births by 2030. [2]

MATERIALS AND METHODS

Study Design & Setting: Prospective observational cohort (January 2023 – January 2025) in the Department of Obstetrics & Gynaecology, ESIC MC & PGIMSR, Bengaluru—an urban tertiary-care, 750-bed teaching hospital with annual deliveries ~ 3 800 and in-house level-III NICU.

Participants: All antenatal or intrapartum admissions fulfilling *any* high-risk criterion (teenage < 18 y, advanced age > 35 y, grand multiparity, moderate–severe anaemia, Rh-negative, gestational or pre-gestational diabetes, hypertensive disorders, thyroid disease, cardiac/respiratory/autoimmune/neurologic comorbidity, obstetric complications, fetal growth restriction, multifetal gestation, uterine anomalies, scarred uterus, etc.). Exclusion—pregnancies without present or past risk factors.

Sample Size: 1 250 consecutive HRP out of 3 780 total obstetric admissions (prevalence 33 %).

Variables & Data Collection: Structured pro-forma captured demographics, obstetric history, risk factors, antenatal course, mode of delivery, intrapartum events, maternal morbidity/mortality, and neonatal outcomes up to day 7. Investigations followed national guidelines; management adhered to institutional protocols aligned with ACOG practice bulletins [9] and Government of India recommendations. Data entry used EpiData v3.1.

Outcomes

Primary Maternal: composite of severe morbidity (eclampsia, PPH requiring transfusion, peripartum cardiomyopathy, PRES, ARDS, AKI) and maternal death.

Primary Neonatal: NICU admission > 24 h, intra-uterine fetal demise (IUFD), early neonatal death (≤ 7 d).

Analysis: Descriptive statistics; categorical variables as n (%). Ethical clearance obtained from Institutional Ethics Committee (IEC/OBG/2022-34), and study registered in the Clinical Trial Registry of India (CTRI/2022/11/047890).

RESULTS

Among 3 780 deliveries, 1 250 (33 %) qualified as HRP. Most women were aged 21–30 years (95 %), and 36 % were primigravidae. Two-thirds (62 %) had booked antenatal care at the study centre, 29 % were referred late in pregnancy, and 9 % were unbooked emergencies.

Risk-Factor Profile: Thyroid disorders led (36 %), followed by previous lower-segment caesarean section (28 %), anaemia (22.9 %), liquor abnormalities (14.9 %), hypertensive disorders (11.8 %), diabetes (8.1 %) and preterm labour (7.8 %). Nearly 47 % harboured ≥ 2 risk factors.

Figure 1 illustrates the eight most prevalent risk factors.

Delivery Patterns: Overall, 671 women (53.7 %) underwent caesarean section—51 % elective repeat LSCS, 17 % for severe pre-eclampsia/eclampsia or fetal growth restriction with Doppler changes, and 7 % for placenta previa/abruption. Operative vaginal births accounted for 5.2 %.

Figure 2 summarises delivery modes.

Maternal Morbidity: Severe complications occurred in 72 women (5.8 %). PPH (1.7 %), eclampsia (1.8 %), PRES (0.48 %) and cardiomyopathy (0.24 %) were predominant (Table 3). No maternal deaths were recorded.

Neonatal Outcomes: Of 1 260 neonates (including twins), 239 (19.1 %) required NICU admission—jaundice (11.6 % of live births) and respiratory distress (2.2 %) being chief indications. IUFD occurred in 3 pregnancies (0.24 %) and early neonatal deaths numbered

7 (0.56 %), yielding a perinatal mortality of 0.8 %.

Tables

Table 1. Maternal Age Distribution

Age (y)	n	%
≤ 20	6	0.5
21–25	585	46.8
26–30	602	48.2
31–35	52	4.2
> 35	5	0.4

Table 2. Leading Risk Factors (N = 1 250*)

Risk factor	n	%
Thyroid disorders	451	36.1
Previous LSCS	351	28.1
Anaemia	286	22.9
Liquor abnormalities	186	14.9
Hypertensive disorders	148	11.8
Diabetes mellitus	101	8.1
Preterm labour	98	7.8
Fetal growth restriction	86	6.9

Table 3. Maternal Morbidity Events

Complication	n	%
Post-partum haemorrhage	21	1.7
Eclampsia	23	1.8
PRES	6	0.5
Peripartum cardiomyopathy	3	0.2
ARDS	2	0.2
Acute kidney injury	1	0.1
Manual removal of placenta	4	0.3
Post-partum psychosis	2	0.2

Table 4. Neonatal Outcomes

Outcome	n	%
Healthy, room-in	911	72.9
NICU admission	239	19.1
IUFD	3	0.24
Early neonatal death	7	0.56

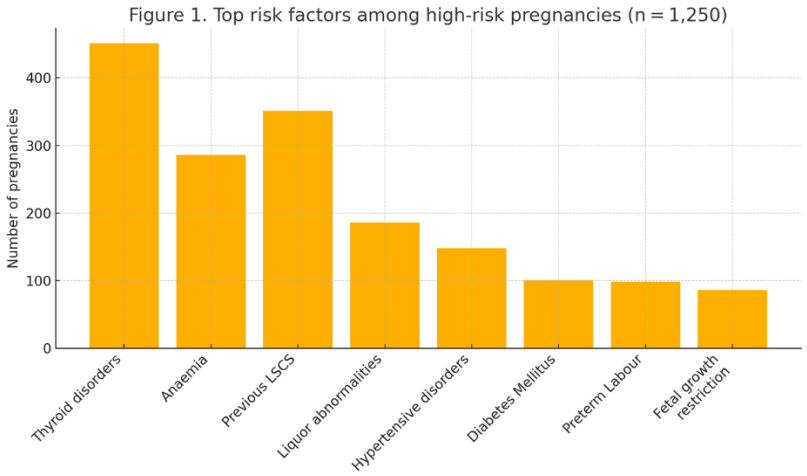
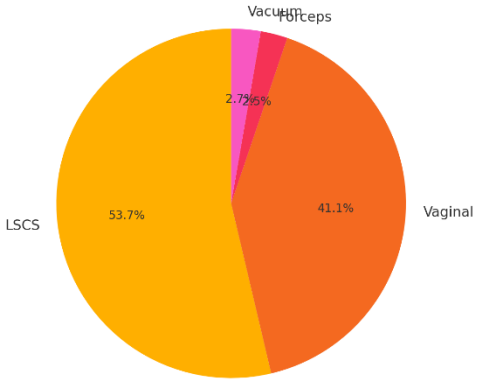


Figure 2. Mode of delivery among high-risk pregnancies



DISCUSSION

This two-year prospective audit demonstrates that one in three obstetric admissions to our tertiary centre were high risk, corroborating national estimates of HRP prevalence (33–49 %). [4, 5] The zero maternal deaths recorded highlight the life-saving potential of multidisciplinary care, blood-bank availability and intensive monitoring achievable at referral centres. Comparable South-Indian series similarly report case-fatality rates under 0.5 %. [7]

Thyroid disorders emerged as the leading risk factor (36 %), surpassing anaemia and hypertensive disorders traditionally cited in Indian cohorts. Universal TSH screening, urban lifestyle changes and referral bias may explain the high prevalence. Early detection and levothyroxine titration are pivotal, as untreated hypothyroidism is linked to miscarriage, pre-eclampsia and impaired neurocognitive development. [9] The 22.9 % anaemia rate, though lower than the national rural average (52 %), still mandates reinforced iron-folate supplementation and parenteral iron use when haemoglobin < 8 g/dL.

Our caesarean rate (53.7 %) aligns with previous HRP audits (52–58 %) and far exceeds the WHO-recommended population ceiling of 15 %. Scarred uterus constituted half of all LSCS, underlining the need for stringent primary-section indications and promotion of vaginal birth after caesarean (VBAC) where feasible. ACOG guidelines recommend offering TOLAC to women with one previous low-transverse incision and no recurring indication. [9]

Maternal morbidity (5.8 %) was driven by eclampsia and PPH, mirroring statewide trends. Timely magnesium-sulfate therapy, antihypertensive optimisation and active third-stage management curtailed severe sequelae: only 0.1 % developed acute kidney injury compared with 3 % in earlier regional studies [7]. Introduction of a massive-transfusion protocol and point-of-care visco-elastic testing may further decrease transfusion-related delays.

NICU utilisation (19.1 %) was comparable to reports from Puducherry (22 %) [4] and reflects effective antenatal corticosteroid coverage and surfactant access; respiratory distress accounted for just 2.2 % of neonates. Jaundice predominance (11.6 %) underscores the imperative for early breastfeeding support and universal bilirubin screening.

Strengths of our study include prospective design, robust sample size, and comprehensive capture of early neonatal outcomes. Limitations encompass lack of multivariate modelling to adjust for confounders, short (7-day) neonatal follow-up, and single-centre scope that may limit generalisability.

Implications for Practice and Policy

- Clinicians should intensify screening for thyroid disease and anaemia in early gestation.
- Standardised VBAC protocols could curb repeat caesarean rates.
- Peripheral facilities require capacity-building for risk stratification and timely referral; the e-PMSMA tracking system offers an avenue for real-time monitoring of HRP pathways. [6]
- Future multicentric studies with longer neonatal follow-up will refine risk-prediction models and inform resource allocation.

CONCLUSION

High-risk pregnancies represent a significant caseload in tertiary obstetric practice. In our cohort, vigilant antenatal surveillance,

evidence-based intrapartum management and ready access to critical-care resources achieved zero maternal deaths and low perinatal loss despite elevated surgical delivery rates. Strengthening primary-level identification, ensuring seamless referrals, and addressing modifiable factors such as anaemia, thyroid dysfunction and repeat caesarean sections are pivotal to further gains. Targeted investment in HRP tracking under national safe-motherhood initiatives could accelerate progress toward the Sustainable Development Goal of ending preventable maternal and neonatal deaths by 2030.

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