

Parental Nutrition Education and the Nutritional Status of School-Going Children in India: A Narrative Review of Rural-Urban Disparities (2014–2024)

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Abstract

Malnutrition among school-going children in India has long been a public health concern, characterized by pronounced rural–urban disparities and a dual burden of undernutrition and overweight. This review provides a critical synthesis of evidence on the nutritional status of school-age children and examines the role of parental nutrition knowledge, attitudes, and feeding practices in shaping children’s dietary behaviors and nutritional outcomes. Structured searches of PubMed, Scopus, Web of Science, and Google Scholar, along with reports from national and international agencies, were conducted to identify peer-reviewed studies published between 2014 and 2024. The analysis indicates that rates of stunting and underweight remain higher among rural children, whereas urban children are increasingly exposed to poor-quality diets and overweight associated with nutritional transition. Parental nutrition education is positively associated with improved dietary diversity and modest improvements in selected anthropometric indicators across settings. The review recommends integrating systematic parental nutrition education into national programs such as PM-POSHAN and POSHAN Abhiyaan to strengthen family-based strategies, reduce rural–urban disparities, and enhance the overall effectiveness of child nutrition interventions.

Keywords

Child nutrition; Nutritional status; Parental nutrition education; Rural–urban disparities; School-going children

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1. Introduction

Nutrition is widely recognized as one of the core determinants of physical growth, cognitive development, and academic achievement among school-going children. Child malnutrition remains a serious public health concern in India, encompassing not only undernutrition but also an emerging dual burden of overweight and obesity, particularly in urban areas. These nutritional challenges are unevenly distributed: rural children are

disproportionately affected by stunting, underweight, and thinness due to persistent socioeconomic, educational, and environmental disparities, whereas urban children are increasingly vulnerable to unhealthy dietary patterns associated with nutritional transition and sedentary lifestyles.

Growing evidence underscores the critical role of parents in shaping children's dietary habits and nutritional outcomes. Studies of home environments reveal that caregiver involvement and structured household routines significantly influence children's wellbeing and daily behaviors, highlighting the need to conceptualize nutrition as a family-centered responsibility rather than solely a school-based initiative (Topno & Sarkar, 2024). Parental nutrition knowledge, attitudes, and feeding practices directly affect food choices, meal frequency, dietary diversity, and overall diet quality within the household. Since maternal, child, and adolescent health represent interconnected stages of the life cycle, nutritional interventions targeting school-age children should be embedded within broader population health frameworks (Parveen et al., 2025). Research consistently indicates that parent-centered nutrition education enhances food literacy, promotes healthier dietary practices, and contributes to improved nutritional outcomes in children.

Despite national initiatives such as the Midday Meal Scheme, now strengthened under PM-POSHAN, and broader policy measures like POSHAN Abhiyaan, rural–urban nutritional disparities persist. While these programs primarily address food provision and supplementation, they often give limited attention to household-level behaviors, parental decision-making, and everyday feeding practices that significantly influence children's nutritional status. This gap highlights the importance of incorporating systematic parental nutrition education as a complementary strategy to enhance the effectiveness and sustainability of existing child nutrition programs.

In addition, psychosocial and contextual factors, such as caregiving responsibilities, work–life stress, and household pressures, affect parental feeding practices. Evidence suggests that meal planning, routine formation, and consistency in healthy feeding behaviors are influenced by these variables, particularly among caregivers managing multiple roles (Pareek, 2024). Behavioral and psychological research further demonstrates that parental guidance, encouragement, and self-regulation within the family context are crucial for sustaining positive health-related behaviors among children (Sharma et al., 2025). These findings reinforce the value of parent-based nutrition interventions that not only address knowledge gaps but also consider contextual and psychosocial constraints.

Against this backdrop, there remains limited synthesized evidence on the impact of parental nutrition education on the nutritional status of school-going children across rural and urban settings, particularly at localized and district levels. This narrative review synthesizes existing literature on:

1. The nutritional status of school-going children in rural and urban districts
2. Parental nutrition knowledge, attitudes, and feeding practices
3. The impact of parent-based nutrition education on children's dietary behaviors and nutritional outcomes.

By integrating these strands, the review aims to inform future research and policy development, particularly in mixed rural–urban regions such as the Moradabad division, and to support the design of family-

centered strategies aligned with national nutrition initiatives.

2. Literature Review

2.1 Nutritional Status of School-Going Children in Rural and Urban Areas

Anthropometric, dietary, and clinical indicators, such as height-for-age (stunting), weight-for-age (underweight) and body mass index-for-age (thinness or overweight), are used to evaluate the nutritional status of school-going children because they measure chronic and acute malnutrition (World Health Organization, 2018). Other most common diet quality assessment tools are dietary diversity scores, meal frequency, and micronutrient intake, especially in low- and middle-income nations (UNICEF, 2019). Micronutrient deficiencies particularly iron-deficiency anemia are still very high among school-aged children in India, which is evidence of the persistence of dietary inadequacy (Kumar et al., 2025).

Research provides substantial evidence of pronounced rural–urban inequalities in child nutrition. In most cases, children residing in rural areas show higher rates of stunting, underweight, and thinness compared to their urban counterparts, largely attributable to poverty, food insecurity, low parental education, inadequate sanitation, and limited access to healthcare services (Deshmukh et al., 2006; Jawaregowda & Angadi, 2017). These patterns are further supported by studies conducted in various Indian states, including Uttar Pradesh, which emphasize that chronic undernutrition in rural regions remains a persistent and significant public health concern (Jawaregowda & Angadi, 2017; Nutritional Status of Rural School-Age Children, 2023).

However, a dual burden of malnutrition is increasingly being faced in urban areas, as an undernourished population coexists with growing prevalence of overweight and obesity among children. It can be explained by nutrition transition, which is the rising intake of high-energy foods and the decrease in physical exercise (Gupta et al., 2018; Ranjani et al., 2016). The studies concerning the slum population of urban areas also suggest that the insufficient quality of diets, food insecurity, and the unhealthy food environment expose urban children to high nutritional vulnerability despite the increased access to services (Ghosh & Shah, 2004). Taken altogether, these results highlight the importance of context-based and household-specific interventions to deal with rural to urban nutritional disparities.

2.2 Parental Nutrition Knowledge, Attitudes, and Practices

Parents are key to influencing children about their eating habits by the type of food children consume, the time they eat, the amount they eat, their cooking habits, and their hygiene behaviors. It is proven by many studies that the nutrition patterns of children are strictly determined by the knowledge and attitudes of parents and their level of education (Saxena and Kumar, 2020). The empirical data of India and other developing settings indicate that maternal education is a good predictor of better child nutritional status as well as parental education (Burchi, 2012; Kunwar and Pillai, 2001).

There is a significant disparity in parental nutrition knowledge across socioeconomic and geographical settings. Rural parents are often characterized by limited awareness of balanced diets, micronutrient requirements, and appropriate feeding practices, resulting in monotonous, cereal-based diets and persistent undernutrition among children (Deshmukh et al., 2006; Kumar et al., 2025). In contrast, urban parents, despite generally higher educational attainment, may adopt inappropriate feeding patterns due to time constraints, work-related pressures, and increased reliance on processed and convenience foods (Gupta et al., 2018; Ranjani et al., 2016). Similar rural–urban patterns have been observed in other South Asian countries, such as Bangladesh, where parental education and occupation significantly influence child undernutrition outcomes (Nahar & Zahangir, 2024).

Such types of feeding habits as inconsistent meals, high consumption of energy-dense foods, and a low intake of fruits and vegetables have an adverse impact on the nutrient levels in children and their health in the long term (Ghosh & Shah, 2004). Wider evidence suggests that the environments of homes and the involvement of caregivers is central in determining the wellbeing of children and their behavioral outcomes, which creates the necessity to consider the nutrition as a family-based process instead of a school-based measure (UNICEF, 2019).

2.3 Impact of Parental Nutrition Training on Children’s Nutritional Outcomes

Parental nutrition education has become an accepted and effective and cost-effective approach toward enhancing the dietary habits and nutritional conditions of children. In comparison to the child-based ones, parent-based interventions address the household decision-making, food settings, and feeding habits directly affecting diets of children (2020; WHO, 2018). The search and the intervention studies have shown consistent findings of improvements in dietary diversity, meal regularity, and nutrient-rich food intake after parental nutritional education (Huang et al., 2023; Murimi et al., 2018).

There is evidence suggesting that parental nutrition training leads to modest yet statistically significant improvements in anthropometric outcomes, including reductions in the prevalence of underweight and thinness and increases in BMI-for-age, particularly in rural communities with low baseline nutrition knowledge. Comparable findings have been reported in international contexts. For instance, in China, nutrition improvement initiatives and school-based education programs have demonstrated positive effects on the health outcomes of children in rural areas (Wang et al., 2022; Xu et al., 2022). Overall, school- and family-linked nutrition interventions tend to improve children’s nutritional status; however, their effectiveness varies depending on the type, intensity, and duration of the intervention (Pongutta et al., 2022).

Despite these encouraging findings, the literature identifies several methodological limitations, including short follow-up periods, heterogeneity in intervention models, and a lack of localized comparative studies examining rural and urban settings within the same geographic context. While national programs such as POSHAN Abhiyaan and PM-POSHAN primarily emphasize food supplementation and school-based nutrition support (Government of India, 2020), comparatively less attention has been given to structured parental nutrition education as a complementary strategy. These gaps underscore the need for district-level research, particularly in

mixed rural–urban regions such as the Moradabad division, to better understand how parental education can enhance the effectiveness and sustainability of existing child nutrition programs.

3. Methodology

3.1 Review Design

The research design used in this research is the narrative review which aims at synthesizing and critically analyzing the available literature on the nutritional status of school going children in both rural and urban settings with particular emphasis on how parental nutrition knowledge, attitudes and education influence the dietary habits of the school going children and their nutritional conditions. The use of a narrative approach was justified by the fact that the available evidence was heterogeneous (studying design may vary: cross-sectional, intervention-based, and review studies), outcome measurements (anthropometric, dietary, and behavioral indicators), as well as the model of intervention used (school-based, parent-focused, and combined approaches). Such design allows having a flexible and integrative synthesis of various findings and the rural-urban comparison and thematic analysis.

3.2 Search Strategy and Data Sources

To find out the relevant literature, a systematic literature search was performed through which the studies published during 2014-2024 were identified. A systematic search was performed in electronic databases, such as PubMed, Scopus, Web of Science, and Google Scholar, with the use of combinations of keywords related to child nutrition, school going children, rural urban differences, parental nutrition education, feeding habits, and nutrition interventions. Besides the peer-reviewed journal articles, official reports and policies of international and national institutions, especially the World Health Organization (WHO), UNICEF, the Government of India, and similar organizations were studied to make empirical results context-dependent in existing nutrition policies and programs.

3.3 Selection Criteria and Scope of Review

The review follows the criteria that: (a) the study was based on school-aged children, (b) it dealt with nutritional status or dietary behaviors, (c) the studies needed to examine rural-urban differences and/or parental nutrition education, and (d) they were published in English during the time period included. Restricted research that was not related to the outcome of child nutrition, or had no relevance to the parental influence was eliminated. Since the review was narrative in nature, there was no formal scoring of quality or meta-analysis done, rather, thematic relevance, clarity in methodology and contextual applicability were given priority.

3.4 Data Synthesis and Analytical Approach

Within a thematic analysis framework, selected studies were synthesized based on three main domains: nutritional status of school going children in rural and urban settings; nutrition knowledge, attitudes, and feeding practices of

parents; and the effects of parental nutrition education and training on the nutritional outcome of school going children. The comparative analysis was used to find the patterns and differences between rural and urban settings and between intervention models. This method allowed analytical synthesis of evidence and helped to determine research gaps, policy implications and future directions of research on a field at district-level, especially in mixed rural-urban areas like the Moradabad division.

4. Findings and Discussion

4.1 Nutritional Status of School-Going Children: Indicators and Patterns

In the studies reviewed, the nutritional status of school-going children is always evaluated based on the anthropometric, dietary, and clinical indicators, which makes it possible to understand chronic and acute malnutrition comprehensively. The use of anthropometric indicators, including height-for-age (stunting), weight-for-age (underweight), and body mass index-for-age (thinness or overweight) is well known as a good way of measuring the long-term nutrition deprivation and the recent dietary deficiencies (World Health Organization, 2018). Complementary dietary indicators like dietary diversity scores and the rate of meals eaten help to determine the quality and adequacy of children diets especially in environments where there is a shortage of resources (UNICEF, 2019). According to Indian research, additional evidence of the enduring burden of micronutrient deficiencies, in particular, iron-deficiency anemia, in the population of school-aged children identifies the structural gaps in the quality of the diet and food access (Kumar et al., 2025).

4.2 Rural-Urban Disparities in Nutritional Status

One of the main results of the entire literature is the presence of high levels of rural-urban differences concerning child nutrition. Among rural children, stunting, underweight, and thinness are always higher than in urban children, which is controlled by poverty, food insecurity, poor parental education, poor sanitation, and lack of access to healthcare services (Deshmukh et al., 2006; Jawaregowda & Angadi, 2017). Such trends can be observed in various states in India, with Uttar Pradesh being no exception as chronic undernutrition among school children in rural areas continues to be a common issue (Jawaregowda & Angadi, 2017; Nutritional status of rural school-age children, 2023).

Conversely, urban environments are becoming more and more a burden of malnutrition where children are being undernourished as well as becoming more and more overweight and obese at the same time. The change is strongly connected to nutrition transition which is characterized by the growing intake of energy-dense, nutrient-deficient food and inactive lifestyles (Gupta et al., 2018; Ranjani et al., 2016). There is also emerging evidence that dietary diversity and balanced food intakes are important in weight management among adolescents especially in urban areas that have a high rate of dietary changes (Pandey et al., 2025). Research that considers urban and slum populations also illustrates that the increase in food availability does not always lead to better

nutrition because the quality of diets and poor food environments are among the reasons to show unbalanced nutritional outcomes (Ghosh & Shah, 2004). Such results can be used to prove that rural and urban nutritional issues are qualitatively distinct and manifested in specific intervention strategies.

4.3 Socioeconomic and Parental Determinants of Child Nutrition

Socioeconomic status and the parental features turn out to be critical factors influencing the nutritional outcomes of children in the rural and urban setting. Parental education, especially maternal education has always been linked with better child nutrition because educated parents have a high probability of adopting a proper feeding pattern, maintaining a nutritionally diverse diet, and making informed food choices (Burchi, 2012; Kunwar & Pillai, 2001). Low nutrition awareness and dependence on cereal-based diet are some of the contributing factors to chronic undernutrition in rural households (Kumar et al., 2025). In cities, although children have access to better food, unhealthy diets due to convenience foods and the lack of parental control adversely influence the nutritional condition of children (Gupta et al., 2018).

These patterns are also supported by similar evidence as in the South Asian region. Bangladesh-based studies indicate that maternal or paternal education plays a significant role in determining the child undernutrition and rural-urban disparities in these studies are the manifestations of unequal access to education and job opportunities (Nahar & Zahangir, 2024; Sarwar et al., 2024). Taken together, these results establish parental knowledge and behavior as an intermediate between socioeconomic status and child nutritional outcomes.

4.4 Impact of Parental Nutrition Education on Dietary Practices

The findings strongly support parent-based nutrition education as an effective strategy for improving children's dietary habits. Parental nutrition training is not based on child-only as it is more focused on the household food environments, decision-making, and feeding practices that influence the daily diets of children (WHO, 2018). Moreover, studies of the work-life balance of the Indian female population indicate that the hassles of caregiving and conflicting duties might restrict the capacity of the parents to persist in adopting healthy feeding habits, despite sufficient nutrition knowledge (Pareek, 2024). In various intervention studies, parental training has been linked to more frequent consumption of fruits, vegetables, pulses, and milk products, more regular meals, and less frequent consumption of processed and energy-dense foods (Murimi et al., 2018). Reviving traditional dietary patterns rich in locally available cereals, pulses, and seasonal foods has also been suggested as a culturally sustainable strategy to improve dietary diversity and reduce micronutrient deficiencies among children (Parveen & Pandey, 2025).

Nutritional diversity and frequency of feeding especially increase in rural areas, where the knowledge of nutrition is usually lower and the relative gains of behavior change are higher (Kumar et al., 2025). Parental education has been found to contribute to better portion control and healthier snack selection to reduce risks of overweight and obesity in urban settings (Gupta et al., 2018; Ranjani et al., 2016). Systematic reviews also attest

to the fact that nutrition education enjoys a greater level of success when it integrates culturally relevant messages, demonstration exercises, and long-lasting involvement via schools and community means (Murimi et al., 2018; UNICEF, 2019).

4.5 Effects on Anthropometric and Nutritional Outcomes

Complementing dietary interventions, parental nutrition education has shown measurable gains in anthropometric outcomes over short- and medium-term periods. Several intervention-based studies find small but statistically significant decreases in BMI-for-age, weight-for-age, and underweight and thinness among school-going children. Even though height-for-age (stunting) does not change significantly in the short-term interventions, long-duration programs demonstrate the positive tendencies in case the nutrition education is accompanied by the enhancement of household food security (WHO, 2018). Behavioral studies also indicate that parent-based interventions are more efficient in cases where they stimulate motivation, stress, and habit formation in addition to knowledge acquisition, which can be directly applied to nutrition education initiatives (Sharma et al., 2025).

The findings are also supported by international evidence. Research in China proves that the nutrition improvement programs with school-based and parental education elements led to a significant enhancement of the children health outcomes, especially in the rural regions (Wang et al., 2022; Xu et al., 2022). Asian meta-analyses also support the general usefulness of family-based and school-based interventions on nutrition, but the results are different with respect to the design and duration of intervention (Pongutta et al., 2022).

4.6 Rural-Urban Differences in Post-Intervention Outcomes

Parental nutrition training has been more effective in urban settings as compared to rural settings. In rural settings, interventions can be more effective in relation to the nutritional effects of children because a growth in parental knowledge has a more direct impact on the change in dietary practices (Deshmukh et al., 2006). Urban interventions, on the other hand, are mainly oriented towards the remedy of inappropriate diet patterns connected to excessive consumption of processed foods and lack of physical activity. The urban parents might be more knowledgeable in nutrition at the baseline, but training programs are still efficient in enhancing the quality of the dieting and decreasing the unhealthy eating habits among the children (Gupta et al., 2018; Ranjani et al., 2016). The results highlight the importance of designing interventions that are context-specific, i.e. involving nutrient adequacy in rural and dietary moderation in urban regions.

4.7 Implications for Policy and Nutrition Programs

The evidence that is synthesized underscores the weakness of food-supplementation-oriented programs that are applied independently. Malnutrition continues to affect both rural and urban populations, even with such national programs as POSHAN Abhiyaan and PM-POSHAN, which means that the household-level factors are still not properly considered (Government of India, 2020; UNICEF, 2019). Policy discussions and policy responses that

have surfaced in recent times have further reported the necessity of integrated, community-based measures to fight malnutrition by enhancing nutrition awareness of households and advocating sustainable food practices. Formal parental nutrition education as an intervention, incorporating into the formal school health education and the Anganwadi and community nutrition education programs would be a significant improvement in program effectiveness. Continuous communication, practical advice, and parent involvement become some of the key elements to the realization of long-term effects in child-nutrition and narrowing the rural-urban disparities.

4.8 Limitations

Despite consistent evidence supporting the role of parental nutrition education in improving children's dietary attitudes and nutritional outcomes, the existing body of literature presents several limitations. A considerable proportion of studies rely on short-term follow-ups, which restrict the assessment of sustained nutritional and developmental impacts over time. Methodological inconsistencies, such as variations in intervention design, duration, measurement tools, and outcome indicators, further limit cross-study comparability and generalizability of findings. Additionally, much of the research is conducted at national or state levels, with limited district-level or localized investigations. There is a paucity of comparative rural–urban intervention studies at the district level, including regions such as the Moradabad division. Methodological gaps, contextual variations, and limited policy integration reduce the practical applicability of findings and highlights the need for more rigorous, context-sensitive research frameworks.

4.9 Future Directions

Future research should prioritize longitudinal and controlled intervention-based studies to examine the long-term effects of parental nutrition education on children's growth patterns, dietary behavior, and health outcomes. There is a pressing need for experimental and quasi-experimental designs that isolate parental education as a primary intervention variable while controlling socioeconomic and environmental factors. Moreover, district-level and culturally responsive research should be undertaken to generate context-specific evidence capable of informing localized policy interventions. Comparative rural–urban intervention analyses are essential to understand differential impacts across resource-diverse settings and to develop adaptable models for varied communities. Integrating behavioral outcomes with anthropometric and clinical indicators through mixed-methods approaches will provide a more comprehensive understanding of the mechanisms linking parental education to child health. Finally, greater emphasis should be placed on implementation and policy-oriented research to evaluate the feasibility, scalability, and cost-effectiveness of embedding parental nutrition education within existing frameworks such as PM-POSHAN, POSHAN Abhiyaan, and Anganwadi services, thereby strengthening evidence-based policymaking and ensuring sustainable improvements in child nutrition.

Conclusion

This review highlights the persistent and evolving challenge of nutritional problems among school-going children in India, marked by pronounced rural–urban disparities and the emerging dual burden of undernutrition and nutrition-related risks. Rural children continue to experience higher rates of stunting and underweight, while urban children increasingly face unhealthy dietary patterns and rising risks of overweight and obesity. These contrasting trends underscore the urgent need for context-sensitive and differentiated nutrition policies that simultaneously address nutrient deficiencies and prevent diet-related non-communicable risks.

A central conclusion of this review is the decisive role of parents in shaping children’s dietary behaviors and nutritional outcomes. Parental nutrition knowledge, attitudes, and feeding practices significantly influence household food choices, dietary diversity, and overall diet quality. Evidence consistently suggests that structured parent-focused nutrition education can positively improve children’s dietary habits and, in some cases, measurable nutritional status. Such interventions appear particularly beneficial in rural settings, where awareness of balanced nutrition may be limited, while remaining equally critical in urban areas to counter unhealthy consumption patterns and prevent early-onset obesity.

The findings strongly advocate for integrating structured parental nutrition education into existing school- and community-based initiatives such as PM-POSHAN, POSHAN Abhiyaan, and Anganwadi services. Strengthening school–family partnerships and adopting culturally responsive, family-centered intervention models can enhance program effectiveness and reduce rural–urban nutritional disparities. Finally, advancing longitudinal, district-level, and mixed-methods research will be essential to generate context-specific and policy-relevant evidence, thereby supporting sustainable improvements in child nutrition and long-term public health outcomes.

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Disclosure statement

The authors declare that there is no conflict of interest about the publication of this article.

AI Declaration

The authors declare no part of this manuscript involves plagiarism or fabrication of data, and all ethical guidelines for educational research have been strictly adhered to during the conduct of the study. AI tools, if used, were solely for language refinement, grammatical clarity and formatting assistance. No AI tool was used for generating

the core ideas, analysis, interpretations, or findings of the research.

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