

ASSESSMENT OF POOR EATING HABITS AND NUTRITIONAL STATUS AMONG SCHOOL-GOING CHILDREN AGED 6–10 YEARS IN PARACHINAR

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Abstract

Aim and objectives:

The present study aims to assess the dietary habits and nutritional status of school-aged children (6–10 years) in Parachinar, Pakistan. The objectives were to determine the prevalence of poor dietary practices among children and to evaluate their association with nutritional status.

Methodology: A cross-sectional study was conducted among 384 school-aged children in Parachinar, Pakistan. The sample included 175 males and 209 females selected through simple random sampling. Data on dietary habits were collected using structured dietary questionnaires. Result were analysed using SPSS 22 version.

Results: The findings revealed that only 43% of children had normal nutritional status, indicating a considerable burden of malnutrition in the study population. Obesity was observed in 22.1% of children, while 20.3% showed signs of micronutrient deficiencies, reflecting the coexistence of undernutrition and overnutrition. In terms of dietary behaviour, 40.1% of children reported consuming fast food at least four times per week. Additionally, the overall quality of diet showed a noticeable decline with increasing age, particularly among children approaching ten years.

Conclusion: The study concludes that school-aged children in Parachinar are experiencing a rapid nutritional transition toward unhealthy and ultra-processed foods, which is contributing to the growing burden of malnutrition and diet-related health risks. There is a need for school-based healthy canteen policies and community-level nutrition education programs to promote healthier dietary habits.

INTRODUCTION

Adequate nutrition during childhood is fundamental for normal physical growth, cognitive

development, immune function, and long-term health. School-aged children require balanced amounts of carbohydrates, proteins, fats, vitamins,

and minerals to support rapid growth and increasing educational demands. The age of 6–10 years represents a critical developmental period during which dietary habits become established and frequently persist into adolescence and adulthood. Consequently, dietary practices adopted during this stage have lifelong implications for health and disease prevention.

In recent decades, childhood dietary patterns have undergone substantial changes worldwide. Traditional diets rich in cereals, legumes, fruits, vegetables, and milk have increasingly been replaced by highly processed foods characterized by excessive sugar, saturated fat, sodium, and refined carbohydrates. Fast foods, packaged snacks, sugar-sweetened beverages, and energy-dense processed meals have become readily available and are aggressively marketed toward children. Although these foods provide substantial caloric intake, they often lack essential vitamins, minerals, dietary fiber, and high-quality protein required for healthy growth. Consequently, many children simultaneously experience excessive energy intake and inadequate micronutrient consumption, resulting in the phenomenon known as the "double burden of malnutrition."

The increasing consumption of ultra-processed foods has contributed to rising rates of childhood obesity, micronutrient deficiencies, and diet-related non-communicable diseases worldwide. Bowman et al. demonstrated that frequent fast-food consumption significantly increases total daily energy intake while reducing overall dietary quality. Similarly, Lobstein et al. concluded that childhood obesity is closely associated with increasing availability and consumption of processed foods, predisposing children to diabetes mellitus, hypertension, and cardiovascular diseases later in life. Recent studies have also shown that replacing traditional nutrient-rich diets with processed foods adversely affects physical growth, cognitive development, and academic performance among school-aged children.

Pakistan is currently experiencing a rapid nutritional transition. Urbanization, changing lifestyles, aggressive food marketing, and increased accessibility of inexpensive processed foods have substantially altered children's dietary behaviors.

National surveys indicate increasing prevalence of overweight, obesity, iron deficiency, vitamin A deficiency, and inadequate dietary diversity among Pakistani children. Despite improvements in food availability, many children continue to consume diets dominated by refined carbohydrates while failing to meet recommended intakes of fruits, vegetables, dairy products, and high-quality protein. This pattern contributes to hidden hunger, whereby adequate caloric intake coexists with deficiencies of essential micronutrients.

Several factors contribute to poor dietary habits among school-aged children. Food preferences are strongly influenced by family eating patterns, socioeconomic status, parental education, school food environments, peer influence, television advertisements, and social media marketing. As children grow older, they become increasingly independent in selecting foods and are more likely to purchase unhealthy snacks and sugar-sweetened beverages. Weichselbaum and Buttriss emphasized that taste and convenience often outweigh nutritional value when children make food choices, thereby promoting excessive consumption of energy-dense, nutrient-poor foods. Likewise, Contento, Patrick and Nicklas, Story et al., and Hawkes et al. highlighted the important roles of schools, families, and public health policies in shaping children's eating behaviors through nutrition education and supportive food environments.

Although numerous international and national studies have investigated childhood nutrition, limited evidence is available from geographically remote districts of Pakistan, including Parachinar. Most published studies have focused on major urban centers, where dietary behaviors, food availability, and socioeconomic conditions differ considerably from rural and mountainous regions. Consequently, local evidence is required to better understand the dietary patterns, prevalence of poor eating habits, and nutritional challenges faced by children in these underserved communities. Such information is essential for designing context-specific nutrition education programs and effective public health interventions. Therefore, the present study was conducted to assess poor eating habits and nutritional status

among school-going children aged 6–10 years in Parachinar, Pakistan. Specifically, the study aimed to evaluate dietary patterns, determine the prevalence of unhealthy eating behaviors, examine age- and gender-related differences, and assess the nutritional status of children using anthropometric measurements based on World Health Organization growth standards. The findings are expected to provide baseline evidence for policymakers, educators, and healthcare professionals to develop targeted interventions aimed at improving childhood nutrition and reducing the burden of malnutrition in the region.

Materials and Methods

Study Design and Setting

A community-based cross-sectional study was conducted between **November 2025 and March 2026** to assess poor eating habits and nutritional status among school-going children aged **6–10 years** residing in Parachinar, District Kurram, Khyber Pakhtunkhwa, Pakistan. The study was carried out at the household level because schools remained closed during the winter vacation. Conducting household visits enabled direct interaction with parents or guardians and allowed collection of more reliable information regarding children's routine dietary practices.

Study Population and Sample Size

The target population comprised boys and girls aged **6–10 years** enrolled in government and private primary schools in Parachinar. The required sample size was calculated using the **Cochran formula** for prevalence studies recommended by the World Health Organization:
$$[n = \frac{Z^2 pq}{d^2}]$$
 where $Z = 1.96$ at a 95% confidence level, $p = 0.50$ (assumed prevalence due to lack of local estimates), $q = 1 - p$, and $d = 0.05$ margin of error. Based on this calculation, the minimum representative sample size was **384 children**.

Sampling Technique

Participants were selected using **simple random sampling** from households across Parachinar. This sampling technique ensured that each eligible child had an equal probability of selection, thereby

reducing selection bias and improving the representativeness of the study population.

Eligibility Criteria

Children aged **6–10 years** enrolled in government or private schools of Parachinar were eligible for inclusion irrespective of sex. Children younger than six years or older than ten years and those receiving long-term medications that could influence nutritional status or growth were excluded from the study.

Data Collection

Data were collected through **face-to-face interviews** using a structured questionnaire developed after an extensive review of relevant literature. Information was obtained from both children and their parents or guardians. Dietary habits were assessed using a **Food Frequency Questionnaire (FFQ)** that evaluated the frequency of fast-food consumption, processed food intake, breakfast skipping, fruit and vegetable consumption, and intake of sugar-sweetened beverages. Parents completed a separate questionnaire regarding household dietary practices to validate the children's responses.

Anthropometric measurements including **height and weight** were obtained using standardized procedures, and Body Mass Index (BMI) was calculated. Nutritional status was assessed using **WHO growth standards**, including BMI-for-age, height-for-age, and weight-for-age indices. In addition, children underwent a brief clinical nutritional assessment to identify visible signs of micronutrient deficiencies.

Study Variables

The primary outcome variables included nutritional status categories (normal, underweight, obesity, stunting, and micronutrient deficiency). Independent variables included age, sex, dietary patterns, fast-food consumption, fruit and vegetable intake, sugary beverage consumption, breakfast skipping, and other poor dietary practices evaluated through the FFQ.

Statistical Analysis

Data were coded, entered, cleaned, and analyzed using **Statistical Package for the Social Sciences (SPSS) version 22**. Descriptive statistics were used to summarize the findings. Continuous variables were summarized using appropriate descriptive measures, whereas categorical variables were presented as frequencies and percentages. Results were displayed using tables and figures to illustrate age-wise, gender-wise, dietary, and nutritional characteristics of the study participants.

Ethical Considerations

Ethical approval was obtained from the **Research Ethics Committee (REC), Institute of Health Sciences Kurram, Khyber Medical University** before commencement of the study. Written informed consent was obtained from parents or

legal guardians prior to data collection. Participation was voluntary, confidentiality of all collected information was strictly maintained, and no invasive procedures were performed during the study.

RESULTS

A total of **384 school-going children** aged **6–10 years** participated in the study. Of these, **175 (45.6%)** were boys and **209 (54.4%)** were girls. The findings demonstrated a high prevalence of unhealthy dietary behaviors, including frequent fast-food consumption, low intake of fruits and vegetables, breakfast skipping, and sugar-sweetened beverage consumption. Nutritional assessment further revealed a considerable burden of obesity and micronutrient deficiencies among the study population.

Table 1. Age and Gender-wise Distribution of School-going Children (n=384)

Age (Years)	Boys (n)	Boys (%)	Girls (n)	Girls (%)	Total (n)
6	30	17.1	35	16.7	65
7	32	18.3	40	19.1	72
8	35	20.0	42	20.1	77
9	34	19.4	45	21.5	79
10	44	25.1	47	22.5	91
Total	175	100	209	100	384

Interpretation

Table 1 presents the demographic characteristics of the study participants. Among the 384 children included in the study, girls constituted a slightly larger proportion (54.4%) than boys (45.6%). The largest age group consisted of ten-year-old children (n=91), representing approximately one-quarter of the study population, whereas children aged six years represented the smallest proportion (n=65).

The relatively even distribution across all age categories provides a representative sample of school-aged children and permits meaningful comparisons of dietary habits and nutritional status across different stages of childhood development. This balanced age distribution also strengthens the reliability of age-specific analyses presented in subsequent tables.

Table 2. Age-wise Distribution of Fast-Food Consumption Among Boys (n=175)

Age (Years)	Boys	Percentage (%)
6	30	17.1
7	32	18.3
8	35	20.0
9	34	19.4
10	44	25.1

Age (Years)	Boys	Percentage (%)
Total	175	100

Interpretation

The age-wise distribution of fast-food consumption among boys demonstrated a progressive increase with advancing age. Children aged ten years accounted for the highest proportion of fast-food consumers (25.1%), whereas six-year-old boys represented the lowest proportion (17.1%). This gradual increase suggests that older boys become increasingly exposed to

unhealthy food environments and exercise greater independence in selecting their meals. Increased purchasing power, peer influence, media exposure, and accessibility of processed foods may contribute to this pattern. These findings indicate that unhealthy eating behaviors become more prevalent as boys grow older and may contribute to the increasing burden of childhood obesity observed within the study population.

Table 3. Age-wise Distribution of Fast-Food Consumption Among Girls (n=209)

Age (Years)	Girls	Percentage (%)
6	35	16.7
7	40	19.1
8	42	20.1
9	45	21.5
10	47	22.5
Total	209	100

Interpretation

Similar to boys, fast-food consumption among girls increased steadily with age. The highest prevalence was observed among ten-year-old girls (22.5%), while the lowest was recorded among six-year-olds (16.7%). The consistent upward trend suggests that dietary behaviors progressively shift toward greater reliance on processed and energy-dense

foods during late childhood. Increasing autonomy, exposure to unhealthy food advertising, and changing food preferences may partly explain this transition. These findings indicate that nutritional interventions should begin early in childhood before unhealthy dietary habits become firmly established.

Table 4. Dietary Pattern with Key Macronutrient and Micronutrient Profiles

Dietary Pattern	Typical Foods Consumed	Macronutrient Profile	Key Micronutrients	Boys (n)	Girls (n)	% Boys	% Girls
Traditional Balanced	Whole wheat, lentils, vegetables, milk	Balanced carbohydrates, adequate protein	Iron, Calcium, Zinc, Vitamin A	13	11	12	5
High-Carb/Refined	White bread, biscuits, snacks	High refined carbohydrates, low protein	Low Iron, Zinc, Vitamin A	27	29	29	14
Protein-Adequate	Eggs, yogurt, chicken, milk	Adequate protein, moderate fat	Calcium, Vitamin B12, Iron	10	11	6	5

Dietary Pattern	Typical Foods Consumed	Macronutrient Profile	Key Micronutrients	Boys (n)	Girls (n)	% Boys	% Girls
Fast Food/Processed	Burgers, soft drinks	fries, High saturated fat and sugar	Low Iron, Calcium, Vitamin C	35	30	20	14
Low-Diversity	Roti with tea, rice only	Energy adequate, low protein	Iron, Zinc, Iodine deficient	16	17	9	8
Milk-Dominant	Milk, tea with milk, bread	Moderate fat, limited protein diversity	Calcium adequate, low Iron	15	16	9	8
Snack-Based	Packaged juices	snacks, High sugar and fat, low protein	Very low micronutrients	33	34	19	16
Diverse/Nutrient-Rich	Cereals, fruits, nuts	pulses, Balanced macronutrients	Iron, Zinc, Calcium, Vitamin D	7	3	4	1
Total				156	151	89	71

Interpretation

Analysis of dietary patterns revealed substantial variation in both macronutrient and micronutrient intake among school-aged children. The most frequently reported dietary patterns were **Fast Food/Processed** and **Snack-Based** diets, both characterized by excessive sugar and saturated fat intake accompanied by poor micronutrient quality. Conversely, only a small proportion of children consumed **Traditional Balanced** or **Diverse/Nutrient-Rich** diets that provide

adequate protein and essential micronutrients. Several children also relied on **High-Carbohydrate Refined, Milk-Dominant, and Low-Diversity** diets, which provide adequate calories but insufficient dietary diversity. These findings demonstrate a clear nutritional transition from traditional eating habits toward energy-dense, nutrient-poor dietary patterns, increasing children's susceptibility to both obesity and hidden micronutrient deficiencies.

Table 5. Frequency of Major Poor Dietary Habits (n=384)

Dietary Habit	Boys	Girls	Total	Percentage (%)
Fast Food (≥4 times/week)	72	82	154	40.1
Sugary Drinks	65	77	142	37.0
Low Fruit Intake	61	74	135	35.2
Low Vegetable Intake	58	69	127	33.1
Breakfast Skipping	44	52	96	25.0

Interpretation

Table 5 summarizes the major unhealthy dietary practices identified among school-aged children. Frequent fast-food consumption was the most common behavior, affecting **40.1%** of participants, followed closely by regular intake of sugar-sweetened beverages (**37.0%**). Approximately one-third of children reported inadequate consumption of fruits (**35.2%**) and vegetables

(**33.1%**), while one-quarter skipped breakfast regularly (**25.0%**). These dietary behaviors collectively indicate poor overall diet quality and inadequate adherence to healthy dietary recommendations. The coexistence of high fast-food intake and low consumption of nutrient-rich foods likely contributes substantially to the high prevalence of obesity and micronutrient deficiencies observed among the study population.

These findings emphasize the urgent need for school- and community-based nutrition

interventions aimed at improving children's dietary behaviors.

Table 6. Overall Nutritional Status of Children Aged 6–10 Years (n = 384)

Nutritional Status	Boys (n=175)	Boys (%)	Girls (n=209)	Girls (%)	Total (n=384)	Overall (%)
Normal	77	44.0	95	45.5	172	43.0
Obese	40	22.8	45	21.5	85	22.1
Micronutrient Deficiency	37	21.1	41	19.6	78	20.3
Stunted	10	5.7	15	7.1	25	6.5
Underweight	11	6.2	13	6.2	24	6.2

Interpretation

Table 6 presents the overall nutritional status of school-going children included in the study. Less than half of the participants (**43.0%**) had normal nutritional status, indicating that the majority were affected by one or more forms of malnutrition. Obesity was the most prevalent nutritional disorder, affecting **22.1%** of children, followed closely by micronutrient deficiencies (**20.3%**). Stunting and underweight were observed in **6.5%** and **6.2%** of participants, respectively. Obesity was distributed almost equally between

boys and girls, whereas stunting occurred slightly more frequently among girls. These findings clearly demonstrate the coexistence of overnutrition and undernutrition within the same population, reflecting the double burden of malnutrition. The predominance of obesity together with micronutrient deficiencies suggests that many children consume excessive calories from processed foods while failing to meet their requirements for essential vitamins and minerals. This pattern represents an important emerging public health challenge in Parachinar and warrants immediate nutritional interventions.

Table 7. Age-wise Distribution of Underweight Children

Age (Years)	Boys (n)	Girls (n)	Total Underweight	Overall (%)
6	3	1	5	1.2
7	2	1	3	0.8
8	1	3	4	1.0
9	3	4	7	1.8
10	2	4	5	1.4
Total	11	13	24	6.2

Interpretation

Table 7 illustrates the distribution of underweight children according to age. Overall, **24 children (6.2%)** were classified as underweight, with a similar prevalence among boys and girls. The highest proportion of underweight children was observed at **nine years of age (1.8%)**, followed by ten years (1.4%). Although the prevalence of underweight was considerably lower than obesity,

these findings indicate that chronic undernutrition continues to affect a proportion of school-aged children in the community. Increased nutritional requirements during the pre-adolescent growth period may partly explain the relatively higher frequency observed among older children. The persistence of underweight alongside obesity further emphasizes the coexistence of multiple forms of malnutrition

within the same population and highlights the need for comprehensive nutritional strategies

addressing both insufficient and excessive dietary intake.

Table 8. Age-wise Distribution of Obese Children

Age (Years)	Boys (n)	Girls (n)	Total Obese	Overall (%)
6	7	8	15	3.9
7	9	9	18	4.7
8	7	8	15	3.9
9	8	9	17	4.4
10	9	11	20	5.2
Total	40	45	85	22.1

Interpretation

Table 8 demonstrates that obesity increased progressively with advancing age. Children aged ten years exhibited the highest prevalence of obesity (5.2%), whereas younger age groups showed comparatively lower frequencies. Obesity affected both boys and girls almost equally, indicating that unhealthy dietary behaviors were common among both sexes. The increasing

prevalence with age suggests cumulative exposure to energy-dense diets, sedentary lifestyles, and reduced physical activity as children progress through primary school. Since obesity during childhood frequently persists into adulthood and substantially increases the risk of non-communicable diseases, these findings underscore the importance of implementing preventive interventions before unhealthy dietary habits become firmly established.

Table 9. Age-wise Distribution of Children with Micronutrient Deficiency

Age (Years)	Boys (n)	Girls (n)	Total	Overall (%)
6	6	7	13	3.2
7	7	8	15	3.8
8	8	9	17	4.3
9	7	9	16	4.1
10	9	8	17	4.9
Total	37	41	78	20.3

Interpretation

Table 9 presents the age-wise distribution of micronutrient deficiencies. Overall, **78 children (20.3%)** exhibited clinical evidence of micronutrient deficiencies, making it the second most common nutritional problem after obesity. The prevalence increased gradually with age and was highest among children aged ten years. Girls showed slightly higher frequencies than boys across most age groups. These findings indicate that despite adequate or excessive caloric intake,

many children continue to experience deficiencies of essential micronutrients such as iron, zinc, vitamin A, and other nutrients required for optimal growth and development. This phenomenon, commonly described as hidden hunger, reflects poor dietary diversity and excessive reliance on processed foods. The findings highlight the urgent need for strategies that improve both the quantity and quality of children's diets rather than focusing solely on calorie intake.

Table 10. Age-wise Distribution of Stunted Children

Age (Years)	Boys (n)	Girls (n)	Total	Overall (%)
6	1	2	3	0.9
7	2	3	5	1.1
8	2	4	6	1.4
9	3	2	5	1.3
10	2	4	6	1.8
Total	10	15	25	6.5

Interpretation

Table 10 shows the distribution of stunting among the study participants. A total of **25 children (6.5%)** were classified as stunted, with girls demonstrating a slightly higher prevalence than boys. The frequency of stunting gradually increased with age, reaching its highest level among ten-year-old children. Unlike obesity, which reflects excessive caloric intake, stunting represents the cumulative effects of chronic nutritional deprivation and repeated exposure to poor-quality diets over a prolonged period. Although the overall prevalence of stunting was lower than obesity and micronutrient deficiencies, its presence across all age groups indicates persistent long-term nutritional inadequacies within the community. These findings suggest that chronic undernutrition continues to coexist with increasing obesity, further confirming the double burden of malnutrition among school-aged children in Parachinar.

DISCUSSION

The present study assessed the dietary habits and nutritional status of school-going children aged 6–10 years in Parachinar, District Kurram. The findings demonstrate a concerning nutritional transition characterized by frequent consumption of energy-dense, nutrient-poor foods and a substantial burden of both obesity and micronutrient deficiencies. The coexistence of overnutrition and undernutrition observed in this study reflects the **double burden of malnutrition**, which is increasingly reported in low- and middle-income countries undergoing rapid dietary transition (2,4,6). The results provide important baseline evidence regarding childhood nutrition

in an underserved region of Pakistan and highlight the urgent need for preventive nutritional interventions.

One of the most notable findings was the high prevalence of unhealthy dietary behaviors among the study participants. Approximately two-fifths of the children consumed fast food at least four times per week, while more than one-third regularly consumed sugar-sweetened beverages. Furthermore, inadequate intake of fruits and vegetables was common, and one-quarter of participants regularly skipped breakfast. These findings indicate a gradual shift from traditional balanced diets toward processed foods rich in saturated fats, refined carbohydrates, sodium, and added sugars. Similar dietary trends have been reported globally. **Bowman et al.** demonstrated that frequent fast-food consumption significantly increases daily energy intake while reducing consumption of fruits, vegetables, calcium, and dietary fiber (7). Likewise, **Weichselbaum and Buttriss** reported that modern childhood dietary patterns are increasingly characterized by processed foods with poor nutritional quality, thereby increasing the risk of obesity and micronutrient deficiencies (18). These observations closely support the dietary patterns identified in the present study.

The present study also demonstrated that unhealthy dietary behaviors increased progressively with age. Older children, particularly those aged ten years, exhibited the highest prevalence of fast-food consumption, obesity, and micronutrient deficiencies. This pattern is biologically and socially plausible because older children generally experience greater independence in food selection, increased

purchasing power, stronger peer influence, and greater exposure to food advertising through television and digital media. **Story et al.** emphasized that family environment, schools, peers, and food marketing substantially influence children's dietary behaviors (23). Similarly, **Patrick and Nicklas** concluded that eating habits established during middle childhood frequently persist into adolescence and adulthood, highlighting the importance of early nutritional interventions (22). The age-related trends observed in the present study therefore reinforce the need to promote healthy eating behaviors before unhealthy dietary practices become firmly established.

A particularly important finding was that only 43% of children had normal nutritional status, while obesity affected 22.1% of participants and micronutrient deficiencies were identified in 20.3%. Although underweight and stunting were less common, their continued presence demonstrates that chronic undernutrition has not been completely eliminated. These findings clearly illustrate the coexistence of excessive caloric intake and inadequate nutrient intake within the same population. This phenomenon has been described by the **World Health Organization (WHO)** and **UNICEF** as the **double burden of malnutrition**, in which overweight and obesity coexist with persistent micronutrient deficiencies and growth failure (2,5,6). Similar patterns have been reported in developing countries experiencing rapid nutrition transition, where increased availability of inexpensive processed foods has substantially altered childhood dietary patterns while dietary diversity remains inadequate (15,20).

The relatively high prevalence of obesity observed in the present study is consistent with previous international investigations. **Lobstein et al.** concluded that increasing childhood obesity is primarily driven by excessive consumption of processed foods and sugar-sweetened beverages together with declining physical activity (12). Similarly, **Hawkes et al.** described how globalization and changing food systems have accelerated the shift toward energy-dense processed foods in low- and middle-income countries, contributing to rising rates of childhood

obesity (15). The comparable findings observed among children in Parachinar suggest that rural and semi-urban communities are now experiencing nutritional challenges previously associated mainly with urban populations. This transition highlights the growing importance of addressing obesity alongside traditional forms of undernutrition within Pakistani public health programs.

Micronutrient deficiencies remained highly prevalent despite the increasing frequency of obesity. This finding indicates that many children consume sufficient or excessive calories while failing to obtain adequate amounts of essential vitamins and minerals. Such **hidden hunger** is commonly associated with diets dominated by refined carbohydrates, processed snacks, and sugar-sweetened beverages rather than nutrient-rich foods such as fruits, vegetables, dairy products, pulses, and lean protein sources. **Angeles-Agdeppa et al.** demonstrated that inadequate dietary diversity is strongly associated with multiple micronutrient deficiencies among school-aged children (3). Likewise, **FAO** emphasized that dietary diversity remains one of the strongest indicators of micronutrient adequacy in children (14). The present findings strongly support these conclusions and demonstrate that improving dietary quality should remain a central component of childhood nutrition interventions.

The persistence of underweight and stunting, although less frequent than obesity, indicates that chronic nutritional deprivation continues to affect a subset of children within the study population. Stunting reflects long-term nutritional inadequacy and recurrent infections during critical periods of growth and has been associated with impaired cognitive development, poor educational achievement, and reduced economic productivity during adulthood. **WHO Child Growth Standards** identify stunting as one of the most important indicators of chronic childhood malnutrition (5). Similar conclusions have been reported by **Amoadu et al.**, who demonstrated that inadequate dietary intake during childhood significantly increases the risk of growth impairment and poor educational outcomes (1). The coexistence of stunting and obesity further

illustrates the complexity of nutritional problems currently facing Pakistani children and emphasizes that public health interventions must simultaneously address multiple forms of malnutrition.

The findings of this study have important public health implications. Schools provide an ideal setting for promoting healthy dietary behaviors because children consume a substantial proportion of their daily food while attending school and because educational interventions can influence lifelong eating habits. **Contento** reported that nutrition education significantly improves dietary knowledge and food choices among school-aged children (11). Similarly, **Scaglioni et al.** recommended school-based nutrition education, parental involvement, and healthy food environments as effective approaches to improving children's dietary behaviors (21). Restricting the sale of unhealthy foods within and around schools and promoting fruit and vegetable consumption may therefore contribute substantially to improving childhood nutritional status in Pakistan.

Several limitations should be acknowledged when interpreting the findings of this study. First, the cross-sectional design limits the ability to establish causal relationships between dietary habits and nutritional outcomes. Second, dietary information was collected using a Food Frequency Questionnaire, which may be affected by recall bias and parental reporting errors. Third, the study was conducted in a single district and therefore may not be fully representative of all regions of Pakistan. Finally, biochemical assessment of micronutrient status was not performed, and nutritional deficiencies were primarily identified through anthropometric and clinical assessment. Despite these limitations, the study provides valuable baseline evidence regarding childhood nutrition in an understudied population and offers important information for designing future nutritional surveillance and intervention programs.

CONCLUSION

The present study assessed the dietary habits and nutritional status of school-going children aged 6–

10 years in Parachinar, District Kurram, Pakistan. The findings revealed that unhealthy dietary behaviors are highly prevalent among school-aged children and are accompanied by significant nutritional challenges. Frequent consumption of fast food, sugar-sweetened beverages, inadequate intake of fruits and vegetables, and breakfast skipping were commonly observed, indicating a gradual shift from traditional balanced diets toward energy-dense, nutrient-poor dietary patterns. These findings are consistent with global evidence demonstrating that changing food environments and increasing availability of processed foods are substantially influencing children's dietary behaviors (2,7,12).

Nutritional assessment showed that less than half of the children had normal nutritional status, while obesity emerged as the most common nutritional disorder, followed closely by micronutrient deficiencies. Although the prevalence of underweight and stunting was comparatively lower, their continued presence indicates that chronic undernutrition remains an important public health concern. The coexistence of obesity, hidden hunger, underweight, and stunting clearly demonstrates the **double burden of malnutrition** within the study population, reflecting the ongoing nutritional transition occurring in Pakistan and other low- and middle-income countries (2,5,6).

The study further demonstrated that unhealthy dietary behaviors increased with age, with older children exhibiting higher frequencies of fast-food consumption, obesity, and micronutrient deficiencies. These findings suggest that dietary habits established during middle childhood progressively worsen if appropriate nutritional guidance is not provided. The results therefore emphasize the importance of initiating nutrition education during the early primary school years before unhealthy eating behaviors become firmly established (18,21,22).

Overall, this study provides important baseline evidence regarding childhood nutrition in Parachinar, a geographically underserved region where published data remain limited. The findings highlight the urgent need for comprehensive school- and community-based interventions aimed

at improving dietary quality, promoting healthy food choices, increasing dietary diversity, and preventing both obesity and micronutrient deficiencies. Strengthening nutrition education, improving school food environments, and encouraging parental involvement will be essential for improving the health and future well-being of school-aged children in the region.

RECOMMENDATIONS

Based on the findings of the present study, the following recommendations are proposed:

1. **School-based nutrition education programs** should be introduced to improve children's knowledge regarding balanced diets, healthy food choices, and the harmful effects of excessive fast-food and sugary beverage consumption.
2. **Parents and caregivers** should receive regular nutrition education through schools and primary healthcare facilities to encourage healthy meal preparation, adequate dietary diversity, and increased consumption of fruits and vegetables.
3. School authorities should **restrict the availability and sale of unhealthy processed foods and sugar-sweetened beverages** within and around school premises while promoting healthier food alternatives.
4. Regular **growth monitoring and nutritional screening** should be implemented in schools to facilitate early identification of obesity, undernutrition, stunting, and micronutrient deficiencies.
5. Government health and education departments should develop **community-based nutrition awareness campaigns** focusing on healthy dietary practices, physical activity, and prevention of childhood obesity.
6. Future research should incorporate **biochemical assessment of micronutrient status**, dietary diversity scores, and longitudinal study designs to better understand causal relationships between dietary habits and nutritional outcomes.
7. Similar multicentre studies should be conducted in other districts of Pakistan to establish nationally representative evidence that can guide childhood nutrition policies and intervention programs.

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