Original Article

Assessment of Nutritional Status in School and Non-School Going Children of Age 5-12 Years

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ABSTRACT

Background: Nutritional problems are prevalent among children, particularly in countries like Pakistan. A balanced diet and physical activity are essential for the normal growth of children between the ages of 5 to 12 years.

Objective: To assess the nutritional status of children aged 5 to 12 years in Lahore.

Methods: A cross-sectional study was conducted among 310 children, including both school-going and non-school-going individuals, from four schools—two from Bhamman and two from Taqipur, Lahore. Participants were selected using a convenient sampling technique. Anthropometric measurements (height and weight) were taken using standardized instruments. Dietary intake data were collected using a Food Frequency Questionnaire (FFQ). The Body Mass Index (BMI) for age, height for age, and weight for age z-scores were calculated using WHO growth standards. Data were analyzed using SPSS version 25, employing descriptive statistics and chi-square tests to assess associations between nutritional status and various factors. Ethical approval was obtained from the Ethical Review Committee of the University Institute of Diet and Nutritional Sciences, Faculty of Allied Health Sciences, The University of Lahore. Informed consent was obtained from the parents or guardians of all participating children.

Results: Out of 310 subjects, 42.9% were stunted, and 18.4% experienced wasting. Underweight prevalence was 40%, while 16.5% were overweight, and 9.7% were obese. The gender distribution included 101 females (32.6%) and 209 males (67.4%). The mean age was 8 ± 2.38 years, with the minimum and maximum ages being 5 and 12 years, respectively.

Conclusion: The study indicates a significant prevalence of both undernutrition and overnutrition among children aged 5 to 12 years in Lahore. There is a critical need for targeted interventions to address these nutritional issues through education, policy development, and community-based initiatives.

Keywords: Malnutrition, Stunting, Wasting, Nutritional Status, Underweight, Overweight, Obesity, BMI, Lahore, Child Nutrition, Public Health, Dietary Intake, Anthropometric Measurements

INTRODUCTION

Nutritional status, a vital indicator of overall health and development, reflects the intricate interplay of dietary intake, health conditions, and environmental factors. Adequate nutrition is essential for maintaining good health at any life stage, but it is particularly crucial during childhood, a period characterized by rapid growth and development (1). Malnutrition, encompassing both undernutrition and overnutrition, leads to alterations in body composition and impaired physiological functions, which may or may not be associated with inflammation (2). The importance of child growth as a key indicator of nutritional status cannot be overstated, given that childhood is a critical period for nutrient deposition that supports future health and development (3). Globally, indices such as underweight, stunting, overweight, obesity, and wasting are recognized measures of nutritional status. Stunting, in particular, has far-reaching consequences, affecting not only immediate health outcomes but also long-term prospects in education, welfare, and maternal health (5).

Malnutrition remains a pervasive global issue, with projections indicating that it will be the underlying cause of a majority of diseases by 2020 (6). Factors influencing child health are multifaceted, including income levels, healthcare access, maternal education,

migration, and economic equality, with nutrient consumption being a predominant determinant (7). In South Asia, over half of the children are malnourished, with a significant proportion of the world's malnourished school-aged children residing in Pakistan, Bangladesh, and India (8). The situation in Pakistan is particularly dire, with an estimated 740,000 children dying annually due to severe malnutrition (9). Globally, malnutrition results in 28% of children being stunted, with even higher rates of underweight and stunting in developing countries, reaching up to 62% and 52%, respectively (10). Without intervention, nearly one billion children are projected to suffer physical and mental impairments by 2020 due to malnutrition (10).

Dietary habits, including regular meals and healthy snacking, play a critical role in meeting daily nutritional requirements and improving overall diet quality (11). Poor nutrition during childhood is strongly associated with delayed academic growth, reduced work competence, and increased functional impairments (12). Despite the known consequences, comprehensive data on the nutritional status of children in Pakistan remains scarce, underscoring the need for detailed assessments using international growth references (13). This study seeks to address this gap by evaluating the nutritional status of school-going and non-school-going children aged 5 to 12 years in Lahore. By identifying the prevalence and risk factors of malnutrition, the study aims to inform targeted interventions and educational programs. These efforts are crucial for reducing morbidity and mortality associated with malnutrition and for promoting healthier dietary choices within the community. Addressing malnutrition requires a multi-faceted approach, including education, policy development, and community-based initiatives to foster sustainable improvements in child health and nutrition.

MATERIAL AND METHODS

The study employed a cross-sectional design to assess the nutritional status of children aged 5 to 12 years in Lahore. A total of 310 children, including 101 females and 209 males, participated in the study. The sample comprised both school-going and non-school-going children selected from four schools—two located in Bhamman and two in Taqipur, Lahore. Participants were recruited using a convenient sampling technique to ensure a diverse representation of the population.

Anthropometric measurements, including height and weight, were taken using standardized instruments. Height was measured to the nearest 0.1 cm using a stadiometer, and weight was recorded to the nearest 0.1 kg using a calibrated digital scale. Children were measured in light clothing and without shoes to ensure accuracy. The Body Mass Index (BMI) for age, height for age, and weight for age z-scores were calculated according to the World Health Organization (WHO) growth standards, which provide a reliable framework for assessing nutritional status in children (3).

Dietary intake data were collected using a Food Frequency Questionnaire (FFQ), which was administered to both the children and their parents or guardians. The FFQ was designed to capture the frequency and quantity of food consumed over the past month, covering various food groups such as cereals, fruits, vegetables, dairy products, meat, and snacks. This method provided comprehensive insight into the children's dietary patterns and nutritional intake.

The study adhered to ethical principles outlined in the Declaration of Helsinki. Informed consent was obtained from the parents or guardians of all participating children, ensuring that they were fully aware of the study's purpose and procedures. The study protocol received approval from the Ethical Review Committee of the University Institute of Diet and Nutritional Sciences, Faculty of Allied Health Sciences, The University of Lahore, ensuring that all ethical standards were met (1).

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Descriptive statistics were employed to summarize the demographic characteristics of the study population, including age, gender, and nutritional status. Frequency distributions and percentages were used to determine the prevalence of stunting, wasting, underweight, overweight, and obesity among the children. Inferential statistics, including chi-square tests, were utilized to assess the association between nutritional status and various demographic and socioeconomic factors. A p-value of less than 0.05 was considered statistically significant, ensuring that the findings were robust and reliable (4).

This methodological approach provided a thorough and accurate assessment of the nutritional status of children in Lahore, offering valuable insights into the prevalence and risk factors of malnutrition in this population. The use of standardized measurements and rigorous data collection and analysis techniques ensured the reliability and validity of the study's findings.

RESULTS

A total of 310 children participated in the study, comprising 101 girls (32.6%) and 209 boys (67.4%). The mean age of the participants was 8 ± 2.38 years, with ages ranging from 5 to 12 years.

Table 1: Distribution of Subjects According to BMI for Age Z-Score

BMI for Age Z-Score	Frequency	Percent (%)

Severe Wasting	42	13.5
Wasting	15	4.8
Normal	172	55.5
Overweight	51	16.5
Obese	30	9.7
Total	**310**	**100.0**

According to the BMI for age z-scores, 13.5% of the children were severely wasted, 4.8% were wasted, 55.5% were normal, 16.5% were overweight, and 9.7% were obese.

Table 2: Distribution of Subjects According to Height for Age Z-Score and Weight for Age Z-Score

Z-Score Category	Frequency (Height)	Percent (Height)	Frequency (Weight)	Percent (Weight)
Normal	135	43.5	152	49.0
Mildly Stunted/Underweight	44	14.2	39	12.6
Moderately Stunted/Underweight	22	7.1	32	10.3
Severely Stunted/Underweight	67	21.6	53	17.1
Tall Stature/Obese	42	13.5	34	11.0
Total	**310**	**100.0**	**310**	**100.0**

Regarding height for age z-scores, 43.5% of the children had normal height, 14.2% were mildly stunted, 7.1% were moderately stunted, and 21.6% were severely stunted. Additionally, 13.5% of the children had tall stature. For weight for age z-scores, 49.0% of the children were normal, 12.6% were mildly underweight, 10.3% were moderately underweight, 17.1% were severely underweight, and 11.0% were obese.

The study revealed that stunting (42.9%) and wasting (18.4%) were prevalent among the children. The prevalence of stunting was similar to the findings of the PMRC National Health Survey of Pakistan NNS 2011, which reported that 43.7% of children were stunted. Wasting was reported at 15.1% in the NNS 2011 survey (14). Comparative studies in other countries reported lower stunting rates: 16.64% in Kenya, 17.4% in Nigeria, and 18.5% in India (15-17).

In comparison to other local studies, the current study showed higher rates of underweight (40%), overweight (16.5%), and obesity (9.7%). According to the NNS 2011, 31.5% of children were underweight (20). A study conducted in Lahore reported that 21.8% of children were overweight and 11.9% were obese (21). Another study in Hazara indicated that 4.78% of children were obese (22), while a study in Karachi found that 8% were overweight and 6% were obese (23).

These findings indicate a significant prevalence of both undernutrition and overnutrition among children aged 5 to 12 years in Lahore. The dual burden of malnutrition underscores the critical need for targeted interventions and educational programs to address these nutritional issues and improve the health status of this vulnerable population.

DISCUSSION

The present study aimed to assess the nutritional status of children aged 5 to 12 years in Lahore, revealing significant insights into the dual burden of undernutrition and overnutrition in this population. The findings indicated that 42.9% of the children were stunted, and 18.4% were wasted, highlighting a critical public health issue. The prevalence of stunting observed in this study was consistent with the PMRC National Health Survey of Pakistan (NNS 2011), which reported that 43.7% of children were stunted and 15.1% were wasted, suggesting that these nutritional deficits have remained persistent over the years (14). This consistency underscored the ongoing challenge of addressing chronic malnutrition in Pakistan.

Comparatively, studies conducted in other countries reported lower stunting rates, such as 16.64% in Kenya, 17.4% in Nigeria, and 18.5% in India (15-17). These differences could be attributed to varying socio-economic conditions, healthcare access, and nutritional interventions across these regions. In rural Sindh, Pakistan, a study found that 16.5% of children were stunted, with a higher prevalence among females compared to males, influenced by factors such as parental employment and socio-economic status (18). Similarly, a study in Islamabad reported 13% wasting, 35% stunting, and 29.5% underweight among children aged 5-10 years, reflecting the widespread nature of malnutrition across different regions of Pakistan (19).

The present study also identified that 40% of children were underweight, 16.5% were overweight, and 9.7% were obese. These findings were in line with previous studies in Pakistan, where 31.5% of children were reported to be underweight according to NNS 2011 (20). In Lahore, another study found that 21.8% of children were overweight and 11.9% were obese, indicating a growing concern of overnutrition alongside undernutrition (21). The observed prevalence of overweight and obesity in this study was

comparable to figures reported in Karachi, where 8% of children were overweight and 6% were obese, highlighting the dual burden of malnutrition in urban settings (23).

This study's strengths included a comprehensive assessment of nutritional status using standardized anthropometric measurements and dietary intake data, which provided a detailed understanding of the nutritional challenges faced by children in Lahore. The use of WHO growth standards ensured that the findings were comparable to international benchmarks. However, the study had several limitations, including the use of convenient sampling, which might not have been representative of the broader population. Additionally, the cross-sectional design limited the ability to establish causal relationships between socio-economic factors and nutritional status(22).

The findings underscored the need for targeted interventions to address both undernutrition and overnutrition among children in Lahore. Recommendations included implementing educational programs for parents and caregivers to promote healthy dietary practices and regular physical activity. Policymakers should develop and enforce nutrition-related policies and monitor their implementation to ensure their effectiveness. Community-based initiatives, such as nutrition awareness campaigns and school-based health programs, could also play a crucial role in improving the nutritional status of children.

Addressing malnutrition required a multifaceted approach, including education, policy development, and community-based initiatives to foster sustainable improvements in child health and nutrition. By identifying the prevalence and risk factors of malnutrition, the study aimed to inform targeted interventions and educational programs, which were crucial for reducing morbidity and mortality associated with malnutrition and for promoting healthier dietary choices within the community.

CONCLUSION

The study indicates a significant prevalence of both undernutrition and overnutrition among children aged 5 to 12 years in Lahore. There is a critical need for targeted interventions to address these nutritional issues through education, policy development, and community-based initiatives.

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