



Influence of Maternal Education, Socio-Economic Status, and Place of Residence on Neonatal Mortality in India: A Narrative Review

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ABSTRACT

Neonatal mortality in India has declined significantly over recent decades, yet wide disparities remain, driven by maternal education, socioeconomic status, and place of residence. This narrative review examines the interconnected influence of these determinants on neonatal mortality and offers insights to inform policies aligned with Sustainable Development Goals (SDGs). Drawing on data from India's National Family Health Surveys (NFHS I–V), Ministry of Health and Family Welfare (MoHFW) reports, UNICEF, UN IGME, and peer-reviewed literature, the review identifies trends and contributing factors through thematic synthesis. Higher maternal education is consistently linked to lower neonatal mortality rates (NMRs) by improving health literacy, care-seeking behavior, and female empowerment, leading to better use of maternal and child health services and optimal newborn care. Conversely, lower socioeconomic status correlates with higher neonatal deaths due to limited healthcare access, poor living conditions, and malnutrition, with inequalities in early neonatal mortality persisting or widening. Although rural areas historically showed higher NMRs, the rural-urban gap has narrowed due to targeted community-level interventions. Overall, improvements in neonatal survival reflect both focused health programs and broader demographic and economic progress.

Keywords: Neonatal mortality, Maternal education, Socioeconomic status, India, Rural-urban disparities

1. INTRODUCTION

Neonatal mortality, defined as the death of a live-born infant within the first 28 days of life, represents the most vulnerable period for child survival (UNICEF, 2023; PMC, 2024). Globally, this initial month accounts for a disproportionately high and increasing share of under-five deaths. In India, neonatal deaths constitute a significant and growing proportion of total under-five mortality, rising from 42.5% in 1993 to approximately 58% in 2021 (PMC, 2024). This trend is mirrored globally, where neonatal deaths comprised 48% of all under-five deaths in 2023, with South Asia exhibiting one of the highest proportions at 63% (UNICEF, 2023). The increasing share of neonatal deaths within overall child mortality indicates a shift in the child mortality landscape, making targeted interventions during this critical period even more crucial for achieving broader child survival goals. While general child survival strategies have been effective, the specific drivers of neonatal mortality appear more complex or resistant to broad-based interventions, necessitating a sharper, more dedicated focus on the neonatal period.

India has demonstrated substantial progress in reducing its Neonatal Mortality Rate. The NMR declined from 52 per 1000 live births in 1990 to 20 in 2020 (Bhatia et al., 2019), and further to 19 per 1000 live births in 2021 (MoHFW, 2025). This represents a remarkable 70% decline from 1990 to 2023, significantly outpacing the global reduction of 54% (MoHFW, 2025; MoHFW, 2020). Despite these achievements, India still bears the largest absolute burden of neonatal deaths globally, accounting for 490,000 deaths in 2020, which is 20% of the world's total (PLOS One, 2023). The Sustainable Development Goal (SDG 3.2) targets reducing NMR to at least 12 per 1000 live births by 2030 (PMC, 2024; UNICEF, 2020; PMC, 2018). India's current annual rate of reduction (ARR) of 3.5% (estimated for 2000-2018) falls short of the required 6.3% ARR needed to meet this ambitious target (UNICEF, 2020). This suggests that while past strategies have yielded significant results, accelerated and intensified efforts are necessary to close the remaining gap, particularly given the high absolute number of neonatal deaths still occurring.

2. METHODS

2.1 Data Sources

This narrative review primarily draws upon publicly available data from multiple rounds of the National Family Health Survey (NFHS) of India (e.g., NFHS 1992-93, 2005-06, 2015-16, 2019-21, and 1993-2021) (PMC, 2024; ResearchGate, 2018; PubMed, 2023). These surveys are nationally representative household surveys that provide comprehensive data on various health and family welfare indicators, including child mortality. Additional data were sourced from reports by the Ministry of Health and Family Welfare (MoHFW), Government of India, including press releases and statistical reports (e.g., Sample Registration System - SRS) (MoHFW, 2025; MoHFW, 2020). Information from international organizations such as UNICEF and

the United Nations Inter-agency Group for Child Mortality Estimation (UN IGME) was also utilized to provide global and regional context and benchmarks (UNICEF, 2023; Bhatia et al., 2019; UNICEF, 2020). Furthermore, a comprehensive global systematic review and meta-analysis on the effects of parental education on child mortality (PMC, 2021), and various academic studies published in peer-reviewed journals (e.g., PLOS One, BMJ Global Health, ResearchGate) provided specific findings and analyses on the determinants of neonatal mortality (PLOS One, 2023; ResearchGate, 2019; ResearchGate, 2018; ResearchGate, 2025; Austriaca.at, n.d.; BMJ Global Health, 2022; CRY, 2022; BMJ Global Health, 2020).

2.2 Search Strategy and Synthesis

The information for this narrative review was gathered through a systematic search of relevant literature and official reports focusing on neonatal mortality in India. Key search terms included, but were not limited to: "neonatal mortality India," "maternal education neonatal mortality," "socioeconomic status neonatal mortality," "wealth quintiles child mortality India," "rural-urban disparities neonatal mortality," "infant mortality India trends," "National Family Health Survey (NFHS) neonatal mortality," and "Ministry of Health and Family Welfare reports child mortality." The search encompassed academic databases and platforms, as well as official government and international organization websites to ensure a comprehensive overview of the topic. The aim was to identify studies and reports that provided data, trends, influencing factors, and policy implications related to neonatal mortality in the Indian context.

The identified information was integrated, analyzed, and synthesized to construct a coherent narrative review. This involved identifying key themes, trends, and relationships between maternal education, socioeconomic status, place of residence, and neonatal mortality. Findings from various sources were cross-referenced to ensure consistency and to highlight areas of consensus or divergence. The synthesis process focused on explaining the mechanisms through which these factors influence neonatal outcomes and identifying effective interventions and policy recommendations. As this is a model-generated review, no external or internal peer review process was conducted in the finalization of this manuscript.

3. REVIEW

3.1 Trends and Regional Disparities in Neonatal Mortality

India has experienced a consistent downward trend in its neonatal mortality rate over the past few decades. From 46 per 1000 live births in 1997, the NMR declined to 22 in 2019 (ResearchGate, 2019), reaching 19 per 1000 live births in 2021 (MoHFW, 2025). Analysis of National Family Health Survey (NFHS) data from 1992-93, 2005-06, and 2015-16 indicates that this reduction was primarily driven by changes in the distribution and utilization of maternal and child care program factors, as well as improvements in household, maternal, and child characteristics (ResearchGate, 2018).

Despite this impressive national decline, significant disparities persist across India's regions and states. Neonatal mortality was consistently highest in the central region of India but showed a notable decline across all regions between 1992 and 2016 (ResearchGate, 2018). The reduction in NMR has not been uniform across all states (Bhatia et al., 2019). A study revealed that 59% of districts in India would require a much higher rate of reduction to meet the SDG targets for NMR by 2030 (UNICEF, 2020). Nine "high-focus states"—Assam, Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttarakhand, and Uttar Pradesh—collectively account for 48.5% of India's population and continue to exhibit NMRs higher than the national average, highlighting concentrated areas of vulnerability (PMC, 2018). Conversely, some states, such as Kerala (8), Delhi (14), and Tamil Nadu (14), have already achieved the SDG target for Under-Five Mortality Rate (U5MR) (≤ 25 by 2030), demonstrating successful sub-national models for mortality reduction (MoHFW, 2025). A notable observation from the NFHS data is that the decline in neonatal mortality in rural areas was higher than in urban areas between 1992 and 2016 (ResearchGate, 2018). This pattern suggests that effective, broad-based public health interventions may have had a greater impact in rural settings, where baseline mortality was historically higher and access to care more limited. This indicates that focused rural health programs are yielding significant dividends, potentially narrowing the traditional rural-urban mortality gap.

The following table provides a chronological overview of India's progress in reducing NMR, consolidating data from various sources to illustrate the significant decline and benchmark it against national and international targets.

Year/Period	NMR (per 1000 live births)	Source
1990	52	(Bhatia et al., 2019)
1997	46	(ResearchGate, 2019)
2000-2018	3.5% Annual Rate of Reduction (ARR)	(UNICEF, 2020)
2014	26	(MoHFW, 2025; MoHFW, 2020)
2018-20	20	(MoHFW, 2020)
2019	22	(ResearchGate, 2019)
2020	20	(Bhatia et al., 2019; MoHFW, 2020)
2021	19	(MoHFW, 2025)

2023 (South Asia average)	22	(UNICEF, 2023)
SDG Target 2030	<=12	(PMC, 2024; UNICEF, 2020; PMC, 2018)

3.2 Influence of Maternal Education on Neonatal Mortality

Maternal education is consistently identified as a powerful determinant of neonatal survival, demonstrating a robust inverse relationship with mortality rates. Numerous studies confirm that higher maternal education levels are associated with lower child mortality, including during the critical neonatal period (PMC, 2021; PubMed, 2023; ResearchGate, 2025; Austriaca.at, n.d.). Analysis of NFHS data from 1992-2016 specifically identified "mother's schooling" as a significant factor contributing to the decline in neonatal deaths, with improvements in maternal schooling contributing to a 1-point reduction in NMR during this period (ResearchGate, 2019; ResearchGate, 2018). A comprehensive global systematic review and meta-analysis further quantified this impact, finding that children born to mothers with 12 years of education (completed secondary education) experienced a 31.0% reduction in under-five mortality compared to those born to uneducated mothers. Moreover, a single additional year of maternal schooling was associated with an average 3.04% reduction in under-five mortality (PMC, 2021). This strong association persists even after controlling for other socioeconomic factors, suggesting that education imparts more than just economic benefits; it fundamentally alters health-seeking behaviors and knowledge, making it a profound social determinant. Maternal education, particularly secondary education, consistently remained a protective factor for Under-Five Mortality (U5M) in both rural and urban areas across five rounds of NFHS surveys (1992-2021), even when accounting for other predictors (PubMed, 2023). This indicates that education equips mothers with the cognitive tools, health literacy, and agency to make informed decisions, navigate healthcare systems, and adopt practices that directly benefit their newborns, even in resource-constrained settings, thereby impacting health outcomes through multiple, interconnected pathways that extend beyond mere economic upliftment.

The mechanisms through which maternal education influences neonatal survival are multifaceted:

- **Improved Health Knowledge and Health-Seeking Behaviors:** Educated mothers are more likely to understand the importance of and actively utilize essential maternal and child health services. This includes increased antenatal care (ANC) visits, ensuring tetanus toxoid injections, and opting for facility deliveries, all of which are crucial for safe pregnancy and childbirth outcomes (ResearchGate, 2018; ResearchGate, 2025).
- **Optimal Infant Feeding Practices:** Higher maternal education is strongly associated with a lower prevalence of potentially harmful pre-lacteal feeding practices and a greater likelihood of early initiation of breastfeeding (within one hour of birth) (PLOS One, 2023). Education can help mothers overcome traditional beliefs, such as the perception that colostrum is harmful, promoting practices vital for newborn health (PLOS One, 2023).
- **Female Empowerment and Decision-Making:** Education contributes to women's empowerment, enabling them to exert greater autonomy and influence over household decisions, including those related to healthcare and resource allocation for their children (ResearchGate, 2019; Austriaca.at, n.d.). This increased agency can translate into better health outcomes for their newborns.
- **Reduction of High-Risk Births:** Broader socioeconomic and demographic shifts, including increased women's literacy, contribute to fewer high-risk births (e.g., births to mothers under 18 or over 36 years, or with short birth intervals), which in turn reduces neonatal mortality (ResearchGate, 2019).

The following table quantifies the impact of maternal education on child survival, providing concrete figures and associations derived from the research.

Table 2 - Influence of Maternal Education on Neonatal/Child Mortality

Education Level/Change	Impact on Mortality	Specifics/Context	Source
Higher Maternal Education	Lower NMR/U5MR	General association; protective factor	(ResearchGate, 2018; PMC, 2021; PubMed, 2023; ResearchGate, 2025; Austriaca.at, n.d.)
12 years (Secondary) vs. No Education	31.0% reduction in U5MR	Global meta-analysis	(PMC, 2021)
1 additional year of schooling	3.04% reduction in U5MR	Global meta-analysis	(PMC, 2021)
Mother's schooling improvement (1992-2016)	Contributed 1-point decline in NMR	NFHS analysis	(ResearchGate, 2019; ResearchGate, 2018)
Primary Education vs. Uneducated Mother	Adjusted OR 0.76 for pre-lacteal feed (lower odds)	PLOS One study on feeding practices	(PLOS One, 2023)

Secondary/Higher Education vs. Uneducated Mother	Adjusted OR 0.86 for pre-lacteal feed (lower odds)	PLOS One study on feeding practices	(PLOS One, 2023)
Secondary education	Remained a protective factor for U5M	In both rural and urban areas (NFHS I-V)	(PubMed, 2023)

3.3 Impact of Socio-Economic Status on Neonatal Mortality

Socioeconomic status (SES) exerts a profound influence on neonatal mortality rates in India, with clear disparities evident across different wealth strata. Neonatal mortality rates consistently show significant variation across wealth quintiles, with deaths predominantly concentrated among the poor (lower wealth quintiles) (PMC, 2024; ResearchGate, 2018; BMJ Global Health, 2022). Despite substantial absolute reductions in mortality across all child age groups, India's most vulnerable children, particularly in terms of household wealth, continue to face the highest risk of death as of 2021. These children are notably not on track to meet the Sustainable Development Goal targets for early neonatal and post-neonatal mortality (PMC, 2024). Persistent socioeconomic inequalities in child death are observed regardless of the mortality stage, affecting early neonatal, late neonatal, post-neonatal, and child mortality (PMC, 2024). A critical observation is that between 1993 and 2021, the absolute and *relative* socioeconomic inequality for early neonatal deaths actually increased (PMC, 2024). This indicates that while overall reductions in mortality have occurred, the benefits of health system improvements are not reaching the poorest segments proportionally, suggesting that the survival gap between the richest and poorest has widened or at least not narrowed at the same pace. This pattern underscores the pressing need for more explicitly pro-poor and equity-focused interventions, as general economic growth or broad health system improvements alone may not inherently resolve these disparities.

Beyond wealth quintiles, other household-level factors significantly associated with NMR include household size, access to improved toilets, and the type of cooking fuel used (ResearchGate, 2018). The use of clean fuel for cooking was identified as a significant predictor and contributed substantially to the decline in neonatal deaths, highlighting the importance of environmental health factors (ResearchGate, 2018).

The mechanisms through which economic disadvantage translates into higher risks for newborns are numerous:

- **Limited Access to Quality Healthcare:** Lower socioeconomic status often presents significant barriers to accessing essential healthcare services. These include inadequate antenatal care, lack of skilled birth attendance, and limited access to facility deliveries and timely emergency care (ResearchGate, 2025; CRY, 2022). High out-of-pocket expenditures for healthcare can be a major deterrent, though initiatives like Ayushman Bharat aim to provide financial protection and access to essential services (MoHFW, 2025).
- **Unsafe Living Conditions:** Poverty is closely linked to poor environmental health conditions. This encompasses a lack of access to clean water, inadequate sanitation facilities, and reliance on polluting cooking fuels, leading to household air pollution. These factors increase the risk of infections (e.g., pneumonia, sepsis) and respiratory distress in newborns, contributing significantly to mortality (ResearchGate, 2018; ResearchGate, 2025; CRY, 2022).
- **Malnutrition:** Both maternal malnutrition during pregnancy and inadequate feeding practices after birth are more prevalent among lower socioeconomic groups. This contributes to higher rates of low birth weight and prematurity, making newborns more susceptible to infections and other complications (CRY, 2022).

The following table visually represents the socioeconomic gradient in neonatal mortality, demonstrating how survival chances vary significantly across different wealth strata.

Table 3 - Neonatal Mortality Rate (NMR) by Wealth Quintiles

Wealth Quintile	Expected NMR Trend (per 1000 live births)	Source
Poorest	Highest Mortality	(PMC, 2024; ResearchGate, 2018; BMJ Global Health, 2022)
Second	Higher Mortality	(PMC, 2024; ResearchGate, 2018; BMJ Global Health, 2022)
Middle	Moderate Mortality	(PMC, 2024; ResearchGate, 2018; BMJ Global Health, 2022)
Fourth	Lower Mortality	(PMC, 2024; ResearchGate, 2018; BMJ Global Health, 2022)
Richest	Lowest Mortality	(PMC, 2024; ResearchGate, 2018; BMJ Global Health, 2022)
<i>Note: Specific numerical values for NMR by wealth quintile are not explicitly provided in the available information, but the consistent trend of variation and concentration among the poor is well-documented.</i>		

3.4 Role of Place of Residence (Rural-Urban) on Neonatal Mortality

The place of residence, whether rural or urban, significantly influences neonatal mortality in India, though the nature of this influence has evolved over time. Historically, rural areas in India have exhibited higher neonatal mortality rates compared to urban areas (ResearchGate, 2018; CRY, 2022; BMJ Global Health, 2022). This disparity was largely attributed to lower healthcare provision and utilization, poorer housing conditions, and lower education levels in rural settings (BMJ Global Health, 2022).

An encouraging trend observed between 1992 and 2016 is that the decline in neonatal mortality in rural areas was higher than in urban areas (ResearchGate, 2018). This suggests that efforts to improve rural health infrastructure and access have yielded significant dividends. While unadjusted Under-Five Mortality Rate (U5MR) remained 50% higher in rural areas across various NFHS surveys, a nuanced picture emerges after controlling for demographic, socioeconomic, and maternal healthcare predictors. A mixed-effect Cox proportional hazard model revealed that urban children initially had a higher adjusted risk of death than their rural counterparts in NFHS I-III. However, in the most recent surveys (NFHS IV-V), there were no significant rural-urban differences in U5MR after controlling for these factors (PubMed, 2023). The narrowing or disappearance of this *adjusted* rural-urban gap, despite persistent *unadjusted* differences, suggests that improvements in healthcare access and socioeconomic conditions in rural areas are effectively mitigating previous disadvantages. This indicates successful policy interventions reaching remote populations, implying that the "place of residence" itself is becoming less of a direct determinant once other confounding factors are addressed.

Several factors contribute to the challenges and disparities in neonatal mortality between rural and urban settings:

- **Healthcare Access and Quality:** Rural areas traditionally face significant challenges, including inadequate prenatal and postnatal care, limited availability of skilled birth attendants, lack of proper medical facilities, and delayed access to emergency care due to distance and transportation issues (CRY, 2022). While facility births have increased nationally, the quality of care, particularly in private facilities, can be a concern. Public health facilities, for instance, show a higher likelihood of early breastfeeding initiation compared to private facilities, suggesting better adherence to recommended practices (PLOS One, 2023).
- **Effectiveness of Home-Based Care:** Even in settings with high rates of facility births, home-based newborn care (HBNC) delivered by dedicated community health workers (e.g., Shishu Rakshak) has been found effective in reducing neonatal and infant mortality rates in rural areas (BMJ Global Health, 2020). This finding is particularly important because it highlights that improving *quality and continuum of care* at the community level, rather than solely focusing on increasing institutional deliveries, is critical for further reducing rural neonatal mortality. It suggests that institutional delivery alone is not the complete solution, and sustained, high-quality care extending into the community is vital.
- **Environmental and Socioeconomic Factors:** Rural settings often exhibit poorer sanitation, limited access to clean water, and lower hygiene practices, contributing to higher infection risks for newborns (CRY, 2022). Furthermore, rural areas typically have lower household incomes and maternal education levels (CRY, 2022), which are interconnected with higher mortality risks, creating a complex web of disadvantage.

3.5 Interconnected Pathways and Contributing Factors

The reduction in neonatal mortality in India is not attributable to isolated factors but rather to a complex interplay of maternal education, socioeconomic status, and place of residence. These determinants are deeply interconnected and exert a synergistic influence on neonatal outcomes. For instance, higher maternal education can partially mitigate the disadvantages associated with lower socioeconomic status or rural residence by fostering improved health knowledge, health-seeking behaviours, and empowerment (PubMed, 2023; ResearchGate, 2025; Austriaca.at, n.d.).

The rapid reduction in both NMR and Maternal Mortality Ratio (MMR) in India has been a result of increased coverage of maternal and newborn health interventions operating alongside broader socioeconomic and demographic shifts. These shifts include improvements in women's literacy, increased household electricity, enhanced sanitation, and better access to communication networks (ResearchGate, 2019). These factors collectively contribute to a reduction in high-risk births and enhance healthcare access, particularly for the poor (ResearchGate, 2019). The decline in NMR is thus a result of a synergistic effect between socioeconomic development and targeted health interventions, rather than either factor acting in isolation. This implies that a holistic, multi-sectoral approach is more effective than siloed strategies, as socioeconomic improvements create an enabling environment for health interventions to be effective, and vice-versa.

Key interventions and programs have played a pivotal role in this decline:

- **Maternal and Child Care Programs:** These programs have been identified as the largest contributors to the decline in neonatal deaths. Around 70% of the NMR reduction between 1992 and 2016 is attributed to changes in the utilization of maternal and child care program factors and improvements in household, maternal, and child characteristics (ResearchGate, 2019; ResearchGate, 2018). This underscores the effectiveness of direct health interventions. However, these programs are most impactful when accessible and when the population is equipped (e.g., through education, clean living conditions) to benefit from them, necessitating a broader development agenda.
- **Antenatal Care (ANC) and Tetanus Toxoid (TT) Injections:** Increased utilization of at least three ANC visits and at least two tetanus toxoid injections significantly contributed to the NMR decline (ResearchGate, 2019; ResearchGate, 2018).

- **Facility Deliveries:** Delivery in a medical facility contributed to a 2-point decline in NMR between 1992 and 2016 (ResearchGate, 2019; ResearchGate, 2018). Public health facilities, in particular, show a higher likelihood of early breastfeeding initiation compared to private facilities, suggesting better adherence to recommended practices (PLOS One, 2023).
- **Home-Based Newborn Care (HBNC):** Demonstrated effectiveness in reducing NMR when delivered by dedicated community health workers, even in contexts with high rates of facility births (BMJ Global Health, 2020). This highlights the importance of community-level follow-up and care, extending the continuum of care beyond the birthing facility.
- **Government Initiatives and Infrastructure Strengthening:** The India Newborn Action Plan (INAP), launched in 2014, sets an ambitious target of single-digit NMR by 2030 (UNICEF, 2020). Flagship schemes like Ayushman Bharat provide financial protection and access to services (MoHFW, 2025). The Ministry of Health and Family Welfare has significantly strengthened health infrastructure, including Maternity Waiting Homes, Maternal and Child Health (MCH) Wings, Obstetric High Dependency Units (HDUs)/Intensive Care Units (ICUs), Newborn Stabilization Units (NBSUs), and Sick Newborn Care Units (SNCUs) (MoHFW, 2025).
- **Quality Improvement and Workforce Development:** Emphasis is placed on facility-based quality certification, enhancing healthcare workers' skills, and robust supervisory mechanisms. Training and deployment of skilled birth attendants, midwives, and community health workers are prioritized to deliver essential maternal and child health services (MoHFW, 2025).
- **Data-Driven Policy:** Reinforcing health data systems and real-time surveillance through digital platforms is crucial for facilitating evidence-based policy decisions in maternal, newborn, and child health (MoHFW, 2025).

4. Policy Implications and Recommendations

The findings of this narrative review underscore several critical policy implications for further reducing neonatal mortality in India and ensuring equitable progress towards the SDG targets. The recommendations focus on addressing the identified socio-demographic disparities and strengthening the underlying health systems and social determinants.

4.1 Prioritizing Girls' Education

Maternal education is a consistent and powerful protective factor against neonatal mortality, influencing health knowledge, behaviors, and empowerment (ResearchGate, 2018; PMC, 2021; PubMed, 2023; ResearchGate, 2025; Austriaca.at, n.d.). Secondary education for girls has been particularly impactful in reducing child mortality (PubMed, 2023). Therefore, it is imperative to implement and strengthen comprehensive programs that ensure universal access to and completion of quality secondary education for girls, especially in high-burden regions and among socioeconomically disadvantaged communities. This includes addressing systemic barriers such as cost, distance, safety, and ingrained cultural norms that impede girls' schooling.

4.2 Strengthening Equitable Access to Quality Maternal and Newborn Care

Maternal and child care programs have been key drivers of NMR decline (ResearchGate, 2018). However, disparities in access and quality persist, particularly in rural areas and among the poor (PMC, 2024; CRY, 2022). The focus must shift to ensuring *effective coverage* of interventions (UNICEF, 2020). Recommendations include:

- Promoting universal antenatal care visits and tetanus toxoid injections (ResearchGate, 2018).
- Ensuring skilled birth attendance and facility deliveries, with a focus on improving the quality of care in both public and private facilities, including adherence to evidence-based practices like early breastfeeding initiation (MoHFW, 2025; PLOS One, 2023).
- Expanding and strengthening home-based newborn care programs, particularly through dedicated community health workers, to ensure continuity of care and early identification of complications post-discharge (BMJ Global Health, 2020).
- Improving access to emergency obstetric and neonatal care, especially in remote and rural areas, by strengthening transport networks and referral systems (CRY, 2022).
- Targeting high-focus states and districts with intensified, context-specific interventions to address their disproportionately high mortality burdens (UNICEF, 2020; PMC, 2018).

4.3 Addressing Broader Socioeconomic Determinants

Socioeconomic status, household characteristics, and environmental factors significantly influence neonatal survival, with persistent inequalities observed (PMC, 2024; ResearchGate, 2018; BMJ Global Health, 2022; CRY, 2022). Given the persistent socioeconomic inequalities despite overall progress, future policy must explicitly adopt an "equity lens." This implies that interventions should be specifically designed and prioritized to reach and benefit the hardest-to-reach, poorest, and least educated segments of the population, moving beyond simply providing services to actively ensuring equitable access and outcomes. Recommendations include:

- Investing in initiatives that promote access to clean cooking fuel, improved sanitation facilities, and safe drinking water, particularly for vulnerable households (ResearchGate, 2018; CRY, 2022).
- Strengthening social protection schemes, such as Ayushman Bharat, to reduce catastrophic out-of-pocket health expenditures and ensure financial access to essential services for all, especially the poorest (MoHFW, 2025).
- Implementing more pro-poor policies and interventions specifically designed to close the persistent socioeconomic gaps in child survival (PMC, 2024; BMJ Global Health, 2022).

4.4 Data-Driven Policy and Monitoring

Effective policy requires robust data for identifying disparities, monitoring progress, and making timely adjustments (MoHFW, 2025; ResearchGate, 2018). It is crucial to strengthen health information systems to enable real-time surveillance and granular data analysis (e.g., district-level, wealth quintile-specific, and disaggregated by maternal education and residence) of maternal, newborn, and child health indicators. This will facilitate evidence-based policy decisions and allow for precise targeting of interventions to areas and populations most in need.

5. Conclusion

India has achieved commendable progress in reducing neonatal mortality, a testament to sustained national efforts and investment in child survival. However, the journey towards achieving the Sustainable Development Goal targets by 2030 is far from complete. The review consistently demonstrates the critical and interconnected roles of maternal education, socioeconomic status, and place of residence as fundamental determinants of neonatal survival. These factors do not operate in isolation; rather, their synergistic influence shapes the landscape of newborn health outcomes.

The ultimate success in achieving SDG targets for neonatal mortality in India hinges on recognizing and actively addressing the complex interplay of these social determinants. This means moving beyond purely medical interventions to a holistic development agenda that prioritizes the most vulnerable. The cumulative evidence suggests that while direct health programs are vital, their effectiveness is deeply intertwined with, and often amplified by, improvements in social determinants such as education, clean living conditions, and economic empowerment. The remaining challenge is largely concentrated among the most vulnerable populations, whose mortality risks are driven by a complex web of social and economic disadvantages. Therefore, a strategic shift towards a comprehensive, developmental approach, with an explicit equity focus, is paramount. Only through sustained investment in both robust health systems and broader social determinants can India ensure that every newborn has an equitable chance at survival and thriving.

Limitations:

As a narrative review, this paper does not employ the exhaustive search and quantitative synthesis methods characteristic of a systematic review. The findings are based on available published literature and official reports, which may have inherent limitations in data collection, scope, or specific numerical disaggregation for all factors.

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