

Nutritional Status and Dietary Patterns of School-Aged Children and Adolescents in Urban Pakistan: Addressing Overweight, Obesity and Micronutrient Deficiencies — A Narrative Review

Suhaib Ahmed¹, Ali Ammar Abid², IlsaAftab³

¹Fcps II in general surgery from Dr Ruth k.m. pfau hospital civil hospital Karachi.

²School of Acupuncture, Moxibustion and Tuina, Tianjin University of Traditional Chinese Medicine, Tianjin, China.

³HND, Faculty of Eastern Medicine, Hamdard University

Corresponding author: Suhaib Ahmed

Email address: tsuhaibahmedmemon786@gmail.com, aliammarabid1@gmail.com,

Abstract

Pakistan is facing a double burden of malnutrition, the coexistence of undernutrition, micronutrient deficiencies, overweight and obesity in children and adolescents. The nutritional status of school-aged children in urban areas has been greatly affected by rapid urbanization, altering dietary patterns, food insecurity, socioeconomic disparities, and the shift to a sedentary lifestyle. This is a narrative review to assess the nutritional status, dietary pattern, prevalence of overweight and obesity, and micronutrient deficiency in school-aged children and adolescents of urban Pakistan. PubMed, Google Scholar, Scopus, EMBASE, the Cochrane Library and national nutrition reports were used to search the literature from 2016 to 2026. All national surveys, cross sectional studies, systematic reviews and meta-analyses relating to nutritional status, dietary patterns, obesity, anemia and micronutrient deficiencies were included. The evidence reviewed indicated that Pakistani children are significantly affected by stunting, wasting, under

weight status, iron deficiency anemia, vitamin D deficiency, as well as other micronutrient deficiencies. At the same time, there was a rise in overweight and obesity, especially in urban areas. High intakes of processed foods and sugar-sweetened beverages, and low intakes of fruits and vegetables and nutrient-rich foods were significant drivers of nutritional imbalance. The results reveal that the problem of malnutrition is an important public health issue in school-going children and adolescents in Pakistan. Interventions that address nutrition more comprehensively, such as school-based nutrition programs, food fortification, nutrition education, routine nutrition screening, and promotion of healthy dietary behaviors and physical activity are critical to improving nutrition outcomes and reducing the long-term health burden of malnutrition.

Keywords:

Nutritional status, dietary patterns, malnutrition, overweight, obesity, micronutrient defi-

ciency, iron deficiency anemia, vitamin D deficiency, school-aged children and adolescent children of Pakistan.

1. INTRODUCTION

Childhood and adolescent nutrition are essential for the physical growth, mental development, immune system and general health and well-being of children. Good nutrition at these crucial times in a child's life helps support growth and development, boost academic achievement, prevent diseases, and lower the risk of chronic adult diseases (World Health Organization, 2021; Black *et al.*, 2013). On the other hand, malnutrition can have negative implications for physical growth, cognition, academic performance and long-term health. Malnutrition is a major public health problem in developing countries such as Pakistan, and continues to be a significant issue in the country due to poverty, food insecurity, lack of dietary diversity, frequent infections, poor sanitation facilities and poor health care services among children and adolescents (National Institute of Health Pakistan, 2018; World Health Organization, 2021; UNICEF Pakistan, 2021). Pakistan is facing a double burden of malnutrition with undernutrition, micronutrient deficiencies, overweight and obesity all coexisting within the same population (National Institute of Health Pakistan, 2018; World Health Organization, 2021). This nutrition shift will present significant challenges for health-care systems and public health policymakers. The rapid urbanization, socioeconomic changes, and changes in lifestyle patterns have had a tremendous impact on dietary behavior of children and adolescents in Pakistan (World Health Organization, 2021; Food and Agriculture Organization, 2019). Changes in traditional diets that emphasize fruits, vegetables, legumes and whole grains are increasingly being

replaced by increased consumption of energy-dense foods and beverages with little nutritional value, such as ultra-processed foods, fast foods and sugar-sweetened beverages (World Health Organization, 2021; 1. Association Between Obesity and Iron Deficiency *et al.*, 2021; Food and Agriculture Organization, 2019). At the same time, a decline in physical activity, rising screen time and sedentary lifestyles have been a major driver of the increasing rate of childhood overweight and obesity, especially in cities (Abbas *S et al.*, 2021/2023 ; Vitamin D Status in Under Five Children in Diverse Communities of Karachi. 2019). While public health measures have been implemented in Pakistan to alleviate micronutrient deficiencies, they are still widespread in children and adolescents (Abbas *et al.*, 2021; UNICEF Pakistan, 2021). Among the most prevalent nutritional diseases reported in this population, we can cite iron deficiency anemia, vitamin D deficiency, zinc deficiency, iodine deficiency, and vitamin A deficiency (Abbas *et al.*, 2021; Abbas *et al.*, 2023; Vitamin D Status Study *et al.*, 2019). These deficiencies have a negative impact on cognitive functioning, immune function, academic achievement and psychosocial development, which reduces the potential of these children to develop to their full capacity (Abbas *et al.*, 2021; Hoddinott *et al.*, 2018; Stevens *et al.*, 2013). Malnutrition in the form of stunting, wasting, underweight status and anaemia continues to be a significant problem among children as evident in the National Nutritional Survey of Pakistan (NNSP) (National Institute of Health Pakistan, 2018). In addition, recent research has reported a rise in overweight and obesity among school-aged children in cities, a new public health crisis, in addition to the ongoing undernutrition (Assessment of Nutritional Status Study *et al.*,

2024; World Health Organization, 2021). There are several negative health outcomes related to childhood obesity such as insulin resistance, type 2 diabetes mellitus, cardiovascular diseases, hypertension and psychological disorders (Association of Iron Deficiency and Anemia with Obesity *et al.*, 2025; Association Between Obesity and Iron Deficiency *et al.*, 2021; World Health Organization, 2021a). With the increasing magnitude of nutritional problems among children and adolescents in Pakistan, it is necessary to have a complete picture of the nutritional status of children and adolescents and their dietary practices, so that they can be used to devise interventions and effective policies. Hence, the present narrative review seeks to critically analyze the nutritional status, dietary pattern, overweight/obesity prevalence and micronutrient deficiencies of school going children and adolescents of urban Pakistan and to identify the possible strategies for improving the nutritional health outcomes of the vulnerable group (National Institute of Health Pakistan, 2018; World Health Organization, 2021; UNICEF Pakistan, 2021; ENN Field Exchange *et al.*, 2017).

Objectives:

1. To evaluate the nutritional status of school-aged children and adolescents in urban Pakistan.
2. To assess overweight and obesity in children.
3. To examine micronutrient deficiencies such as iron deficiency anemia (IDA) and vitamin D deficiency.
4. To examine dietary patterns that can lead to nutritional imbalances.
5. To emphasize preventive measures and public health advice.

3. MATERIALS AND METHODS

The literature search for the narrative review was carried out from 2016 to 2026. Electronic databases (PubMed, Google Scholar, Scopus, EMBASE, and Cochrane Library) and national nutrition reports and official publications were used to identify relevant articles. The studies included the ones focused on nutritional status, dietary patterns, obesity, overweight, anemia, and micronutrient deficiencies in school-aged children and adolescents in Pakistan. National surveys, cross-sectional study, systematic reviews and meta-analyses were taken into consideration. The characteristics of the study and the main findings were extracted and synthesized narratively.

4. RESULTS AND DISCUSSION

The results of this narrative review showed that the malnutrition status in school-going children and adolescents in Pakistan is still a serious public health problem. The results show that under nutrition, micronutrient deficiencies, overweight and obesity all co-exist, pointing to the double burden of malnutrition occurring in a rapidly urbanizing low and middle-income country (LMIC) (National Institute of Health Pakistan, 2018; World Health Organization, 2021; UNICEF Pakistan, 2021). These findings are consistent with the National Nutritional Survey of Pakistan, which revealed high prevalence of stunting, wasting and underweight among children, suggesting the presence of persistent nutritional inequalities with socio-economic disparities (National Institute of Health Pakistan, 2018). The studies reviewed indicated that there was a high prevalence of undernutrition in children in Pakistan. A cross-sectional study carried out in Lahore found that

40% of children were underweight, 42.9% were stunted, 18.4% wasted and 16.6% were overweight and 9.7% were obese (Assessment of Nutritional Status Study *et al.*, 2024). Such findings suggest that both under and overnutrition are present within the same population. The same has been observed in other parts of the world; food consumption and nutritional status have changed due to urbanization and economic transformation (Black *et al.*, 2013). Concurrently, both of these contrasting nutritional situations point to the complexity of tackling malnutrition in Pakistan. The lack of micronutrients was universally mentioned as a serious nutritional problem (Abbas *et al.*, 2021; UNICEF Pakistan, 2021). Iron, zinc, vitamin D and iodine deficiencies were commonly reported in school-age children and adolescents (Abbas *et al.*, 2021; UNICEF Pakistan, 2021). A study was done in flood impacted districts of Khyber Pakhtunkhwa and it was observed that high prevalence of calcium, zinc, iron, vitamin A and iodine deficiency was noted especially in girls (Abbas *et al.*, 2021). The results indicate that environmental, socioeconomic and gender issues could be associated with poor nutrition status. These deficiencies have been shown to affect growth, cognition, immunity and achievement in school. The micronutrient deficiency that was identified as one of the most common nutritional issues was vitamin D deficiency (Abbas *et al.*, 2023; Vitamin D Status Study *et al.*, 2019). One study conducted in Karachi found that the vitamin D level was low in about 60% of the children, with malnourished children having significantly lower levels of vitamin D (Vitamin D Status Study *et al.*, 2019). This may be due to less sun exposure, living indoors, environmental changes and poor food consumption (Abbas *et al.*, 2023; Vitamin D Status Study *et al.*, 2019). These findings are very

important because vitamin D is vital to bone, growth and immune function, and suggest a need for public health interventions to improve vitamin D status in children. Another common nutritional problem reported in school-going children and adolescents was Iron Deficiency Anemia (IDA) (Hoddinott *et al.*, 2018; Frequency of Anemia and Iron Deficiency Study *et al.*, 2018; Iron Deficiency Anemia Review *et al.*, 2024). The reviewed studies reported a high prevalence of anemia, which can have a negative impact on cognition, physical growth, academic achievement, and immunity (Frequency of Anemia and Iron Deficiency Study *et al.*, 2018; Iron Deficiency Anemia Review *et al.*, 2024). Recent studies indicate further association between obesity and iron deficiency. Iron deficiency prevalence was significantly greater in obese children than in the non-obese children in a systematic review of over 24,000 children (Association of Iron Deficiency and Anemia with Obesity *et al.*, 2025). Moreover, obesity-induced inflammation can disrupt iron metabolism and absorption, creating a risk of iron deficiency even in overweight people (Association Between Obesity and Iron Deficiency *et al.*, 2021). The results of this study suggest that there is a possibility of the coexistence of obesity and micronutrient deficiencies and that they should not be considered as two distinct nutritional issues. A significant shift in dietary patterns of Pakistani children and adolescents has also been pointed out in the review as a result of urbanization and lifestyle changes (World Health Organization, 2021; Food and Agriculture Organization, 2019). Over time, habits of drinking more sugar-sweetened beverages, eating more fast foods and processed foods, and more energy dense snacks have replaced traditional diets which is rich in fruits and vegetable and legumes (World Health

Organization, 2021; Food and Agriculture Organization, 2019). Consequently, low consumption of foods that are high in nutrients and insufficient dietary diversity are prevalent among children, which leads to micronutrient deficiencies and overconsumption of calories (Food and Agriculture Organization, 2019). This is in line with the international research that has established a connection between the dietary shift and the increasing burden of malnutrition. In addition, childhood overweight and obesity were recognized as emerging as public health issues, especially in cities (Assessment of Nutritional Status Study *et al.*, 2024; World Health Organization, 2021; World Health Organization, 2022). The literature that was reviewed was linked to sedentary lifestyles, more screen time, less physical activity, and eating more “energy dense” foods (World Health Organization, 2022). The rising incidence of obesity is a cause of concern as it causes long-term health issues such as insulin resistance, type 2 diabetes mellitus, cardiovascular diseases, and psychological disorders. The situation of coexisting micronutrient deficiencies with overweight or obesity also supports the concept of “hidden hunger” where the child is eating enough, or too many calories but not enough nutrients (Association of Iron Deficiency and Anemia with Obesity *et al.*, 2025; Association between Obesity and Iron Deficiency *et al.*, 2021). In short, the findings of this review suggest that nutritional issues among school-going children in Pakistan have multifaceted and interlinked nature. The evidence indicates that the problem of undernutrition is not the only issue since micronutrient deficiencies and obesity are becoming more common (Abbas *et al.*, 2021; UNICEF Pakistan, 2021; Hoddinott *et al.*, 2018). The review of the literature confirms that comprehensive interventions, such as school-

based nutrition programs, routine nutritional screening, nutrition education physical activity promotion, and food fortification interventions can be implemented (Hoddinott *et al.*, 2018; ENN Field Exchange *et al.*, 2017). Fortification of staple foods with micronutrients has been proven to address micronutrient deficiencies and could be a pragmatic public health strategy (Hoddinott *et al.*, 2018). The findings also highlight the need for a coordinated action plan with the involvement of the health, education, policymakers, parents, and community stakeholders for enhancing the nutritional status of children and adolescents in Pakistan (Bhutta *et al.*, 2020; ENN Field Exchange *et al.*, 2017). Specific focus needs to be paid to vulnerable groups such as adolescent girls and children from disadvantaged socioeconomic backgrounds, who continue to be vulnerable to malnutrition and its long-term effects (Abbas *et al.*, 2021; Bhutta *et al.*, 2020). Overall, the evidence indicates that the implementation of integrated and sustainable nutrition interventions is a key priority to alleviate the burden of malnutrition and enhance the health of children and adolescents in Pakistan.

4. CONCLUSION

This narrative review brings attention to the fact that the problem of malnutrition has persisted as a serious public health issue in school-age children and adolescents in Pakistan. The growing evidence shows that undernutrition, micronutrient deficiency, overweight and obesity are all present, which shows a double burden of malnutrition (National Institute of Health Pakistan, 2018; World Health Organization, 2021; UNICEF Pakistan, 2021; Assessment of Nutritional Status Study *et al.*, 2024). Iron, vitamin D, zinc, iodine and vitamin A deficiencies have continued to negatively impact

growth, cognition, academic achievement and health in children and adolescents (Abbas *et al.*, 2021; UNICEF Pakistan, 2021; Vitamin D Status Study *et al.*, 2019; Pakistan Journal of Health Sciences *et al.*, 2024; Frequency of Anemia and Iron Deficiency Study *et al.*, 2018). Concurrently, with the growing urbanization rate, unhealthy eating habits, lack of physical activity and sedentary lifestyle are contributing to the growing prevalence of child overweight and obesity (World Health Organization, 2021; Association Between Obesity and Iron Deficiency *et al.*, 2021; Food and Agriculture Organization, 2019; UNICEF Pakistan, 2021; World Health Organization, 2022). The presence of micronutrient deficiencies in children even when they are obese further corroborates the increasing problem of hidden hunger in children of Pakistan (Association of Iron Deficiency and Anemia with Obesity *et al.*, 2025; Association Between Obesity and Iron Deficiency *et al.*, 2021). The results of this review highlight the need for wide-reaching and comprehensive nutrition interventions, such as school-based nutrition programs, micronutrient supplementation and food fortification, frequent nutrition screening, nutrition education and nutrition messages to promote healthy eating habits and physical activity (Hoddinott *et al.*, 2018; ENN Field Exchange *et al.*, 2017; Association of Iron Deficiency and Anemia with Obesity *et al.*, 2025). Improving nutrition surveillance systems and enacting evidence-based public health policies are also critical in order to effectively prevent undernutrition and overnutrition (National Institute of Health Pakistan, 2018; Hoddinott *et al.*, 2018; ENN Field Exchange *et al.*, 2017). Enabling better nutrition and nutrition outcomes for Pakistani children and adolescents, and more especially for vulnerable groups including adolescent girls and

children from poor socioeconomic status, will require concerted action between healthcare, education, policy making, parents and community (Abbas *et al.*, 2021; ENN Field Exchange *et al.*, 2017; Bhutta *et al.*, 2020).

5. REFERENCES

- Abbas S, Aboushlela D, Ismail Khan. Prevalence of Micro-nutrient Deficiency Among Preschool and School going Children in Flood-Hit Areas of Pakistan. 2021.
- Abbas S, Aboushlela D, Ismail Khan. Prevalence of Micro-nutrient Deficiency Among Preschool and School going Children in Flood-Hit Areas of Pakistan. 2021/2023.
- Assessment of Nutritional Status in School and non going School Going Children of Age 5–12 Years. J Health Rehabil Res. 2024.
- Association Between Obesity and an Iron Deficiency. Exp Ther Med. 2021.
- Association of Iron Deficiency and Anemia with obesity among Children: A Systematic Review and Meta-analysis. Obesity Reviews 2025.
- Bhutta ZA, Soofi SB, Zaidi SS, et al. Nutrients and a Health Challenges in Pakistan. Journal of Pakistan Medical Association.
- Black RE, Victora CG, Walker SP, et al. Maternal and Child undernutrition and overweight in low Income and Middle-Income Countries. The Lancet 2013; 382:427–451.
- Filling the Nutrient Gap in Pakistan: Insights to an Address Malnutrition. ENN Field Exchange 2017.
- Food and Agriculture Organization (FAO). The Nutrition Country Profile: Pakistan.
- Frequency of Anemia and Iron Deficiency Among the Children Starting First Year of School Life and their Association with Weight and Height. 2018.
- Hoddinott J, et al. Reducing Micronutrient Deficiencies in Pakistani Children: Are Subsidies on Fortified Complementary Foods Cost-Effective? The Public Health Nutrition. 2018.
- Micronutrient Profiles in Severe Acute Malnutrition: The Analyzing Vitamin B12, Zinc, Copper, Manganese, Molybdenum, and Cobalt Levels. Pakistan Journal of Health Sciences. 2024.
- National Institute of Health Pakistan. National Nutritional Survey 2018. Islamabad: Government of Pakistan; 2018.

- Stevens GA, Finucane MM, De-Regil LM, et al. Global, Regional, and National Trends in Hemoglobin Concentration and Prevalence of Total and Severe Anemia in Children and Pregnant Women. *A Lancet Global Health*. 2013.
- UNICEF Pakistan. Child Nutrition and the Micronutrient Deficiency Reports. Islamabad: UNICEF.
- Uncovering the Hidden Health Burdens: A Systematic Review and Meta-analysis of Iron Deficiency anemia Among Adolescents and Pregnant Women in Pakistan. 2024.
- UNICEF Pakistan. Child Nutrition and Micronutrients Deficiency Reports.
- Vitamin D Status in Under Five Children in a Diverse Communities of Karachi 2019.
- World Health Organization. The Malnutrition Factsheet. WHO.
- World Health Organization. Obesity and an Overweight Factsheet. WHO.
- World Health Organization. Malnutrition Factsheet Geneva: WHO; 2021.