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## Peri-Urban Transitions, Ecological Change, and Childhood Vulnerabilities in India

**Shrey Chanan**

Department of Anthropology, Amity University Uttar Pradesh, chananshrey@gmail.com

**Dr. Tarun Joshi**

Department of Anthropology, Amity University Uttar Pradesh

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### ABSTRACT

Peri-urbanization has emerged as a defining spatial and socio-ecological process in contemporary India, reshaping the landscapes that lie between rural and urban boundaries. As cities expand outward, peri-urban zones evolve into hybrid environments characterized by rapid demographic change, ecological degradation, and governance ambiguity. This narrative literature review synthesizes interdisciplinary evidence to examine how these transformations shape the vulnerabilities of children living in urban and peri-urban margins. Drawing on thematic reports, national assessments, ethnographic studies, and global analyses of peri-urban dynamics, the review highlights that children face disproportionately high risks due to infrastructural deficits, environmental exposure, and limited institutional protections. Research consistently shows that peri-urban regions experience intense land-use transitions, heightened pollution, declining ecosystem services, and inadequate access to essential amenities. These conditions intersect with structural inequalities to produce adverse outcomes for children, including increased exposure to contaminated water, air pollution, unsafe mobility systems, and overcrowded or insecure housing. National data reveal persistent disparities in nutrition, health, sanitation, and schooling for children residing in informal or peripheral settlements. Ethnographic evidence



further illustrates how environmental risks, such as wastewater irrigation and industrial emissions, become embedded within everyday livelihood practices, leading to normalized exposure for children. Governance fragmentation intensifies these challenges. Peri-urban areas often fall outside coherent administrative jurisdictions, resulting in weak service delivery and minimal integration of child-centred planning. While ecosystem-based resilience strategies offer promising avenues for mitigating environmental risks, their implementation remains limited. The review concludes that safeguarding children in peri-urban India requires an integrated approach that addresses ecological degradation, strengthens institutional capacity, enhances WASH and infrastructural systems, and incorporates children's rights into regional planning. Such interventions are essential for building equitable and resilient peri-urban futures.

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## Introduction

Peri-urbanization has become one of the most decisive spatial processes shaping contemporary India. As cities extend beyond their administrative boundaries, rural landscapes transform into complex, hybrid peri-urban zones marked by demographic influx, ecological degradation, and institutional ambiguity. These transitions have profound consequences for children, particularly those living in informal settlements, migrant households, or communities lacking infrastructural security. The thematic paper on the vulnerabilities of urban poor children emphasizes that climatic stressors, inadequate water and sanitation systems, and environmental degradation converge to create acute disadvantages for low-income families residing in both urban and peri-urban locations (UNICEF India, 2021). Children, owing to their developmental needs and limited agency, carry a disproportionate share of these burdens.

Research on peri-urbanization in India highlights the tensions inherent in these transitional geographies. Narain, Anand, and Banerjee (2013) argue that peri-urban regions illustrate the blurring of rural and urban categories, producing settlements that combine agricultural livelihoods, urban real-estate pressures, and fragmented governance. This fluidity complicates planning, disrupts traditional resource management regimes, and restructures social life. At the global scale, Sahana et al. (2023) similarly describe peri-urban areas as neither distinctly urban nor rural, noting that their transitional nature limits the applicability of standardized definitions and demands flexible frameworks for spatial demarcation.



These spatial transformations have direct implications for child well-being. The National Institute of Urban Affairs (NIUA, 2016) provides substantial evidence demonstrating how housing inadequacy, limited sanitation, and poor access to services shape the health and development of children in Indian cities. In addition, international research on child rights and environmental determinants shows that unequal exposure to air pollution, heat stress, unsafe mobility systems, and declining green spaces systematically undermines children's rights to health, play, safety, and development (Gemmell et al., 2023). The cumulative effect of these exposures is particularly severe for children who live in the expanding margins of cities.

Peri-urban ethnographic research provides further insight into how environmental degradation becomes intertwined with children's daily experiences. The study conducted in Karhera, a former agricultural village between Delhi and Ghaziabad, illustrates that domestic wastewater irrigation, industrial pollution, and governance neglect generate complex health concerns and uneven community perceptions of risk (Waldman et al., 2017). While some families acknowledge health dangers, others normalize these conditions due to economic necessity or resignation.

Within this broader context, the present review synthesizes interdisciplinary evidence on peri-urban growth, environmental change, and child vulnerabilities in India. The review synthesizes interdisciplinary literature to examine how spatial expansion, ecological degradation, and infrastructural deficits shape childhoods at the urban margins. The synthesis aims to develop a coherent understanding of the structural, environmental, and social drivers that mediate children's well-being in peri-urban India.

## **Research Methods**

### **Search Strategy**

This review employed a narrative and thematic approach to examine the relationship between peri-urban transformation, environmental change, and child vulnerabilities. The corpus consisted of six key documents provided for analysis, including peer reviewed studies, policy reports, thematic research on peri-urbanization, and conceptual discussions related to urban environmental health. Instead of a database-based search, the review relied on this curated collection of interdisciplinary literature. Each document was examined carefully to identify evidence related to peri urban spatial change, environmental conditions, and the social implications for children living in transitional urban landscapes.



## **Selection Criteria**

Documents were included if they discussed peri urbanization in India, ecological or environmental conditions in expanding urban areas, or the vulnerabilities experienced by urban and peri urban children. Both empirical and conceptual works were considered, including ethnographic research, environmental health studies, and policy analyses. Studies focusing exclusively on adult outcomes or unrelated policy areas were excluded to maintain thematic relevance.

## **Screening and Data Extraction**

All six documents were screened for thematic relevance through examination of their key sections. The studies were analysed to extract themes related to peri-urban transformation, ecological degradation, governance gaps, sanitation conditions, and implications for child wellbeing.

## **Results and Analysis**

### **Peri-urbanization and Spatial Change**

Peri-urbanization in India manifests through the erosion of conventional rural–urban distinctions. Narain et al. (2013) show that peri-urban regions around cities such as Chennai, Ahmedabad, Patna, and Guwahati are marked by land-use conflicts, infrastructure deficits, and rising pressure on local ecosystems. These spaces attract migrants, small industries, and real-estate investors while simultaneously displacing agrarian livelihoods. Sahana et al. (2023) demonstrate that globally, peri-urban zones are characterized by rapid land-use transitions and governance fragmentation. The Indian experience parallels these findings, with peri-urbanization driven by both demographic pressures and economic restructuring.

### **Ecological Degradation and Environmental Risks**

Environmental degradation is a defining feature of India’s peri-urban belts. The UNICEF thematic paper on urban poor children underscores that climate change, heat stress, water scarcity, and declining ecosystem services exacerbate vulnerabilities for children living in informal settlements and peri-urban fringes (UNICEF India, 2021). Waldman et al. (2017) provide ground-level evidence from Karhera, where wastewater-dependent agriculture and industrial discharge contaminate soil and water, producing tangible yet unevenly recognized health risks. Gemmell et al. (2023) further document how environmental determinants across global cities affect children’s rights, noting that those in marginal settlements face the highest exposures to polluted air, unsafe transportation, and degraded built



environments. Together, these studies reveal a consistent pattern: peri-urban children face disproportionately high environmental burdens.

### **Vulnerabilities of Urban and Peri-urban Children**

The NIUA (2016) report offers extensive evidence that children in urban India suffer from higher mortality rates, malnutrition, and inadequate access to services compared to their rural counterparts. These disadvantages intensify within peri-urban zones, where infrastructural provision often lags behind demographic growth. Children in these areas encounter barriers to immunization, schooling, and nutritional support, while also facing risks associated with insecure housing, overcrowding, and limited green spaces. UNICEF India (2021) further notes that such vulnerabilities stem from structural inequality and the concentration of environmental hazards in settlements predominantly inhabited by low-income families. Rural livelihood transformations associated with urban expansion are also visible among pastoral communities in Himachal Pradesh, where urbanization alters traditional economic practices and cultural landscapes (Thakur, 2025).

### **Water, Sanitation, and Health Inequities**

Access to safe water and sanitation is a significant determinant of child health in peri-urban settings. The NIUA report highlights persistent deficits in WASH facilities in both slums and peripheral urban settlements (NIUA, 2016). Contaminated water, poor drainage, and limited waste management create fertile conditions for infectious diseases. Waldman et al. (2017) illustrate how wastewater irrigation in Karhera produces direct and indirect health risks for children who consume crops grown in contaminated soils or who engage in agricultural labour alongside their caregivers. Such evidence reinforces the critical role of WASH systems in mitigating peri-urban child vulnerabilities.

### **Governance Fragmentation and Institutional Liminality**

Governance gaps emerged as a recurring theme across all studies. Narain et al. (2013) contend that peri-urban areas fall between rural and urban jurisdictions, creating administrative uncertainty that undermines service delivery. Informal settlements often lack legal recognition, limiting residents' ability to demand infrastructural improvements. Gemmell et al. (2023) critique the limited integration of child-centred principles in urban planning, arguing that children remain structurally invisible in environmental governance. UNICEF India (2021) emphasizes that ecosystem-based resilience requires integration across planning, environmental regulation, and welfare systems coordination that is notably absent in most peri-urban contexts.



## Community Responses and Social Meaning of Risk

Ethnographic work demonstrates that environmental risk in peri-urban areas is mediated by community perceptions. Waldman et al. (2017) report that while residents widely acknowledge industrial pollution as hazardous, wastewater irrigation is often viewed as normal or economically indispensable. Children participate in daily activities that intensify their exposure, yet they seldom recognize these risks. Gemmell et al.'s (2023) findings support this observation, suggesting that children's experiences are shaped by constrained mobility, lack of safe spaces, and structural inequalities that limit opportunities for adaptation.

## Discussion

The findings reveal that peri-urbanization is central to understanding child vulnerability in contemporary India. As cities expand, the spatial reconfiguration of land and resources generates ecological stress, infrastructural inadequacy, and institutional ambiguity conditions that coalesce around the most disadvantaged children.

Peri-urbanization itself is a driver of inequality. Marginalized families gravitate toward peri-urban areas because of lower housing costs, displacement from rural lands, or proximity to casual labor markets. Yet these zones offer limited infrastructural support and expose residents to ecological hazards. Children thus experience disadvantages rooted in spatial marginality and socio-economic precarity. The evidence indicates that environmental risks such as air pollution, contaminated water, heat stress, and industrial waste cluster within peri-urban belts, amplifying their effects on child health and development.

Governance fragmentation further deepens vulnerability. Peri-urban areas often lack clear administrative oversight, creating gaps in service provision, urban planning, and environmental regulation. Children's rights to health, safety, education, and developments articulated by the UNCRC remain unprotected when planning mechanisms fail to incorporate child-centred perspectives. The absence of institutional coordination leaves communities to navigate environmental hazards largely on their own.

Community responses are complex and shaped by socio-economic necessity. While residents may recognize certain environmental risks, economic dependence on peri-urban agriculture or informal labor creates a reluctant acceptance of unsafe conditions. Children become unwitting participants in practices that heighten exposure. Addressing these vulnerabilities therefore requires interventions that consider not only infrastructural deficits but also cultural, economic, and social factors influencing community decisions.



Finally, ecosystem-based resilience offers a promising yet underutilized pathway for improving child well-being in peri-urban settings. Restoring wetlands, protecting green belts, and reviving water bodies can buffer climatic hazards, strengthen local ecosystems, and create healthier environments for children. However, integrating such strategies requires systemic reforms in governance and planning.

## Conclusion

The synthesis presented in this review demonstrates that peri-urbanization in India is not merely a spatial or demographic shift but a profound socio-ecological transformation whose consequences are disproportionately borne by children living in marginal environments. As cities extend into surrounding rural spaces, the resulting peri-urban landscapes reveal an intricate interplay of ecological degradation, institutional fragmentation, and socio-economic precarity. These interlocking processes shape the everyday lives of children, whose developmental needs, limited autonomy, and embeddedness within household and community structures render them uniquely vulnerable to the stresses generated by urban expansion.

The evidence suggests that peri-urban areas function as zones of compounded disadvantage. On the one hand, they attract marginalized families due to lower living costs, proximity to informal labour markets, and the forced displacement of agricultural households. On the other hand, these zones are characterized by weak service provision, environmental risks, and a persistent absence of coordinated governance. Children in peri-urban India thus grow up in environments where access to basic services such as clean water, sanitation, health care, education, and safe mobility is uneven at best and severely deficient at worst. Such disparities do not arise incidentally but are structured by spatial marginality, institutional neglect, and uneven development trajectories that accompany rapid urbanization.

Ecological degradation within peri-urban landscapes further compounds these vulnerabilities. The literature consistently highlights that peri-urban belts around major Indian cities accumulate environmental hazards from air pollution and contaminated groundwater to industrial effluents, wastewater irrigation, and shrinking green spaces. Children heightened physiological sensitivity makes them more susceptible to the long-term consequences of these exposures, while their social environments offer limited protection or mitigation mechanisms. The everyday realities documented in ethnographic work, such as the normalization of wastewater irrigation in Karhera, illustrate how environmental harms become embedded within livelihood practices. This normalization both reflects and reinforces the structural constraints within which peri-urban families operate, as economic survival frequently outweighs health considerations.



The governance landscape of peri-urban India exacerbates these risks. Peri-urban territories fall at the interstices of rural and urban administrative regimes, producing institutional ambiguity that leaves significant gaps in planning, monitoring, and service delivery. Children's rights, though articulated clearly within international frameworks, remain unevenly operationalized in these contexts. Urban planning systems largely overlook children as stakeholders, and environmental governance seldom accounts for the differentiated impacts of urban expansion on young populations. As a result, children in peri-urban regions remain structurally invisible within policy architectures, even as their well-being is deeply affected by spatial and ecological decisions.

At the same time, community responses reveal the complex ways in which risk is perceived and managed. Economic necessity, social norms, and limited alternatives shape how families interpret environmental hazards. Children's participation in household labour, agricultural activities, or daily mobility exposes them to risks that are often accepted as unavoidable. These dynamics underscore the importance of interventions that go beyond infrastructural improvement to incorporate community engagement, behavioural insights, and culturally informed strategies for risk communication.

Ecosystem-based resilience emerges from this review as a critical but underutilized framework for addressing child vulnerabilities in peri-urban India. Restoring ecological buffers such as wetlands, river corridors, and peri-urban green belts can mitigate climate risks, improve environmental quality, and create healthier spaces for children's growth and development. To realize this potential, however, systemic reforms in governance, planning, and interdepartmental coordination are essential. Integrating child-centred perspectives into urban and peri-urban policy frameworks is not only a developmental imperative but also a matter of social justice, given that the costs of rapid urbanization are disproportionately externalized onto the youngest and most vulnerable residents.

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