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Review Article

Vaccine Hesitancy and Acceptance in India: Behavioural, Social, and Programmatic Perspectives – A Narrative Review

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Abstract

Background: Vaccine hesitancy has emerged as a major public health challenge, affecting the success of immunization programs globally and in India. Despite the availability of free vaccination services under the Universal Immunization Programme, gaps persist in achieving optimal coverage due to behavioural, social, and programmatic barriers. The increasing spread of misinformation, particularly through digital platforms, has further complicated vaccine acceptance.

Objective: This narrative review aims to examine vaccine hesitancy and acceptance in India by analyzing behavioural determinants, social influences, and programmatic factors, and to identify strategies to improve immunization uptake.

Methodology: A narrative review approach was adopted using literature from PubMed, Google Scholar, Scopus, and Web of Science, along with reports from national and international organizations. Studies published between 2010 and 2025 were included. Relevant articles were screened based on predefined inclusion and exclusion criteria, and data were synthesized into thematic domains including magnitude of hesitancy, behavioural factors, social determinants, programmatic gaps, and misinformation.

Results: The review found that vaccine hesitancy affects approximately 20%–30% of caregivers in India, contributing to incomplete immunization, with 10%–15% of children partially vaccinated. Behavioural factors such as lack of awareness (30%–40%) and fear of side effects (25%–35%) were major contributors. Social determinants, including maternal education and community influence, significantly affected vaccine uptake, with educated mothers being 1.5–2 times more likely to ensure complete immunization. Programmatic issues such as inadequate counselling (~30%) and service-related gaps (15%–20%) also contributed to missed vaccinations. Additionally, exposure to misinformation (40%–50%) negatively impacted vaccine acceptance, particularly during the COVID-19, where acceptance ranged from 60% to 80%. Targeted communication interventions were shown to improve uptake by 15%–20%.

Conclusion: Vaccine hesitancy in India is a multifactorial issue influenced by behavioural, social, and health system factors. Addressing misinformation, strengthening communication strategies, and improving health system performance are essential to enhance vaccine acceptance and achieve universal immunization goals.

Keywords: Vaccine hesitancy; Immunization; Vaccine acceptance; India; Behavioural factors; Social determinants; Misinformation; Public health.

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Introduction

Vaccination is one of the most effective and cost-efficient public health interventions, preventing an estimated 3.5–5 million deaths globally each yearfrom diseases such as measles, diphtheria, tetanus, and pertussis [1]. Despite these achievements, vaccine-preventable diseases continue to pose a significant burden due to gaps in immunization coverage. The World Health Organization has identified vaccine hesitancy as one of the top 10 global health threats, emphasizing its growing impact on immunization programs worldwide [2]. Vaccine hesitancy, defined as delay in acceptance or refusal of vaccines despite availability of services, is influenced by multiple factors including confidence, complacency, and convenience, making it a complex and context-specific issue [3]. Globally, immunization coverage has shown improvements; however, it remains suboptimal in many regions. According to WHO and UNICEF estimates, global coverage of the

third dose of diphtheria-tetanus-pertussis (DTP3) vaccine was approximately 84% in 2022, leaving millions of children unprotected [4]. Furthermore, around 20–25 million children globally either missed routine immunization or were incompletely vaccinated, particularly in low- and middle-income countries [5]. Vaccine hesitancy contributes significantly to this gap, leading to outbreaks of vaccine-preventable diseases even in areas with established immunization programs.

In India, immunization services are primarily delivered through the Universal Immunization Programme, one of the largest public health programs in the world, targeting millions of beneficiaries annually. Over the years, India has made significant progress in improving immunization coverage. According to the National Family Health Survey (NFHS-5, 2019–21), full immunization coverage among children aged 12–23 months increased to 76.4%, compared to 62% in NFHS-4 [6]. Despite this progress, disparities persist across states, with coverage ranging widely between regions, particularly in rural, tribal, and socioeconomically disadvantaged populations.

Behavioural factors play a crucial role in vaccine acceptance. Studies in India have reported that 20%–30% of caregivers exhibit some degree of vaccine hesitancy, often due to misconceptions regarding vaccine safety, fear of adverse effects, and lack of awareness [7]. Myths such as vaccines causing infertility, weakening immunity, or being unnecessary have been widely reported, particularly in rural and low-literacy populations. The rise of social media has further amplified misinformation, influencing public perception and reducing confidence in vaccines. Social determinants such as education, socioeconomic status, gender norms, and community beliefs significantly influence vaccination behaviour. Evidence suggests that children of mothers with higher education levels are more likely to be fully immunized compared to those from less educated backgrounds. Additionally, decision-making within households, especially in patriarchal settings, can affect vaccine uptake. Trust in healthcare providers and government health systems is another critical factor, with higher trust associated with increased acceptance of vaccines [8]. Programmatic factors within the health system also contribute to vaccine hesitancy. Issues such as inadequate counselling by healthcare workers, lack of effective communication strategies, irregular vaccine supply, and accessibility barriers can reduce utilization of immunization services. Government initiatives like Mission Indradhanush have aimed to improve coverage in underserved areas; however, challenges related to awareness and follow-up still exist [9]. Strengthening health system performance and communication strategies is essential for improving vaccine acceptance. The COVID-19 further highlighted the dual challenges of vaccine development and public acceptance. While India achieved large-scale vaccination coverage, initial hesitancy was observed, with studies reporting vaccine acceptance rates ranging from 60% to 80%, influenced by concerns about safety, efficacy, and misinformation [10]. This situation underscored the importance of effective risk communication, community engagement, and trust-building measures in vaccination programs.

From a Community Medicine perspective, understanding the behavioural, social, and programmatic determinants of vaccine hesitancy is essential for designing targeted interventions. Addressing myths, improving communication, enhancing health literacy, and strengthening trust in immunization services are critical steps to achieve universal vaccine coverage. Therefore, this narrative review aims to explore vaccine hesitancy and acceptance in India by integrating global and national evidence to inform policy and public health strategies.

This narrative review aims to comprehensively examine vaccine hesitancy and acceptance in India from behavioural, social, and programmatic perspectives, with a focus on understanding factors influencing immunization uptake and identifying strategies to improve vaccine coverage. The objectives are to assess the extent and patterns of vaccine hesitancy in different population groups, to analyze behavioural determinants such as knowledge, attitudes, beliefs, and myths related to vaccination, to evaluate social factors including education, socioeconomic status, gender norms, and community influence, and to examine programmatic aspects such as accessibility, service delivery, and communication gaps within the Universal Immunization Programme.

Additionally, the review aims to explore the role of misinformation, particularly in the context of the COVID-19, and to identify policy-level interventions for improving vaccine acceptance and trust in immunization programs. The justification for this study lies in the persistent gap between vaccine availability and utilization, despite the presence of well-established national programs. Vaccine hesitancy continues to be a significant barrier to achieving optimal immunization coverage, contributing to outbreaks of vaccine-preventable diseases and undermining public health efforts.

Understanding the multidimensional determinants of hesitancy is essential for designing targeted communication strategies, strengthening health system performance, and enhancing community engagement. From a Community Medicine perspective, this review will provide evidence-

based insights to support policymakers, healthcare providers, and program managers in developing effective interventions to improve vaccine uptake and achieve universal immunization goals.

Methodology

This narrative review was conducted to synthesize available evidence on vaccine hesitancy and acceptance in India from behavioural, social, and programmatic perspectives. A structured literature search was performed using electronic databases including PubMed, Google Scholar, Scopus, and Web of Science to identify relevant studies published between 2010 and 2025. In addition, reports from national and international agencies such as the World Health Organization, Government of India publications, and program documents related to the Universal Immunization Programme were reviewed to ensure contextual and policy relevance.

Keywords used for the search included "vaccine hesitancy," "vaccine acceptance," "immunization," "India," "behavioural factors," "social determinants," "health system," and "misinformation," combined using Boolean operators (AND, OR) to refine the search. Studies were included if they addressed vaccine hesitancy or acceptance among any population group in India or provided relevant global comparisons. Both quantitative and qualitative studies, including cross-sectional studies, cohort studies, systematic reviews, and policy reports, were considered to provide a comprehensive understanding of the topic. Studies focusing exclusively on clinical efficacy of vaccines without behavioural or social context, non-English publications, and articles lacking methodological clarity were excluded. Titles and abstracts were initially screened for relevance, followed by full-text review of eligible articles.

Data extraction was performed using a standardized format capturing key variables such as author, year, study setting, population characteristics, type of vaccine, prevalence of hesitancy, determinants (behavioural, social, programmatic), and key findings. The extracted data were organized into thematic domains including magnitude and patterns of hesitancy, behavioural determinants (knowledge, attitudes, and myths), social determinants, programmatic factors, and the role of misinformation and communication gaps.

A narrative synthesis approach was employed to integrate findings across studies. The emphasis was placed on identifying patterns, variations, and relationships between determinants of vaccine hesitancy and acceptance. No meta-analysis or statistical pooling was performed, as the objective of the review was descriptive and interpretative. Quality appraisal of studies was carried out informally based on study design, sample size, methodological rigor, and relevance to the research objectives. The findings are presented in a thematic format to facilitate understanding of the multifactorial nature of vaccine hesitancy and to provide insights for public health interventions, policy formulation, and strengthening of immunization programs.

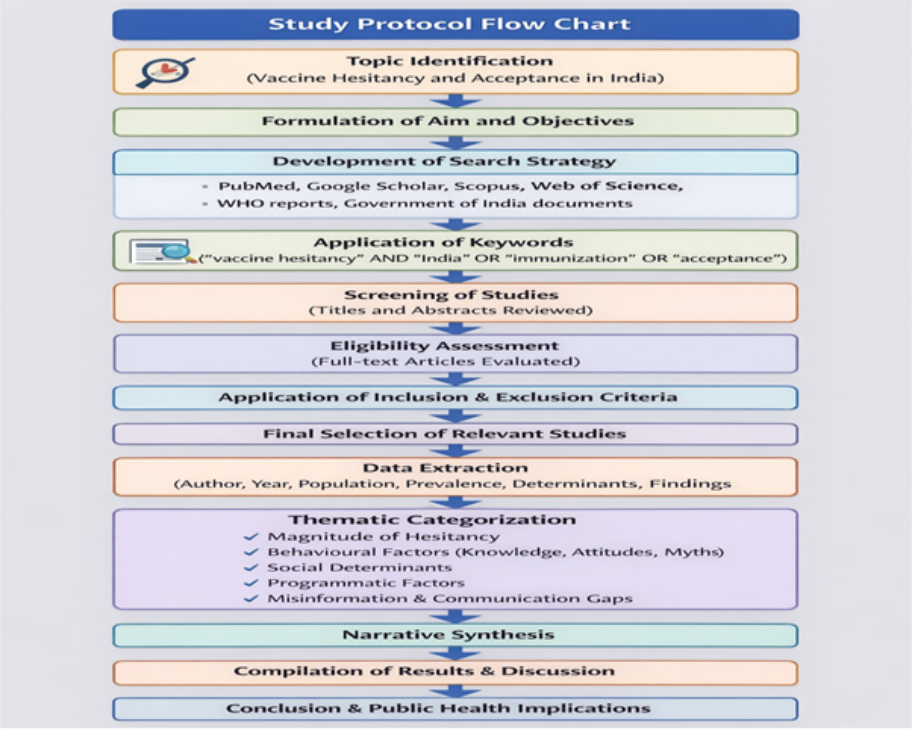

Figure 1: Study protocol flow chart

Theme 1: Magnitude and Patterns of Vaccine Hesitancy: Vaccine hesitancy varies widely across regions and populations, reflecting its context-specific nature. Global estimates suggest that approximately 15%–25% of individuals exhibit some degree of vaccine hesitancy, depending on the vaccine and setting [8]. In India, studies have reported hesitancy levels ranging from 20% to 30% among caregivers, particularly in rural and underserved areas. Additionally, partial immunization and delayed vaccination are common manifestations of hesitancy. Data from community-based studies indicate that 10%–15% of children remain partially immunized, highlighting gaps in complete vaccine uptake despite availability of services [9]. These findings demonstrate that vaccine hesitancy contributes significantly to suboptimal immunization coverage.

Theme 2: Behavioural Determinants – Knowledge, Attitudes, and Myths: Behavioural factors play a central role in influencing vaccine acceptance. Studies have shown that lack of awareness and misconceptions affect nearly 30%–40% of caregivers, leading to reluctance in vaccinating children [10]. Common myths include beliefs that vaccines cause infertility, weaken immunity, or lead to severe side effects. Fear of adverse events following immunization (AEFI) has been reported by 25%–35% of respondents, contributing to refusal or delay in vaccination. Furthermore, low perceived risk of disease (complacency) reduces motivation to vaccinate, especially in areas where vaccine-preventable diseases are less visible. These findings highlight the need for effective health education and risk communication strategies.

Theme 3: Social Determinants and Community Influence: Social and demographic factors significantly influence vaccination behaviour. Evidence indicates that children of mothers with higher education levels are 1.5 to 2 times more likely to be fully immunized compared to those with lower educational status [11]. Socioeconomic disparities also play a role, with lower-income groups demonstrating reduced vaccine uptake due to limited access and awareness. Gender norms and decision-making dynamics within families further influence immunization practices, particularly in patriarchal societies. Community-level factors, including influence of local leaders, peer groups, and cultural beliefs, have been shown to affect acceptance, with some studies reporting 20%–25% variation in vaccine uptake based on community influence alone.

Theme 4: Programmatic Factors and Health System Gaps: Health system factors significantly contribute to vaccine hesitancy and incomplete coverage. Studies have reported that 15%–20% of missed vaccinations are due to programmatic issues, such as irregular vaccine supply, long waiting times, and poor accessibility of services [12]. Inadequate counselling and lack of effective communication by healthcare workers have also been identified as major barriers. Data suggest that nearly 30% of caregivers do not receive adequate information regarding vaccination schedules and benefits, leading to confusion and missed doses. Strengthening service delivery and ensuring consistent availability of vaccines are essential for improving uptake.

Theme 5: Misinformation, Media Influence, and Policy Implications: The spread of misinformation, particularly through digital and social media platforms, has emerged as a major challenge in recent years. Studies indicate that 40%–50% of individuals have been exposed to vaccine-related misinformation, which negatively influences attitudes and acceptance [13].

During the COVID-19, misinformation regarding vaccine safety and efficacy significantly impacted vaccination rates, with acceptance varying between 60% and 80% across different populations. Policy responses emphasizing risk communication, community engagement, and transparency have been shown to improve trust and acceptance. Evidence suggests that targeted communication interventions can increase vaccine uptake by 15%–20%, highlighting their importance in public health strategies [14].

Result

Table 1: Summary of Key Findings on Vaccine Hesitancy and Acceptance

Variable	Findings (%)	Interpretation
Vaccine hesitancy prevalence	20–30%	Significant proportion of caregivers show reluctance or delay
Partially immunized children	10–15%	Indicates gap in complete vaccine uptake
Lack of awareness	30–40%	Major behavioural barrier
Fear of side effects	25–35%	Key reason for refusal/delay
Programmatic issues	15–20%	Missed vaccinations due to system gaps
Inadequate counselling	~30%	Communication gap with healthcare workers
Exposure to misinformation	40–50%	Strong negative influence on acceptance
COVID-19 vaccine acceptance	60–80%	Variable acceptance due to safety concerns
Impact of interventions	+15–20% improvement	Communication strategies improve uptake

The results of this narrative review indicate that vaccine hesitancy remains a substantial barrier to achieving optimal immunization coverage in India. Approximately 20–30% of caregivers exhibit hesitancy, while 10–15% of children remain partially immunized despite availability of services under the Universal Immunization Programme. Behavioural factors such as lack of awareness (30–40%) and fear of side effects (25–35%) are major contributors to hesitancy. Social determinants including education and community influence further affect vaccine uptake. Programmatic gaps, including inadequate counselling (~30%) and service-related issues (15–20%), also play a significant role. Additionally, exposure to misinformation (40–50%) has emerged as a critical challenge, particularly highlighted during the COVID-19, where vaccine acceptance ranged between 60% and 80%. However, targeted communication and community engagement strategies have demonstrated the potential to improve vaccine uptake by 15–20%.

Discussion

The present narrative review highlights that vaccine hesitancy remains a significant barrier to achieving optimal immunization coverage in India despite the availability of free vaccination services under the Universal Immunization Programme. The magnitude of hesitancy observed across studies indicates that approximately 20%–30% of caregivers exhibit reluctance or delay in vaccination, which is consistent with global estimates ranging from 15%–25% [15]. This variation reflects the context-specific nature of hesitancy influenced by sociocultural and systemic factors. Additionally, incomplete immunization remains a concern, with 10%–15% of children partially vaccinated, contributing to the persistence of vaccine-preventable diseases.

Behavioural determinants such as knowledge gaps, misconceptions, and fear of adverse effects play a crucial role in shaping vaccine acceptance. Evidence suggests that 30%–40% of caregivers lack adequate awareness regarding vaccination benefits, while 25%–35% report fear of side effects as a major concern [16]. Myths such as vaccines causing infertility or serious illness are commonly reported in Indian settings, particularly in rural and low-literacy populations. These findings align with studies indicating that low perceived risk of disease and misinformation significantly reduce motivation for vaccination, thereby increasing hesitancy.

Social determinants further influence immunization behaviour. Studies have demonstrated that maternal education is a strong predictor of vaccine uptake, with children of educated mothers being 1.5 to 2 times more likely to be fully immunized [17]. Socioeconomic disparities also contribute to uneven coverage, as lower-income groups often face barriers related to access, awareness, and health-seeking behaviour. Community influences, including family decision-making and cultural beliefs, have been shown to account for 20%–25% variation in vaccination uptake, highlighting the importance of social context in public health interventions.

Programmatic factors within the health system are equally important contributors to vaccine hesitancy. Data indicate that 15%–20% of missed vaccinations are due to service delivery issues, including irregular vaccine supply, long waiting times, and accessibility challenges [18]. Furthermore, nearly 30% of caregivers report inadequate counselling by healthcare workers, leading to confusion regarding vaccination schedules and benefits. These findings suggest that strengthening health system performance and communication strategies is essential for improving vaccine acceptance.

Misinformation, particularly through digital and social media platforms, has emerged as a major challenge in recent years. Studies have shown that 40%–50% of individuals are exposed to vaccine-related misinformation, which negatively impacts trust and acceptance [19]. The COVID-19 further amplified this issue, with vaccine acceptance rates varying between 60% and 80%, largely influenced by concerns about safety, efficacy, and misinformation. However, targeted communication strategies and community engagement initiatives have demonstrated effectiveness, with evidence suggesting that such interventions can improve vaccine uptake by 15%–20% [20].

Overall, the findings of this review indicate that vaccine hesitancy in India is a multifactorial issue driven by behavioural, social, and programmatic determinants. While significant progress has been made in improving immunization coverage, persistent gaps highlight the need for comprehensive strategies focusing on health education, community engagement, and strengthening of health systems. Addressing misinformation, enhancing trust in healthcare services, and improving communication between healthcare providers and communities are essential steps toward achieving universal immunization goals.

Conclusion

- Vaccine hesitancy remains a major barrier to achieving universal immunization in India despite wide availability of services under the Universal Immunization Programme.
- The problem is multifactorial, driven by behavioural (myths, fear of side effects), social

(education, community influence), and programmatic (access, counselling) determinants.
- A substantial proportion of caregivers (20–30%) exhibit hesitancy, contributing to partial immunization (10–15%) among children.
- Misinformation (40–50%), especially via digital media, has significantly reduced trust in vaccines and influenced decision-making.
- Programmatic gaps such as inadequate counselling (~30%) and service-related issues (15–20%) further hinder vaccine uptake.
- Strengthening risk communication, community engagement, and trust in healthcare systems is crucial for improving vaccine acceptance and sustaining immunization gains.

Limitations of the Study

- As a narrative review, the study lacks a systematic search protocol and may be subject to selection bias.
- No meta-analysis was performed, limiting the ability to generate pooled prevalence estimates.
- Considerable heterogeneity in study designs, populations, and measurement methods reduces direct comparability across studies.
- Most included studies were cross-sectional, restricting causal inference.
- Limited availability of region-specific (state or district-level) data, particularly from underserved and tribal areas, may affect generalizability.
- Potential publication bias, as primarily English-language and published studies were included.

Recommendations

Strengthen health education and communication

- Implement targeted IEC/BCC strategies to address myths and misconceptions regarding vaccination.
- Use culturally appropriate messaging tailored to local communities.

Enhance counselling by healthcare workers

- Train frontline workers (ASHA, ANM, Anganwadi workers) to provide effective vaccine counselling and build trust.
- Ensure clear communication regarding benefits, schedules, and side effects.

Address misinformation proactively

- Monitor and counter false information on social media through verified public health messaging.
- Promote credible digital health platforms and community awareness campaigns.

Improve health system performance

- Ensure consistent vaccine supply, reduce waiting times, and improve accessibility, especially in rural and remote areas.
- Strengthen follow-up mechanisms for missed or delayed vaccinations.

Promote community engagement

- Involve local leaders, teachers, and influencers to improve acceptance.
- Encourage community participation in immunization programs.

Policy and program strengthening

- Integrate behavioural insights into national programs like Universal Immunization Programme and Mission Indradhanush.
- Develop evidence-based strategies to address vaccine hesitancy at policy level.

Future research

- Conduct longitudinal and interventional studies to assess causal relationships and effectiveness of interventions.
- Generate region-specific data, especially from Gujarat and other underserved areas, to guide localized strategies.

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