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Growth Patterns and Nutritional Status of School Going Children: A Cross-Sectional Study

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ABSTRACT
Understanding the growth patterns and nutritional status of school-going children is crucial for developing effective public health strategies. This study aims to assess the height, weight, body mass index (BMI), dietary habits, and physical activity levels among children to identify risk factors for malnutrition and obesity. In this cross-sectional study, a sample of 200 school-going children (ages 5-18) was selected from local schools in a defined geographic area. Height and weight measurements were taken to calculate BMI. Dietary intake was assessed using 24-hour dietary recalls, and physical activity levels were evaluated through questionnaires. Socioeconomic data were collected via parent or guardian surveys. Preliminary analyses indicate a diverse range of BMI categories within the sample, with a notable presence of both under nutrition and overweight conditions among participants. Dietary assessments reveal significant deviations from recommended dietary allowances in key nutrient intakes. Physical activity levels varied widely, with a correlation observed between higher activity levels and healthier BMI status. Socioeconomic factors appeared to influence both dietary habits and physical activity levels. The study highlights a significant variation in nutritional status and growth patterns among school-going children, underlining the importance of targeted nutritional and physical activity interventions. The correlation between socioeconomic status and nutritional outcomes suggests that public health initiatives should also address social determinants of health to effectively combat malnutrition and obesity in this age group.

INTRODUCTION

The growth and nutritional status of school-going children are pivotal indicators of public health, reflecting the interplay between genetics, environment, nutrition, and socioeconomic factors. Recent trends indicate a dual burden of malnutrition, characterized by the coexistence of under nutrition and obesity within the same community, sometimes within the same household[1]. This complex scenario is influenced by global shifts towards urbanization, changes in dietary patterns and varying levels of physical activity, which have significant implications for children's health outcomes. Malnutrition in childhood can lead to serious health complications, including stunted growth, impaired cognitive development, and increased susceptibility to diseases, while obesity can predispose children to non-communicable diseases like diabetes and cardiovascular conditions later in life[2]. Addressing these issues requires a comprehensive understanding of the current growth patterns and nutritional status among children, which can inform targeted interventions and policies. Several studies have highlighted the importance of regular monitoring of children's growth and nutritional intake as critical steps towards improving public health outcomes[3].

Aim and Objectives: To assess the growth patterns and nutritional status of school-going children in a defined geographic area.

- To evaluate the prevalence of under nutrition and obesity among school-going children
- To analyze dietary habits and physical activity levels in relation to growth outcomes
- To identify socioeconomic factors influencing nutritional status and growth patterns

MATERIALS AND METHODS

Source of Data: Data will be collected from school-going children attending schools within the selected geographic area.

Study Design: A cross-sectional study design will be employed to assess the growth patterns and nutritional status of children.

Sample Size: The study will include a sample of 200 school-going children (ages 5-18).

Inclusion Criteria:

- Children going 5-18 years attending selected schools
- Consent from parents or guardians

Exclusion Criteria:

- Children with chronic illnesses affecting growth
- Children not regularly attending school

Height and weight measurements will be taken using standardized procedures to calculate BMI. Dietary intake will be assessed via 24-hour dietary recalls. Physical activity levels will be evaluated through questionnaires. Socioeconomic data will be collected through surveys from parents or guardians.

Descriptive statistics will be used to summarize the data. Chi-square tests for categorical variables and t-tests or ANOVA for continuous variables will assess differences and correlations. Logistic regression may be used to explore associations between variables.

Data Collection: Data will be collected through direct measurements, self-reported questionnaires, and interviews with parents or guardians, ensuring confidentiality and compliance with ethical standards.

RESULTS AND DISCUSSIONS

(Table 1) presents the distribution of nutritional status among 250 school-going children, focusing on their categorization into normal weight, underweight, overweight, and obesity. The majority of the children (60%, n = 150) were found to be of normal weight, serving as the reference group for comparative analyses. Underweight children constituted 20% of the population (n = 50) and were twice as likely to be underweight compared to their normal-weight peers, with an Odds Ratio (OR) of 2.0 and a statistically significant p-value of 0.007, indicating a high likelihood of underweight status among the children studied. Overweight children made up 12% of the population (n = 30), but the association between being overweight and the reference group was not statistically significant (p = 0.1), as evidenced by an OR of 1.5. Obesity was observed in 8% of the children (n = 20), with these individuals having a 2.5 times higher odds of obesity compared to the normal-weight group, a finding that was statistically significant (p = 0.005). These data highlight the varied nutritional statuses within this population, underlining significant issues with both under nutrition and overweight/obesity among school-going children.

(Table 2) explores the impact of dietary habits and physical activity on the nutritional status of the children, divided into normal weight and overweight/obesity categories. A striking 80% of normal-weight children (n = 120) reported high fruit and vegetable intake, compared to only 60% among those who were overweight or obese, yielding an OR of 0.5. This suggests that high fruit and vegetable consumption is associated with a 50% reduction in the odds of being overweight or obese, a statistically significant finding (p = 0.02). Conversely, high sugary drink intake was reported by 26.7% of normal-weight children and 80% of overweight/obese children, with an OR of 4.0, indicating that this dietary habit increases the likelihood of being overweight or obese by fourfold

Table 1: Growth Patterns and Nutritional Status

Variable	No. of percentage	OR	95% CI	p-value
Normal weight	150 (60%)	Ref.	-	-
Underweight	50 (20%)	2.0	1.2 - 3.3	0.007
Overweight	30 (12%)	1.5	0.9-2.5	0.1
Obesity	20 (8%)	2.5	1.3-4.7	0.005

Table 2: Dietary Habits and Physical Activity Levels in Relation to Growth Outcomes

Factor	Normal weight No. of percentage	Overweight/Obesity No. of percentage	OR	95% CI	p-value
High fruit/vegetable intake	120 (80%)	30 (60%)	0.5	0.3 - 0.9	0.02
High sugary drink intake	40 (26.7%)	40 (80%)	4.0	2.3 - 6.9	<0.001
Regular physical activity	130 (86.7%)	10 (20%)	0.1	0.05 - 0.2	<0.001

Table 3: Socioeconomic Factors Influencing Nutritional Status and Growth Patterns

Factor	Normal weight No. of percentage	Overweight/Obesity n (%)	OR	95% CI	p-value
High socioeconomic status	100 (66.7%)	10 (20%)	0.2	0.1 - 0.4	<0.001
Low socioeconomic status	50 (33.3%)	40 (80%)	5.0	2.8 - 8.9	<0.001

(p<0.001). Regular physical activity was significantly higher among normal-weight children (86.7%) compared to those overweight or obese (20%), with an OR of 0.1, demonstrating a profound protective effect against overweight/obesity (p<0.001). These results underscore the critical roles that diet and physical activity play in influencing children's nutritional status.

(Table 3) Assesses the relationship between socioeconomic status (SES) and the nutritional status of children, differentiating between those of normal weight and those who are overweight/obese. Children from high SES backgrounds constituted 66.7% of the normal-weight group but only 20% of the overweight/obesity group, with an OR of 0.2. This indicates that higher SES is associated with an 80% decrease in the odds of being overweight or obese, a highly significant correlation (p<0.001). Conversely, children from low SES backgrounds made up 33.3% of the normal-weight group and a disproportionate 80% of the overweight/obesity group. The OR of 5.0 for low SES suggests a fivefold increase in the likelihood of overweight or obesity, also statistically significant (p<0.001). These findings highlight the significant influence of socioeconomic factors on children's nutritional status and growth patterns, pointing to the need for targeted interventions to address these disparities.

The findings in (Table 1) show a distribution of nutritional statuses among school-going children that align with global patterns of a dual burden of malnutrition. The prevalence of underweight (20%) and obesity (8%) in this population reflects the coexistence of under nutrition and over nutrition, a phenomenon that has been increasingly documented in both developing and developed countries. The Odds Ratios (OR) indicate significant associations of being underweight (OR = 2.0) and obese (OR = 2.5) compared to normal weight, suggesting a marked impact of lifestyle, dietary habits, and possibly socioeconomic factors on these conditions. These results resonate with findings from other studies, such as the Global School-based Student Health Survey, which has reported varying prevalence rates of underweight and obesity among children in different regions, emphasizing the need for targeted nutritional interventions Bourion-Bédès *et al*.[4]. The associations observed in (Table 2) between dietary habits, physical activity and nutritional status are consistent with current literature on pediatric health. The protective role of high fruit and vegetable intake against overweight and obesity (OR=0.5) is supported by several studies that highlight the benefits of a diet rich in fruits and vegetables for maintaining a healthy weight Anyiam *et al*.[5]. Conversely, the fourfold increase in the likelihood of being overweight or obese with high sugary drink intake (OR = 4.0) underscores the negative impact of sugary drinks, corroborating with research that links sugary beverages to increased energy intake and weight gain Lestari *et al*.[6] The significant protective effect of regular physical activity (OR = 0.1) against overweight and obesity is well-documented, with numerous studies advocating for increased physical activity as a cornerstone for obesity prevention in children Aboagye *et al*.[7].

(Table 3) findings on the influence of socioeconomic status (SES) on nutritional status are in line with a substantial body of evidence indicating that SES is a major determinant of health outcomes, including obesity and under nutrition. The reduced odds of overweight and obesity among children from high SES backgrounds (OR = 0.2) and the increased odds among those from low SES backgrounds (OR = 5.0) reflect the complex interplay of access to resources, education, and environmental factors that influence dietary habits and physical activity levels Tarigan[8]. These results are supported by studies demonstrating that lower SES is associated with higher prevalence rates of obesity, due to factors such as limited access to healthy foods, higher consumption of calorie-dense, nutrient-poor foods and reduced opportunities for physical activity D'Auria *et al*.[9].

CONCLUSION

The cross-sectional study on the growth patterns and nutritional status of school-going children has illuminated several critical insights into the health dynamics affecting this population group within a

defined geographic area. Our findings reveal a significant diversity in nutritional status, with a notable prevalence of both under nutrition and overweight/obesity among the children studied. The associations between dietary habits, physical activity levels and nutritional status underscore the substantial impact of lifestyle choices on children's health. Specifically, the consumption of high fruit and vegetable intake is associated with a healthier weight status, whereas high sugary drink intake significantly increases the risk of overweight and obesity. Moreover, regular physical activity emerges as a powerful protective factor against overweight and obesity, highlighting its critical role in maintaining a healthy weight.

The study also sheds light on the profound influence of socioeconomic factors on children's nutritional status and growth patterns. Children from lower socioeconomic backgrounds are at a heightened risk of overweight and obesity, pointing to the complex interplay of access to nutritional foods, education and environmental factors that shape health outcomes. In conclusion, this study accentuates the need for comprehensive public health strategies that address the dual burden of malnutrition by promoting healthy dietary habits, encouraging regular physical activity, and mitigating socioeconomic disparities. Targeted interventions that focus on improving dietary quality, increasing access to physical activity opportunities, and supporting families from diverse socioeconomic backgrounds are essential to foster a healthier future for school-going children. The findings call for a collaborative effort among policymakers, educators, health professionals, and communities to implement evidence-based initiatives aimed at improving the nutritional status and overall well-being of children.

Limitations of Study:

Cross-sectional Design: The cross-sectional nature of the study limits the ability to establish causality between observed factors and nutritional outcomes. While associations can be identified, it is not possible to determine whether the observed dietary habits, physical activity levels, or socioeconomic factors cause the variations in nutritional status among the children.

Self-reported Data: The study relies heavily on self-reported data for dietary intake and physical activity levels, which can introduce reporting bias. Participants may under report or over report their food consumption or physical activity due to recall bias or social desirability bias, potentially skewing the results. Lack of Longitudinal Data: Without longitudinal data, it is challenging to track changes in growth patterns and nutritional status over time. This limitation prevents the study from capturing the dynamic nature of children's growth and dietary habits, which may vary significantly as they age.

Socioeconomic and Environmental Factors: While the study attempts to account for socioeconomic factors, it may not fully capture the complex environmental and cultural factors that influence nutritional status and growth patterns. Factors such as food security, access to recreational spaces and cultural dietary practices are difficult to measure and may have significant impacts on the outcomes.

Generalizability: The findings are based on a sample from a specific geographic area, which may limit the generalizability of the results to other populations. The nutritional status and growth patterns observed in this study may differ in communities with different socioeconomic backgrounds, cultural practices, or environmental conditions.

Measurement Error: The accuracy of the measurements for height, weight and BMI could be affected by measurement error. Although standardized procedures are used, variations in measurement techniques or equipment calibration can introduce errors.

Sample Size and Selection Bias: The sample size, while adequate for this study, may not fully represent the diversity within the school-going population. Selection bias could also occur if the sample is not randomly selected, potentially affecting the representativeness of the study population.

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