

Review Article

Asian Pacific Journal of Reproduction

Journal homepage: <https://journals.lww.com/apjr/>

doi: 10.4103/apjr.apjr_119_25

Barriers and facilitators in the identification and management of high-risk pregnancy: A scoping review of literature from India

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ABSTRACT

Objective: To identify the barriers and facilitators in the identification and management of high-risk pregnancies in India.**Methods:** A systematic search of PubMed and Google Scholar was conducted from the inception of database till 27 March 2024, using predefined keywords and search terms, including “high risk pregnancy,” “identification,” “management,” “barrier,” “challenge,” “facilitator,” “enabler,” and “India,” combined using Boolean operators (AND/OR). Only studies published in English were included. Screening was conducted using Rayyan software. Data were extracted into structured tables and synthesized using a qualitative thematic approach to identify key barriers and facilitators in the identification and management of high-risk pregnancies.**Results:** A total of 144 publications were identified. After screening based on eligibility criteria, 21 studies were finally included in the review. The included studies highlighted multiple barriers in the identification and management of high-risk pregnancies, including knowledge and awareness gaps among women and healthcare providers, inconsistent clinical management, and inadequate infrastructure. Financial constraints and cultural factors further added to the challenges. Women in tribal and rural areas faced additional barriers such as geographical isolation, lack of transportation, and limited access to specialized maternal healthcare. Facilitators identified in the literature included social support networks, the role of community health workers in bridging gaps between facilities and communities, and targeted education programs. Improved health literacy, standardized clinical protocols, and tailored management strategies were also reported as important facilitators.**Conclusions:** This review highlights the importance of strengthening healthcare infrastructure and addressing the identified barriers comprehensively to improve maternal and fetal outcomes. Enhancing awareness, empowering community health workers, and adopting standardized management protocols can contribute

significantly to better identification and management of high-risk pregnancies in India.

KEYWORDS: Barriers; Facilitators; High-risk pregnancy; Healthcare; India

Key Points

Question: What are the barriers and facilitators in the identification and management of high-risk pregnancies in India?**Findings:** In this systematic review of 21 studies, key barriers included knowledge gaps among women and providers, inconsistent clinical management, inadequate infrastructure, financial constraints, and geographic isolation in tribal and rural areas. Facilitators comprised social support networks, community health workers, targeted education programs, improved health literacy, and standardized clinical protocols.**Meaning:** Strengthening healthcare infrastructure, empowering community health workers, and implementing standardized protocols are essential to overcoming barriers and improving maternal and fetal outcomes in India.[✉]To whom correspondence may be addressed. E-mail: mukti.khetan11@gmail.com

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How to cite this article: Verma S, Khetan M, Dhankhar R, Huda RK, Sangwan RK. Barriers and facilitators in the identification and management of high-risk pregnancy: A scoping review of literature from India. *Asian Pac J Reprod* 2026; 15(3): 110-123.**Article history:** Received: 14 May 2025; Revision: 21 September 2025; Accepted: 19 November 2025; Available online: 15 May 2026

1. Introduction

Improving maternal, newborn, and child health has become a global priority as countries strive to accelerate progress towards the Sustainable Development Goals. However, many low- and middle-income countries still face high mortality burdens and have yet to achieve these goals[1]. Globally, an estimated 10%–30% of pregnancies are considered high-risk, with India reporting a high-risk pregnancy rate of 20%–30%[2]. According to the Sample Registration System (SRS 2016–2018), India has registered an overall decline of 70% in maternal mortality compared to a global decline of 44%. Although maternal and infant mortality have declined substantially, an estimated 44 000 women still die each year due to pregnancy-related causes and approximately 660 thousand infants die within 28 days of birth[3]. Early identification of high-risk pregnancies and timely implementation of appropriate interventions are critical to preventing complications and achieving positive pregnancy outcomes[2].

The World Health Organization considers high-risk pregnancies to be a major public health challenge[4]. Any medical or obstetric condition that may adversely affect pregnancy and its outcome (maternal, perinatal or both) can render a pregnancy high-risk. Common high-risk conditions include severe anaemia, pregnancy-induced hypertension (pre-eclampsia, eclampsia), gestational diabetes mellitus, hypothyroidism, multiple pregnancy, young primigravida or elderly gravida, placenta previa and Rh-negative status[5]. Pregnancy is a unique experience for every woman, involving physical, psychological and social changes that unfold differently for each individual. How these changes are perceived and managed is influenced by factors such as a woman's personality, marital status, family context and social support[6]. For women diagnosed with a high-risk pregnancy, accepting this reality can be challenging and may lead to psychological and emotional consequences such as fear, guilt, shock, grief, frustration, worry, loneliness and isolation[7]. High-risk pregnancies with complications can also result in psychosomatic problems, including anxiety, depression and distress, as well as impairments in overall health[6]. High-risk pregnant women face numerous barriers in seeking referral care, such as limited education and lack of health awareness, difficulties in accessing transportation, geographic isolation, financial constraints, the need for accompaniment to referral facilities and competing household responsibilities. Social support at community and interpersonal levels has been identified as a key facilitator in overcoming these barriers[8].

The Government of India launched the Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) in 2016 to ensure comprehensive, quality antenatal care, free of cost, for every pregnant woman. One of the main components of this programme is the early identification and follow-up of high-risk pregnancies[2]. However, inconsistency has been observed in screening for gestational diabetes mellitus due to a lack of routine testing during antenatal care visits, representing

a missed opportunity for early identification and management[9]. Women living below the poverty line have been reported to have almost twice the risk of high-risk pregnancy as compared to those above the poverty line[10]. High rates of morbidity and mortality due to pregnancy-related complications can be prevented through early detection, regular follow-up and provision of quality antenatal, intranatal and postnatal interventions[11,12].

Despite the existence of national programmes such as PMSMA and multiple individual studies from different parts of India, there is limited synthesised evidence on what specifically helps or hinders the identification and management of high-risk pregnancies. Most existing studies focus on particular states, specific interventions or isolated aspects such as antenatal care utilisation or risk stratification, rather than providing an overall picture across the continuum of care. To address this gap, this scoping review aims to assess the literature on the identification and management of high-risk pregnancies and to explore the barriers and facilitators related to these processes in the Indian context.

2. Methods

This scoping review followed the Preferred Reporting Items for systematic reviews and meta-analyses extension for scoping reviews (PRISMA-ScR)[13] guidelines to systematically explore the barriers and facilitators in the identification and management of high-risk pregnancies.

2.1. Inclusion and exclusion criteria

The inclusion criteria: a) Articles reporting on high-risk pregnancy challenges, barriers, facilitators, enablers, identification, and management; b) Studies were conducted in India; c) The study must involve human participants or populations; d) Studies must rely on primary data collection methods; e) Only articles published in English were included.

The exclusion criteria: a) Articles reporting on pregnancy or low-risk pregnancy in countries other than India; b) Study includes an animal population or sample; c) Review articles, which summarize existing research and commentaries, perspectives, *etc.*, that do not report original research findings.

2.2. Information sources

To identify potentially relevant documents, searches were conducted in two databases, PubMed and Google Scholar, from the inception of database till 27 March 2024. Only studies published in English were included in the review. Search strategies were initially drafted and then refined through expert discussion. Duplicate documents were identified and eliminated using the Rayyan software.

2.3. Search strategy

An advanced search strategy was used with the keywords. 'High-risk pregnancy' AND 'identification' OR 'management' OR 'barrier' OR 'challenge' OR 'facilitator' OR 'enabler' AND 'India'. "high-risk pregnancy"[All Fields] OR ("pregnancy, high risk"[MeSH Terms] OR ("pregnancy"[All Fields] AND "high risk"[All Fields]) OR "high-risk pregnancy"[All Fields] OR ("high"[All Fields] AND "risk"[All Fields] AND "pregnancy"[All Fields]) OR "high-risk pregnancy"[All Fields]) OR "high-risk pregnant women"[All Fields] AND identification and management OR barrier OR challenge OR facilitator OR enabler-"identification and management*" [All Fields] OR "barrier*" [All Fields] OR "challenge*" [All Fields] OR "facilitator*" [All Fields] OR "enabler*" [All Fields] AND "India"[MeSH Terms] OR "India"[All Fields] OR "India s"[All Fields] OR "India's"[All Fields], for PubMed. The 'allintitle' option was used on Google Scholar using the search strategy for high-risk pregnancy in India.

2.3.1. Title and abstract screening

Title and abstract screening were conducted using Rayyan software. The screening process was based on pre-defined eligibility criteria. Studies that met the specified eligibility criteria were included, leading to full-text screening.

2.3.2. Full-text screening

The full-text screening includes all the articles eligible in the title and abstract screening. Full-text screening was also conducted using Rayyan software based on pre-defined eligibility criteria. Studies that met the specified criteria were included in the subsequent phases of the review process.

2.4. Data extraction

Relevant data from each eligible study were extracted into pre-designed tables in Microsoft Word. To identify barriers and facilitators related to the identification and management of high-risk pregnancies, we created dummy tables that included the following fields: authors, study setting and location, study design, population, sample size, objectives and key findings. Information from each included study was then entered into these tables for further analysis. The extracted data are summarised, and the results are presented using a narrative synthesis approach.

2.5. Data synthesis

A qualitative thematic synthesis was conducted as described by Thomas and Harden (2008)[14]. Qualitative findings (including author interpretations and summaries) were treated as data for the synthesis. An inductive approach was used to identify themes related to barriers and facilitators in the identification and management

of high-risk pregnancies. The three steps proposed by Thomas and Harden were followed: (i) free line-by-line coding of relevant text, (ii) organisation of codes into descriptive themes and (iii) development of analytical themes. Similar codes were grouped to create descriptive themes, and the frequency of each theme was noted across studies. These themes were then interpreted to generate inferences about barriers and facilitators, including subgroup patterns where possible.

3. Results

3.1. Characteristics of sources of evidence

The search identified 144 records in PubMed and Google Scholar. After removal of two duplicates, 142 records remained for title and abstract screening. Sixty-three records were excluded at this stage based on the eligibility criteria. Of the 79 articles selected for full-text assessment, six could not be retrieved because the full text was not available. The remaining 73 articles were screened in detail, and 52 were excluded because they did not meet the inclusion criteria. Finally, 21 studies that examined barriers and facilitators related to the identification and management of high-risk pregnancies in the Indian context were included in the synthesis. The PRISMA ScR flowchart diagram Figure 1 illustrates the steps in the search process.

The results were categorized based on the primary components of the included studies. This review comprised 21 studies, among which six were qualitative, fourteen were quantitative, and one was a mixed-method study. The selected studies encompassed barriers and facilitators related to the identification and management of high-risk pregnancies, with two studies reporting the prevalence of high-risk pregnancies. Detailed characteristics of the studies[6,8,9,10,12,15–30] are provided in Table 1.

3.2. Thematic analysis of results

In this scoping review, findings from 21 studies were analyzed to identify key themes related to barriers and facilitators in the identification and management of high-risk pregnancies in India. From these studies, five themes for barriers were developed and are further elaborated in Table 2. The five barriers themes identified were healthcare access, knowledge and awareness, healthcare system constraints, psychological and perceived barriers, and cultural and societal factors.

Additionally, four facilitator themes were identified and elaborated in Table 3. The four facilitator themes included social support and community engagement, education and awareness, strengthening the healthcare system, and patient-centered care strategies. These themes were presented in detail and discussed in the subsequent sections.

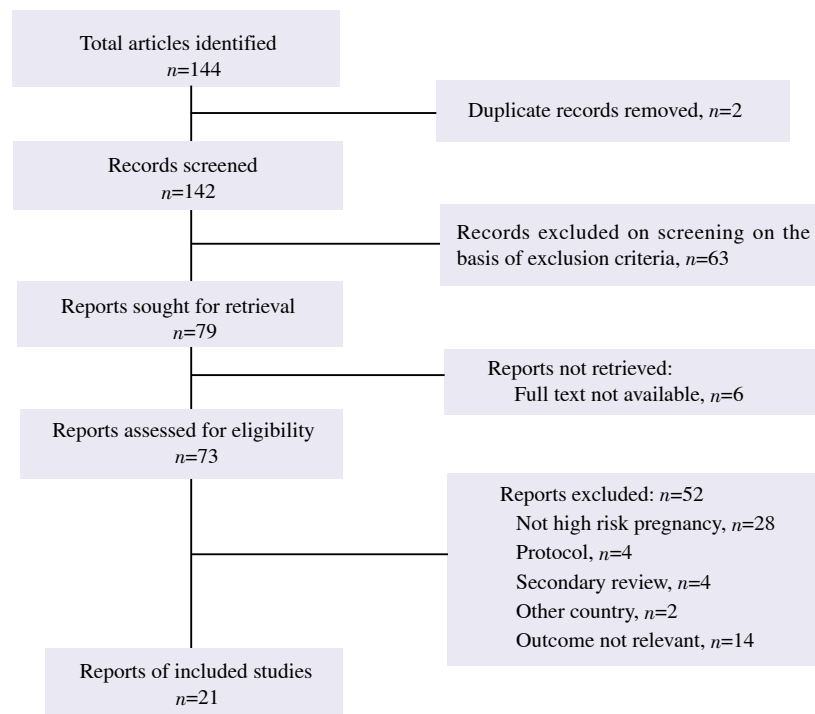


Figure 1. Flowchart depicting the selection process of articles included in the review.

Table 1. Study characteristics of the included studies.

S.No	Study	Objective	Study design/ type	Population	Sample size	Study location	Data collection method
1	Kragelund Nielsen <i>et al.</i> , 2020[6]	To investigate women's experiences with the dietary and pharmaceutical treatment for gestational diabetes mellitus (GDM) in rural and urban Tamil Nadu, India	Qualitative study	Women diagnosed with GDM	Until data saturation	The study was conducted in two settings in Tamil Nadu, India: the rural district of Tiruvallur and the state capital Chennai	In-depth interviews
2	Dalal <i>et al.</i> , 2022[8]	To qualitatively assess the barriers and facilitators to the uptake of referral services amongst high-risk pregnant women in rural Rajasthan	Qualitative research	Pregnant women identified as high-risk by the Khushi Baby digital health mobile application	Till saturation	Geographical blocks of Gogunda, Sarada, Salumbar, and Jhadol	In-depth interviews
3	Nagraj <i>et al.</i> , 2019[9]	To investigate the perceptions of women and healthcare providers in rural India regarding hypertensive disorders during pregnancy (HDPs) or GDM	Qualitative study	Pregnant women and post partum women, community health workers, primary care physicians, obstetricians, laboratory technicians, and healthcare officials	Seven focus group discussions and 11 in-depth interviews (n=71 participants)	Two states in rural India: Haryana and Andhra Pradesh	In-depth interviews and focus group discussion
4	Majella <i>et al.</i> , 2019[10]	To determine the prevalence and outcome of high-risk pregnancy among antenatal women in rural Puducherry	Record-based longitudinal study	Pregnant women attending the antenatal clinic at Jawaharlal Institute of Postgraduate Medical Education and Research (JIPMER) Rural Health Centre	569 records of antenatal women were taken for the assessment of high-risk pregnancy and the outcome of the pregnancy	Antenatal clinic of JIPMER Rural Health Centre	Review of the maternal and child health register maintained in the antenatal clinic, from January 2013 to December 2017
5	Prajapati <i>et al.</i> , 2022[12]	To determine the prevalence of high-risk pregnancy in pregnant females availing services under Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA) and to assess awareness of pregnant mothers about services provided under PMSMA in district Etawah of Uttar Pradesh	Cross-sectional study	Female beneficiaries who were registered under the PMSMA scheme and delivered their baby at any government health facility during one year of study period	400 female beneficiaries	Etawah district, Uttar Pradesh	In-depth interviews

Table 1. Continued.

S.No	Study	Objective	Study design/type	Population	Sample size	Study location	Data collection method
6	Madankar <i>et al.</i> , 2023[15]	To understand poor maternal and child health among tribal women and children in Bhamaragadh, one of the most socio-economically underdeveloped areas in the Indian state of Maharashtra	Qualitative study	Madia-Gond tribes	7 primary healthcare workers from the key informant interview, 8 family members of 3 deceased women and 5 infants from the verbal autopsy interviews, 7 tribal women from an focus group discussion, and 68 tribal women from the in-depth interviews	B h a m a r a g a d h , Maharashtra	In-depth interviews and focus group discussions
7	Vidler <i>et al.</i> , 2016[16]	To describe the patterns and determinants of routine and emergency maternal health care utilization in rural Karnataka State, India	Qualitative study	Health workers and other stakeholders	Auxiliary nurse midwife (ANM) and staff nurses ($n=48$), accredited social health activist (ASHA) ($n=53$), community women ($n=132$), and medical officer ($n=12$), leaders ($n=27$)	Two rural districts of Karnataka State (Belgaum and Bagalkot)	Focus group discussions and in-depth interview
8	Chebrolu <i>et al.</i> , 2023[17]	Home-based GDM screening in two urban slum communities of Pune, India would improve oral glucose tolerance test (OGTT) uptake by decreasing the logistical barriers to administering the fasting OGTT. Secondary objectives included determining GDM prevalence, linkage to GDM care, and conducting a qualitative evaluation of the barriers and facilitators of home-based OGTT	Mixed method	Pregnant women who accepted the community health workers-delivered OGTT	223 pregnant women who accepted the community health workers-delivered OGTT	Two slum communities of Pune, India: Tadiwala Road and Yerawada Block	For quantitative: Redcap mobile app for qualitative data interviews
9	Nagar <i>et al.</i> , 2015[18]	To study the role of Doppler imaging in the prediction of high-risk pregnancies and their outcomes	Prospective observational study	Women with high-risk pregnancies attending antenatal clinic	500 women with high-risk pregnancy	Panna Dhari Rajkiya Mahila Chikitsalaya, Udaipur	Data collected through color Doppler study of uterine and umbilical artery flow velocity forms
10	Reddy <i>et al.</i> , 2022[19]	To evaluate the prevalence of preterm births and risk factors associated with it among women delivered at a rural tertiary teaching hospital in Telangana and further assess its impact on perinatal outcome	Retrospective case-control study	Mothers and their newborns at the Medici Institute of Medical Sciences	Cases: $n=135$; Control: $n=248$	Medici Institute of Medical Sciences, Medchal district in Telangana State, India	Retrospectively through a review of prenatal and hospital delivery records
11	Kapoor <i>et al.</i> , 2019[20]	To evaluate the feasibility and potential effectiveness of a lifestyle intervention (diet and physical activity) among women with a history of GDM, delivered by trained facilitators	Single-arm pilot pre-and post-intervention study	Women with a history of GDM	56 normoglycemic or prediabetic women with prior GDM were recruited at a mean of 17 months postpartum	The study was carried out at two large centers in India (All India Institute of Medical Sciences, New Delhi, and MHRT-Hospital and Research Trust, Hyderabad)	Structure interview, weight, height, waist circumference, body mass index, and blood pressure
12	Jadhao <i>et al.</i> , 2017[21]	To find out the prevalence of high-risk pregnancy and some related socio-demographic factors in high-risk pregnancy in rural areas of Nagpur district, Central India	Cross-sectional study	Pregnant women of 20 weeks and above gestation residing in the selected rural block <i>i.e.</i> , Patansawangi	214 pregnant women	Patansawangi Primary Health Centre, District Nagpur, central India	Pre-designed proforma using interview techniques
13	Damor <i>et al.</i> , 2021[22]	To assess the knowledge, attitude, and practices of pregnant women regarding high-risk pregnancy in a tertiary care center in Western India	Descriptive cross-sectional study	Pregnant women (ages of 18-45 years) registered at the hospital who understand Hindi/ Gujarati language	100 newly registered pregnant women after the initiation of the study	Maternal and child health department of a tertiary care center in Western India	Questionnaire; Likert scale used
14	Naik <i>et al.</i> , 2022[23]	To assess risk factors and challenges in the management of ectopic pregnancies	Retrospective observational descriptive study	Patients presenting with ectopic pregnancies at the hospital	51 cases of ectopic pregnancies, of which 10 cases were non-tubal ectopic pregnancies	Shri Dharmasthala Manjunatheshwara College of Medical Sciences & Hospital, Shri Dharmasthala Manjunatheshwara University, Dharwad, Karnataka, India	Retrospectively from medical records

Table 1. Continued.

S.No	Study	Objective	Study design/ type	Population	Sample size	Study location	Data collection method
15	Nilofer <i>et al.</i> , 2012[24]	The present study was done to screen the high-risk pregnancy group for GDM, to find the incidence of abnormal results on screening, and to correlate the abnormal results with the maternal and fetal outcomes	Prospective cohort study	Pregnant women with high-risk factors for GDM who underwent elective screening	150 pregnant women with high-risk factors for GDM who underwent elective screening	Tertiary care teaching institute in Karnataka, India	GDM screening (glucose challenge test; OGTT)
16	Bansal <i>et al.</i> , 2016[25]	To evaluate maternal outcomes in high and low-risk pregnancies	Prospective descriptive study	Married women aged 16 to 40 years, with gestational age >28 weeks, who underwent caesarean section (emergency/elective)	100 high-risk cases and 100 low-risk cases	Department of Obstetrics & Gynecology at Mamata General Hospital, Khammam	History recorded using a predesigned and pretested proforma. Modified Coopland's Scoring System
17	Ghosh <i>et al.</i> , 2017[26]	To investigate the association between third-trimester uterine artery Doppler assessment and adverse obstetric outcomes	Prospective observational study	Pregnant women with high-risk factors were admitted to the department during the period from July 2008 to October 2012	110 high-risk pregnancies	Department of Obstetrics and Gynecology, B.J. Medical College, Ahmedabad	Detailed history-taking, clinical examination, preliminary investigations, ultrasound scanning, Doppler velocimetry, and follow-up of patients
18	Contractor <i>et al.</i> , 2018[27]	To understand tribal women's experiences with pregnancy and childbirth and their interactions with the formal health system	Qualitative study	Women residing in 9 villages within 1 Gram Panchayat ($n=4\ 663$) belonging to the Kondha tribe	In-depth interviews ($n=36$), key informant interview ($n=9$), participant observation ($n=5$), group discussions ($n=3$)	Kalyansinghpur block, Rayagada district, Southern Odisha, India	Surveys, interviews, and observations
19	Dwarkanath <i>et al.</i> , 2024[28]	To assess the noninferiority of a 500-mg daily dose to a 1500-mg daily dose of calcium supplementation	Randomized trials	India Trial ($n=11\ 000$) pregnant women	11 000 underwent randomization, 55 497 pregnant women=Ca 500 mg, 5503 pregnant women=Ca 1500 mg	India	Questionnaire/Survey
20	Das <i>et al.</i> , 2021[29]	(a) To design and implement context-specific interventions that improve the quality of care including care at birth, emergency obstetric care, sick newborn care, and antenatal care for high-risk pregnancies; (b) To develop local capacity for adopting quality improvement (QI) processes targeted at maternal and newborn care; and (c) To assess the feasibility, acceptability, and sustainability of these QI interventions	Pre-post, quasi-experimental study design	Pregnant women, mothers, newborns, healthcare providers, and quality improvement teams at the selected hospitals	The three district hospitals (Faridabad and Rewari 200 beds each and Jhajjar 100 beds) and one sub-district hospital (200 beds) in Jhajjar have facilities to provide comprehensive obstetric and sick newborn care services	District and sub-district referral hospitals in urban and semi-urban areas of Haryana, India	Facility assessment and service readiness, WHO integrated tool adapted for India to assess the facility-level quality of care in maternal, newborn and child health
21	Seema <i>et al.</i> , 2014[30]	To enlist the categories of high-risk pregnancies and to record their outcome	Retrospective study of case records	All deliveries conducted at the hospital during the period of one year, from January 2008 to December 2008	Records of all deliveries conducted at the hospital during the specified period of one year, specifically from January 2008 to December 2008	Hospital setting in South India	Utilized predesigned proforma to collect data from the medical records department of the hospital

Table 2. Barriers in identification and management of high-risk pregnancy.

S.No.	Themes	Barriers	References
1	Health care access	Travel and distance-related barriers to accessing facilities, including lack of accompaniment to health centres, transportation constraints and geographical isolation, leading to delayed or missed antenatal and follow-up visits.	Dalal <i>et al.</i> 2022[8], Prajapati <i>et al.</i> 2022[12], Madankar <i>et al.</i> 2024[15], Vidler <i>et al.</i> 2016[16], Chebrolu <i>et al.</i> 2023[17], Jadhao <i>et al.</i> 2017[21]
2	Knowledge and awareness	Limited education and health awareness, including poor understanding of high-risk pregnancy and its long-term complications, particularly among women from rural and marginalised communities, resulting in delayed care-seeking and suboptimal self-care. In addition, lack of clinician awareness and training on high-risk pregnancy identification and management contributes to missed opportunities for early detection and appropriate intervention.	Dalal <i>et al.</i> 2022[8], Madankar <i>et al.</i> 2024[15], Reddy <i>et al.</i> 2022[19], Kapoor <i>et al.</i> 2019[20], Jadhao <i>et al.</i> 2017[21], Damor <i>et al.</i> 2021[22], Nagraj <i>et al.</i> 2019[9], Nilofer <i>et al.</i> 2012[24], Chebrolu <i>et al.</i> 2023[17], Naik <i>et al.</i> 2022[23]
3	Health care system constraints	Non-standardised screening and risk-assessment practices and inconsistent clinical management of conditions such as gestational diabetes mellitus, together with limited access to diagnostic testing, specialist care and emergency obstetric services, especially in rural and tribal areas. These challenges are compounded by administrative constraints, inadequate infrastructure and equipment, shortages of trained staff, unwelcoming provider attitudes and lack of family-planning support, all of which undermine timely and effective management of high-risk pregnancies.	Nagraj <i>et al.</i> 2019[9], Reddy <i>et al.</i> 2022[19], Naik <i>et al.</i> 2022[23], Nilofer <i>et al.</i> 2012[24], Seema <i>et al.</i> 2014[30], Chebrolu <i>et al.</i> 2023[17], Bansal <i>et al.</i> 2016[25], Ghosh <i>et al.</i> 2017[26], Jadhao <i>et al.</i> 2017[21], Contractor <i>et al.</i> 2018[27], Das <i>et al.</i> 2021[29], Madankar <i>et al.</i> 2024[15], Prajapati <i>et al.</i> 2022[12], Damor <i>et al.</i> 2021[22]
4	Psychological and perceived barriers	Psychological distress, fear and anxiety following a high-risk pregnancy diagnosis, concerns about medication safety and side-effects, and difficulties adhering to recommended diets and treatment regimens. These problems are often exacerbated by financial barriers that limit women's ability to purchase medicines, supplements and recommended foods, thereby hindering adherence and optimal management.	Kragelund Nielsen <i>et al.</i> 2020[6], Madankar <i>et al.</i> 2024[15], Dwarkanath <i>et al.</i> 2024[28], Vidler <i>et al.</i> 2016[16]
5	Cultural and societal factors	Cultural dissonance between traditional beliefs and biomedical recommendations, limited trust in the formal health system, linguistic differences, early marriage and teenage pregnancy, restricted autonomy in women's decision-making and social-class barriers. Together these sociocultural factors increase the risk of high-risk pregnancy and can delay or prevent timely care-seeking and use of available maternal health services.	Kragelund Nielsen <i>et al.</i> 2020[6], Madankar <i>et al.</i> 2024[15], Vidler <i>et al.</i> 2016[16], Kapoor <i>et al.</i> 2019[20], Contractor <i>et al.</i> 2018[27], Jadhao <i>et al.</i> 2017[21], Damor <i>et al.</i> 2021[22]

Table 3. Facilitators in identification and management of high risk pregnancy.

S.No.	Themes	Facilitators
1	Social support and community engagement	Social and family support networks that encourage care-seeking and adherence to treatment, together with strong community engagement. Community health workers, local leaders and community-based interventions act as trusted links between households and health facilities, provide culturally appropriate support and promote use of antenatal, delivery and follow-up services.
2	Education and awareness	Women's education and tailored education/health-literacy programmes that improve awareness of high-risk pregnancy, promote recognition of danger signs and increase utilisation of antenatal and delivery services. Community-based and facility-based Information, Education and Communication (IEC) activities support informed decision-making and timely care-seeking.
3	Healthcare system strengthening	Strengthened service delivery, quality-improvement initiatives and improved infrastructure and diagnostics (including early and comprehensive antenatal care, use of risk-scoring tools, better-equipped facilities and reliable referral systems) that support timely identification and management of high-risk pregnancies. Effective implementation of government programmes and, where appropriate, integration of traditional systems further enhance access and acceptability of services.
4	Patient-centered care strategies	Tailored clinical management based on individual risk factors, supportive supervision for healthcare providers and delivery of respectful, culturally sensitive and family-inclusive care. Involving family members, ensuring clear and empathetic communication and adapting services to local cultural norms help build trust, support adherence and improve maternal and fetal outcomes.

4. Discussion

High-risk pregnancies constitute a substantial proportion of pregnancies in India and contribute disproportionately to maternal morbidity and mortality. Despite declines in the maternal mortality ratio and the roll-out of national programmes to improve antenatal, intrapartum and postnatal care, preventable deaths and severe complications continue to occur. Many of these adverse outcomes are linked to delayed or missed identification of high-risk pregnancies and to gaps in the quality and continuity of care, particularly within public health facilities. Against this background, the present scoping review synthesised evidence on barriers and facilitators in the identification and management of high-risk pregnancies in India.

4.1. Barriers

Drawing on the socio-ecological model, the barriers identified in this review operate at multiple, interacting levels: individual, interpersonal, community, organisational/health-system, and broader structural levels. Understanding them in this way helps explain why women continue to experience difficulties in the identification and management of high-risk pregnancies despite the presence of national programmes and clinical guidelines.

4.1.1. Individual-level barriers: Knowledge, awareness and psychological responses

Lack of knowledge and awareness among both women and healthcare providers presents significant challenges in the identification and management of high-risk pregnancies. This can lead to delays in seeking care, suboptimal management strategies, and increased risks of adverse outcomes. Insufficient education and awareness initiatives contribute to delayed care-seeking behaviour, particularly in rural and marginalised communities[8,15,18–22]. Women may not fully understand the potential consequences of high-risk pregnancies, such as the heightened risk of developing chronic conditions later in life. This lack of awareness can lead to complacency regarding preventive measures and follow-up care, further jeopardising maternal health. The deficiency in clinician awareness is also a critical impediment to effective high-risk pregnancy management[9,23]. Healthcare providers may lack sufficient knowledge or training to recognise and address the complexities associated with these pregnancies, increasing the likelihood of missed opportunities for early intervention and inappropriate management strategies. Addressing these knowledge and awareness gaps is essential to ensure timely interventions and improve maternal and fetal health outcomes[17,24].

Psychological and perceived barriers further complicate the management of high-risk pregnancies. Concerns about the safety and potential side effects of prescribed medications may lead to hesitancy

or non-compliance with treatment recommendations, driven by fears of fetal harm or uncertainty about the medication's impact on maternal health[7]. The diagnosis of conditions such as gestational diabetes mellitus induces profound emotional distress, including shock, fear and anxiety about the baby's health. This emotional burden not only hampers treatment initiation and adherence but also jeopardises mental well-being, potentially compromising overall maternal and fetal health outcomes[7,19]. Women also face difficulties adhering to prescribed dietary recommendations due to concerns that the recommended diet may not sufficiently nourish the fetus. These challenges are compounded by conflicts with cultural norms and financial constraints, making it difficult to follow recommended dietary regimens. The broader issue of nutritional deficiencies, driven by poverty and resource scarcity, further contributes to malnutrition among mothers and children[19]. Lack of adherence to treatment regimens, including calcium supplementation, remains a concern, particularly in resource-constrained settings with limited access to healthcare services. Inadequate calcium intake can increase the risk of complications such as pre-eclampsia and low birth weight[27].

4.1.2. Interpersonal and household-level barriers

Interpersonal dynamics within families strongly influence women's access to timely and appropriate care. In a qualitative study conducted in rural Rajasthan, the lack of accompaniment to health centres was a major challenge for women, particularly those residing in rural areas. Cultural norms, financial constraints and physical limitations often prevent women from travelling to healthcare facilities alone, resulting in delayed or missed antenatal visits[8,15–17]. Husbands and mothers-in-law often play influential roles in women's care-seeking decisions regarding their health. This lack of autonomy can lead to delays in seeking care, inadequate access to essential services and suboptimal management of high-risk pregnancies, ultimately impacting maternal and fetal health outcomes[12].

4.1.3. Community and sociocultural barriers

At the community level, cultural and societal factors strongly shape the identification and management of high-risk pregnancies. Women's concerns that prescribed diets may not adequately nourish the fetus reflect a conflict between cultural beliefs, dietary restrictions and financial constraints[5]. Cultural and linguistic differences pose challenges in implementing effective interventions, necessitating adaptations to local languages and cultural norms[16]. The clash between top-down health programmes and traditional beliefs limits their effectiveness in tribal communities, hindering the identification and management of high-risk pregnancies[24]. Cultural norms, including early marriage and traditional practices such as immediate newborn bathing and discarding colostrum, are significant barriers to appropriate maternal and newborn care. Tribal women's

preference for pre-lacteal feeds over breastfeeding contributes to inadequate nutrition for newborns[11]. Cultural beliefs and limited access to pregnancy tests may lead to delayed initiation of antenatal care, potentially impacting pregnancy outcomes[14]. Cultural norms promoting early marriage contribute to a high incidence of teenage pregnancies, resulting in increased risks for adverse maternal and child health outcomes[11,18]. The significance of teenage pregnancy as a barrier emphasises the importance of educational programmes and interventions to promote maternal health awareness and reduce risks among adolescents in the context of high-risk pregnancy identification and management[14].

Limited trust in the formal healthcare system further acts as a community-level barrier. Women's concerns about the safety and potential adverse effects of pharmaceutical treatments, such as insulin, contribute to treatment hesitancy and delay, indicating a lack of trust in medication safety. Tribal women's lack of faith in the formal healthcare system, rooted in negative past experiences and perceived coercion, hinders the utilisation of services, particularly for high-risk pregnancies. Despite efforts to enhance healthcare infrastructure, concerns persist regarding poor maintenance, insufficient staffing and inadequate medical equipment, which continue to affect trust in and utilisation of services[5,12,24]. The necessity of translating participant manuals into local languages such as Hindi, Urdu and Telugu and adapting content to align with cultural norms and preferences further highlights the importance of culturally appropriate interventions. This adaptation is essential for ensuring that interventions are accessible and acceptable, ultimately improving their effectiveness in addressing barriers to high-risk pregnancy identification and management[15].

4.1.4. Organisational and health–system barriers

At the organisational level, health system constraints were a recurrent theme. Healthcare access barriers result in delays in identifying and managing high-risk pregnancies, leading to missed antenatal screenings crucial for early detection of complications such as gestational diabetes mellitus or hypertension. Such delays elevate the risk of adverse outcomes for both the mother and baby, including preterm birth, low birth weight and maternal mortality. Geographical isolation and transportation constraints present formidable barriers for pregnant women in remote regions of India. Women in these areas face significant challenges due to the considerable distance they must travel to access healthcare facilities. The limited availability of transportation options further compounds the issue, making it difficult for women to reach healthcare facilities promptly. Poor road infrastructure and long distances exacerbate this barrier, hindering pregnant women's ability to access essential antenatal care services and leading to delayed or missed appointments for the monitoring of high-risk pregnancies[8,15–17].

In rural India, screening practices for gestational diabetes mellitus

lack uniformity and evidence-based approaches. This results in missed opportunities for early detection and management, as well as the absence of systematic approaches to identify high-risk pregnancies, especially those at risk of preterm birth. These challenges underscore the need for reliable risk assessment methods[9,18]. Inconsistency in screening practices for gestational diabetes mellitus across healthcare facilities emphasises the necessity for standardised protocols. Inconsistent clinical management within the healthcare system poses a significant challenge[24]. Despite the widespread adoption of gestational diabetes mellitus screening, variations in clinical management practices were observed across clinics and healthcare providers. This variability indicates disparities in the quality of care provided to pregnant women with gestational diabetes mellitus, potentially leading to suboptimal health outcomes[17]. These findings further emphasise the need for standardised protocols and comprehensive approaches to ensure effective clinical management[25,31].

Limited access to diagnostic testing for high-risk pregnancies presents additional challenges in effective management[19,24,26]. Selective screening for gestational diabetes mellitus among only high-risk pregnant women potentially indicates restricted access to diagnostic testing for the general population[24]. This selective approach may result in missed opportunities for early detection and management of gestational diabetes mellitus, highlighting the need to improve access to diagnostic testing for all pregnant women. Additionally, the lack of access to Doppler studies in specific healthcare settings hinders the early identification of high-risk pregnancies[19]. Barriers posed by limited resources and infrastructure impede the implementation of evidence-based interventions to prevent adverse pregnancy outcomes. Addressing these challenges requires efforts to enhance access to diagnostic testing and strengthen healthcare infrastructure, ultimately improving the identification and management of high-risk pregnancies[26].

Inadequate access to specialised care and resources presents further challenges in managing high-risk pregnancies[19,21,25]. The limited involvement of senior healthcare professionals in decision-making processes potentially leads to suboptimal management strategies[19]. The inadequate provision of skilled birth attendance and delayed access to emergency obstetric care in tribal communities pose significant barriers to managing high-risk pregnancies. The limited access to specialised maternal healthcare services in rural areas exacerbates challenges in providing adequate care[18]. Addressing these issues necessitates interventions to improve access to specialised care, skilled birth attendance and emergency obstetric care, ultimately enhancing outcomes for high-risk pregnancies[25]. Inconsistent clinical management more broadly poses challenges in ensuring consistent quality of care for pregnant women with high-risk pregnancies[17,25]. The lack of standardised management protocols for non-traditional endocrine pregnancies results in

variations in treatment approaches, potentially compromising patient outcomes[23]. Standardising these criteria is essential to improve consistency and accuracy in identifying and managing high-risk pregnancies[26]. Administrative challenges, such as bureaucratic processes and limited financial resources, impede healthcare facilities from implementing necessary interventions and improvements to address the needs of pregnant women with high-risk pregnancies effectively. Without adequate administrative support and resources, healthcare providers may struggle to streamline processes, allocate funds for essential services and implement quality improvement initiatives tailored to the needs of high-risk pregnant women[27]. Unwelcoming attitudes of healthcare providers contribute to the underutilisation of healthcare services by tribal women, exacerbating the challenge of timely identification and effective management of high-risk pregnancies[15]. Inadequate infrastructure and resources pose significant barriers to providing comprehensive antenatal care and hinder healthcare facilities' ability to deliver essential services[15,21,22,27,31]. The association between increasing parity and high-risk pregnancies underscores the crucial role of family planning support in mitigating risks. By promoting family planning services and offering comprehensive prenatal care, healthcare providers can support women in managing and preventing high-risk pregnancies associated with multiparity, ultimately improving maternal and fetal health outcomes[19,25].

4.1.5. Structural and financial barriers

Financial barriers present significant challenges in the identification and management of high-risk pregnancies[7,19,20,31]. The cost and availability of recommended foods and insulin pose formidable barriers, particularly for women with limited resources in rural areas, hindering treatment adherence[7,19]. Despite government initiatives, the financial burden associated with healthcare, including transportation costs and medication expenses, remains a hurdle, especially for women from low-income families[19,21]. A higher prevalence of high-risk pregnancies in lower socioeconomic groups, even when not statistically significant, suggests challenges in accessing healthcare services for underprivileged communities. Addressing these financial disparities is essential to ensure equitable access to healthcare services and improve outcomes for women with high-risk pregnancies[19]. Inadequate health insurance coverage, limited financial resources and competing household priorities often hinder women from seeking timely prenatal care and essential interventions[12,17].

4.2. Facilitators

Facilitators to the identification and management of high-risk pregnancies were also observed at multiple socio-ecological levels, highlighting opportunities to strengthen existing programmes and design context-appropriate interventions.

4.2.1. Individual-level facilitators: Education, awareness and empowered decision-making

Investing in women's education and empowerment can enhance awareness about prenatal care and pregnancy-related risks. This empowerment enables women to make healthcare decisions, seek timely antenatal care and implement preventive measures, thereby aiding in the early identification and management of high-risk pregnancies[18–20,31]. Tailored education and health literacy programmes have been shown to be effective in improving acceptance of treatment recommendations for high-risk pregnancies such as gestational diabetes mellitus. Existing Information, Education and Communication programmes effectively raise awareness about high-risk pregnancies, particularly in rural areas[21]. Community-based educational initiatives empower women to make informed decisions about their health and seek timely medical attention, ultimately leading to better utilisation of maternal healthcare services[15]. Improving rural women's literacy and health awareness remains essential for better maternal healthcare utilization[21]. Patient-centred care strategies also operate at the individual level. Tailoring management strategies based on identified risk factors, such as previous caesarean deliveries and maternal medical conditions, optimises outcomes for high-risk pregnancies[19]. Lower-dose regimens improve adherence and reduce programme costs, particularly in low-resource settings, enhancing the effectiveness of management interventions[28]. Clear and empathetic communication from healthcare providers builds trust and encourages adherence to treatment plans, ultimately improving patient outcomes[6].

4.2.2. Interpersonal and family-level facilitators

Social support and family engagement emerge as important facilitators at the interpersonal level. Social support networks help women overcome barriers related to high-risk pregnancies. Positive interactions with healthcare providers and support from family members were found to be crucial for overcoming treatment barriers, providing motivation and facilitating adherence to treatment recommendations[8]. Family support aids women in adhering to treatment regimens and coordinating necessary dietary changes, easing the burden of care.

4.2.3. Community-level and community-health-worker-led facilitators

At the community level, social support and community engagement are central facilitators. Collaboration with local leaders and traditional healers in ensuring culturally appropriate care for pregnant women emphasises the importance of social support in navigating high-risk pregnancies[15]. Community health workers provide education and support and facilitate access to prenatal care, thereby addressing barriers to healthcare access[9]. They serve as intermediaries between healthcare facilities and communities by

providing education, support and facilitation of access to prenatal care services, thereby enhancing the overall management of high-risk pregnancies[15]. Community health workers also play a crucial role in establishing trust and promoting gestational diabetes mellitus screening within communities. Their understanding of local contexts and social capital bridges healthcare access gaps, particularly for marginalised populations[17].

Community-based interventions, such as women's groups using local knowledge, offer promising strategies for improving birth outcomes and overcoming barriers to maternal health services[27]. Adapting healthcare services to align with cultural norms and preferences enhances trust and utilisation of services for managing high-risk pregnancies. This cultural sensitivity fosters engagement and participation, ultimately improving maternal and fetal health outcomes[27]. The integration of traditional systems, including training traditional birth attendants in safe delivery techniques, can improve access to skilled care and address cultural beliefs, thereby facilitating identification and management of high-risk pregnancies by leveraging traditional knowledge alongside modern healthcare approaches.

4.2.4. Organisational and health–system facilitators

Healthcare system strengthening is a key facilitator at the organisational level. Collaboration between primary and tertiary healthcare sectors can enhance access to comprehensive prenatal care and ensure timely referrals for high-risk cases[19]. Quality improvement initiatives are important in maintaining and strengthening healthcare standards. Integrating these initiatives into routine health system processes helps sustain improvements in quality of care. Dedicated teams at state and district levels, supported by expertise from various fields, play a key role in scaling up quality-improvement processes[20]. Implementing standardised risk-scoring systems can aid in predicting maternal outcomes and facilitating timely interventions, ultimately improving outcomes for high-risk pregnancies[25]. Close monitoring of high-risk pregnancies through frequent antenatal visits enables early detection of complications and timely interventions, further improving outcomes[31]. Investing in healthcare infrastructure, including well-equipped facilities, skilled providers and reliable transportation, is vital for improving access to quality care, especially in remote areas[15]. Efficient healthcare systems, with proper referral mechanisms and well-equipped facilities, can significantly reduce maternal morbidity and mortality rates, leading to better neonatal outcomes[25]. Additionally, specific Doppler indices such as umbilical artery pulsatility index and middle cerebral artery pulsatility index can serve as early markers for fetal compromise and placental insufficiency, enabling timely interventions[26]. Supportive supervision frameworks are vital for monitoring and maintaining quality-improvement efforts in high-risk pregnancy management. These frameworks offer guidance and

feedback to healthcare providers, ensuring motivation and sustained quality of care[29,30].

4.2.5. Policy–level and programmatic facilitators

At the policy level, effective implementation of government programmes can significantly impact the management of high-risk pregnancies. Incentive-based initiatives that encourage institutional deliveries and skilled birth attendance are crucial in motivating women to seek care during pregnancy and childbirth[15]. Government healthcare initiatives such as the Janani Suraksha Yojana, which promotes institutional deliveries, have shown positive results[16]. Similar positive outcomes have been reported for other initiatives that promote institutional deliveries and facilitate the management of high-risk pregnancies[21].

Overall, the barriers and facilitators identified in this review map clearly onto the socio-ecological model, with influences operating at individual, interpersonal, community, organisational and policy levels. Barriers arise from limited awareness and psychological distress among women, constrained decision-making within families, restrictive community norms and mistrust of the formal health system, as well as facility-level resource gaps and variable implementation of national programmes. At the same time, facilitators such as women's education and empowerment, supportive families, active community health workers, community-based groups, strengthened referral mechanisms and incentive schemes demonstrate that there are opportunities for improvement at each of these levels. Viewing the findings through this framework highlights that efforts to improve the identification and management of high-risk pregnancies in India will be most effective when they combine community and family engagement with strengthened health-system capacity and consistent implementation of existing programmes and policies. These multi-level insights have important implications for practice, programmes and policy, and should guide efforts to strengthen the identification and management of high-risk pregnancies in India.

4.3. Implications for practice and policy

4.3.1. Short-term, practice–level actions

In the short term, existing platforms and resources can be used more effectively to improve identification and management of high-risk pregnancies. Firstly, focused training and refresher sessions for healthcare providers at primary and secondary level can strengthen skills in risk assessment, use of standardised screening protocols for conditions such as gestational diabetes mellitus and hypertensive disorders, and timely referral of women with complications. Supportive supervision, simple job aids and clear checklists during antenatal visits can help ensure that recommended screening tests,

counselling and follow-up are delivered consistently. Secondly, community health workers can be more systematically engaged to bridge gaps between households and facilities. Empowering them with clear guidance, practical tools for high-risk pregnancy identification, and structured home-visit schedules can improve early registration, adherence to antenatal visits and follow-up after diagnosis. Short-term communication strategies, including targeted Information, Education and Communication (IEC) activities and community meetings, can raise awareness among women and families about danger signs, the importance of regular antenatal care and the need to comply with dietary, medication and lifestyle advice. Thirdly, facilities can adopt simple, low-cost measures to strengthen continuity of care. These include maintaining a register or digital list of high-risk pregnancies, flagging high-risk status on antenatal cards, scheduling follow-up appointments before women leave the facility, and ensuring that referral pathways and contact points at higher centres are clearly defined and known to staff. Paying attention to respectful and culturally sensitive care, and providing basic psychosocial support when a woman is labelled as high-risk, are also feasible short-term actions that can improve trust and engagement with services.

4.3.2. *Longer-term policy and system-level reforms*

Over the longer term, reducing the burden of high-risk pregnancies will require broader policy and system-level changes. Sustained investment is needed to strengthen infrastructure and human resources at primary and secondary care facilities, particularly in rural and tribal areas. This includes ensuring reliable transport, functioning laboratories and ultrasound services, availability of essential medicines and diagnostics, and adequate numbers of trained staff with appropriate skills in managing high-risk pregnancies and emergency obstetric complications.

Financial protection policies should also be expanded to cover the direct and indirect costs associated with high-risk pregnancies. Coverage of diagnostic tests, medicines, hospitalisation and transport under existing government schemes can reduce out-of-pocket expenditure for women from low-income and marginalised groups. In parallel, integrating high-risk pregnancy identification and outcome indicators into routine health information systems and programme monitoring frameworks would allow regular tracking of performance and support data-driven planning at district and state levels.

Finally, long-term strategies need to address upstream social determinants, including early marriage, adolescent pregnancy, malnutrition and limited educational and economic opportunities for women. Stronger linkages between maternal health programmes and initiatives focused on adolescent health, nutrition, family planning

and women's empowerment can help prevent high-risk pregnancies before they occur.

Taken together, these short-term and long-term actions provide a coherent set of implications for practice and policy, grounded in the findings of this scoping review, and can guide efforts to improve outcomes for women with high-risk pregnancies in India.

5. Limitations

The findings of this review should be interpreted in light of several methodological constraints. Only English-language publications were included, so relevant evidence in other languages may have been missed, although the number of such studies is likely to be small. Some potentially relevant studies could not be included because full texts were not accessible. We also excluded documents that did not involve primary data collection, such as survey-based secondary analyses, programme reports and other review articles, which may have omitted useful contextual information. Grey literature and other unpublished sources were not systematically searched, so programme experience and local innovations may be under-represented. The categorisation of barriers and facilitators relied solely on information reported in the included papers, which may have simplified important nuances and complexities of high-risk pregnancies. In addition, most included studies focused only on women with high-risk pregnancies; limited inclusion of comparison groups with low-risk pregnancies restricts the scope for comparative analysis and may limit the comprehensiveness of our understanding.

6. Conclusions

This scoping review synthesised existing literature to examine barriers and facilitators related to the identification and management of high-risk pregnancies in India. The findings show that high-risk pregnancies are shaped by multifaceted challenges, including barriers to healthcare access, gaps in knowledge and awareness, health-system constraints, psychological and perceived barriers, and cultural and societal factors. These barriers interact and compound, underscoring the complexity of addressing high-risk pregnancies within the Indian healthcare system. At the same time, the review identifies important facilitators such as social support networks, community engagement, targeted education programmes and strengthened healthcare systems. Together, these results highlight the need for integrated, multi-level strategies that combine community and family engagement with health-system strengthening and consistent implementation of national programmes to improve outcomes for women with high-risk pregnancies in India.

Conflict of interest statement

The authors declare no conflicts of interest.

Funding

The study received no funding.

Authors' contributions

Sakshi Verma, Mukti Khetan, Rakhi Dhankhar, Ramesh Kumar Huda, and Ramesh Kumar Sangwan participated in the literature search, interpretation of the articles and review of the manuscript. All the authors have read and approved the final version of the manuscript.

Publisher's Note

The Publisher of the *Journal* remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

References

- [1] Hogan MC, Foreman KJ, Naghavi M, Ahn SY, Wang M, Makela SM, et al. Maternal mortality for 181 countries, 1980–2008: A systematic analysis of progress towards Millennium Development Goal 5. *Lancet* 2010; **375**(9726): 1609–1623. doi: 10.1016/S0140-6736(10)60518-1.
- [2] National Health Mission, Ministry of Health and Family Welfare, Government of India. *Guidance note – extended PMSMA for tracking high-risk pregnancies (HRPs)*. New Delhi: National Health Mission, Ministry of Health and Family Welfare, Government of India; 2024. [Online] Available from: https://nhm.gov.in/New_Update-2022-23/MH/GUIDELINES-%20MH/Guidance_Note-Extended_PMSMA_for_tracking_HRPs.pdf [Accessed 20th November 2024].
- [3] Office of the Registrar General & Census Commissioner, India. *Sample Registration System (SRS)–statistical report 2020*. New Delhi: Ministry of Home Affairs, Government of India; 2020. [Online] Available from: <https://censusindia.gov.in/nada/index.php/catalog/44376> [Accessed 20th November 2024].
- [4] World Health Organization. *Maternal mortality*. Geneva: World Health Organization; 2024. [Online] Available from: <https://www.who.int/news-room/fact-sheets/detail/maternal-mortality> [Accessed 20th November 2024].
- [5] Ministry of Health and Family Welfare, Government of India. *High-risk conditions in pregnancy: PMSMA operational guidance*. New Delhi: Ministry of Health and Family Welfare, Government of India; 2016. [Online] Available from: <https://pmsma.mohfw.gov.in/wp-content/uploads/2016/10/High-Risk-Conditions-in-preg-modified-Final.pdf> [Accessed 20th November 2024].
- [6] Kragelund Nielsen K, Vildekilde T, Kapur A, Damm P, Seshiah V, Bygbjerg IC. “If I don’t eat enough, I won’t be healthy”: Women’s experiences with gestational diabetes mellitus treatment in rural and urban South India. *Int J Environ Res Public Health* 2020; **17**(9): 3062. doi: 10.3390/ijerph17093062.
- [7] Öhman SG, Saltvedt S, Grunewald C, Waldenström U. Does fetal screening affect women's worries about the health of their baby? A randomized controlled trial of ultrasound screening for Down's syndrome versus routine ultrasound screening. *Acta Obstet Gynecol Scand* 2004; **83**(7): 634–640. doi: 10.1111/j.0001-6349.2004.00462.x.
- [8] Dalal S, Nagar R, Hegde R, Vaishnav S, Abdullah H, Kasper J. Referral care for high-risk pregnant women in rural Rajasthan, India: A qualitative analysis of barriers and facilitators. *BMC Pregnancy Childbirth* 2022; **22**(1): 310. doi: 10.1186/s12884-022-04601-6.
- [9] Nagraj S, Hinton L, Praveen D, Kennedy S, Norton R, Hirst J. Women's and healthcare providers' perceptions of long-term complications associated with hypertension and diabetes in pregnancy: A qualitative study. *BJOG* 2019; **126**: 34–42. doi: 10.1111/1471-0528.15847.
- [10] Majella MG, Sarveswaran G, Krishnamoorthy Y, Sivarajini K, Arikrishnan K, Kumar SG. A longitudinal study on high-risk pregnancy and its outcome among antenatal women attending rural primary health centre in Puducherry, South India. *J Educ Health Promot* 2019; **8**: 12. doi: 10.4103/jehp.jehp_144_18.
- [11] Kuppusamy P, Prusty RK, Kale DP. High-risk pregnancy in India: Prevalence and contributing risk factors – A national survey-based analysis. *J Glob Health* 2023; **13**: 04116. doi: 10.7189/jogh.13.04116.
- [12] Prajapati AK, Kumar V, Soni K, Singh NP, Jain PK. Prevalence of high-risk pregnancy among pregnant women enrolled under Pradhan Mantri Surakshit Matritva Abhiyan in government health facilities of district Etawah, Uttar Pradesh: A cross-sectional study. *J Family Med Prim Care* 2022; **11**(5): 1876–1882. doi: 10.4103/jfmpc.jfmpc_1636_21.
- [13] Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Ann Intern Med* 2018; **169**(7): 467–473. doi: 10.7326/M18-0850.
- [14] Thomas J, Harden A. Methods for the thematic synthesis of qualitative research in systematic reviews. *BMC Med Res Methodol* 2008; **8**: 45. doi: 10.1186/1471-2288-8-45.
- [15] Madankar M, Kakade N, Basa L, Sabri B. Exploring maternal and child health among tribal communities in India: A life course perspective. *Glob J Health Sci* 2024; **16**(2): 31. doi: 10.5539/gjhs.v16n2p31.
- [16] Vidler M, Ramadurg U, Charantimath U, Katageri G, Karadiguddi C, Sawchuck D, et al. Utilization of maternal health care services and their determinants in Karnataka State, India. *Reprod Health* 2016; **13**: 55. doi: 10.1186/s12978-016-0138-8.
- [17] Chebrolu P, Chalem A, Ponticciello M, Broderick K, Vaidyanathan A,

- Lorenc R, et al. A community health worker-led program to improve access to gestational diabetes screening in urban slums of Pune, India: Results from a mixed methods study. *PLOS Glob Public Health* 2023; **3**(10): e0001622. doi: 10.1371/journal.pgph.0001622.
- [18]Nagar T, Sharma D, Choudhary M, Khoiwal S, Nagar RP, Pandita A. The role of uterine and umbilical arterial Doppler in high-risk pregnancy: A prospective observational study from India. *Clin Med Insights Reprod Health* 2015; **9**: CMRH-S24048. doi: 10.4137/CMRH.S24048.
- [19]Reddy KM, Ravula SR, Palakollu S, Betha K. Prevalence of preterm birth and perinatal outcome: A rural tertiary teaching hospital-based study. *J Family Med Prim Care* 2022; **11**(7): 3909-3914. doi: 10.4103/jfmpc.jfmpc_1440_21.
- [20]Kapoor D, Gupta Y, Desai A, Praveen D, Joshi R, Rozati R, et al. Lifestyle intervention programme for Indian women with history of gestational diabetes mellitus. *Glob Health Epidemiol Genomics* 2019; **4**: e1. doi: 10.1017/ghg.2018.18.
- [21]Jadhao AR, Gawade MD, Ughade SN. Outcome of pregnancy among high-risk pregnancies in rural area of Nagpur, Maharashtra, Central India. *Int J Community Med Public Health* 2017; **4**: 628-633. doi: 10.18203/2394-6040.ijcmph20170443.
- [22]Damor A, Mehta S. Knowledge and attitude of antenatal mother regarding high-risk pregnancy in a tertiary care hospital in Western India. *Parity* 2021; **12**(1): 11-14.
- [23]Naik S, Kumar S, Rani A, Patil S, Voorkara U, Kamath VS. Interventional challenges in non-tubal ectopic pregnancy. *J Family Reprod Health* 2022; **16**(1): 78-85. doi: 10.18502/jfrh.v16i1.8597.
- [24]Nilofer AR, Raju VS, Dakshayini BR, Zaki SA. Screening in high-risk group of gestational diabetes mellitus with its maternal and fetal outcomes. *Indian J Endocrinol Metab* 2012; **16**(Suppl 1): S74-S78. doi: 10.4103/2230-8210.94268.
- [25]Bansal P, Verma A, Bansal A, Verma D. Prenatal risk score in high-risk pregnancy cases and maternal outcome: A study from South India. *Indian J Obstet Gynecol Res* 2016; **3**(4): 356-360. doi: 10.18231/2394-2754.2016.0013.
- [26]Ghosh R, Oza H, Meel S. Third trimester Doppler ultrasound as prediction of obstetric outcome in high-risk pregnancy, Gujarat, India. *Int J Reprod Contracept Obstet Gynecol* 2017; **6**: 3519-3523. doi: 10.18203/2320-1770.ijrcog20173475.
- [27]Contractor SQ, Das A, Dasgupta J, Van Belle S. Beyond the template: The needs of tribal women and their experiences with maternity services in Odisha, India. *Int J Equity Health* 2018; **17**(1): 134. doi: 10.1186/s12939-018-0850-9.
- [28]Dwarkanath P, Muhihi A, Sudfeld CR, Wylie BJ, Wang M, Perumal N, et al. Two randomized trials of low-dose calcium supplementation in pregnancy. *N Engl J Med* 2024; **390**(2): 143-153. doi: 10.1056/NEJMoa2307212.
- [29]Das MK, Arora NK, Dalpath SK, Kumar S, Kumar AP, Khanna A, et al. Improving quality of care for pregnancy, perinatal and newborn care at district and sub-district public health facilities in three districts of Haryana, India: An implementation study. *PLoS One* 2021; **16**(7): e0254781. doi: 10.1371/journal.pone.0254781.
- [30]Seema P, Sangeetha S, Phukan P. A retrospective study on high-risk pregnancy and their outcome in a teaching hospital in South India. *Medica Innovatica* 2014; **3**(1): 122-126.
- [31]Sagili H, Pramya N, Prabhu K, Mascarenhas M, Reddi Rani P. Are teenage pregnancies at high risk? A comparison study in a developing country. *Arch Gynecol Obstet* 2012; **285**(3): 573-577. doi: 10.1007/s00404-011-1987-6.