



Investigating Growth Disorders in Elementary School Children in Zahedan City

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Abstract

Background: Proper growth during childhood is a critical indicator of overall public health. In Zahedan, emerging evidence suggests that growth disorders – including short stature and undernutrition – are increasingly observed among elementary school children, potentially reflecting underlying socioeconomic disparities and nutritional challenges.

Objectives: This study aimed to investigate the prevalence of growth disorders in elementary school children in Zahedan and to examine the association between family economic status, school feeding programs, and growth outcomes.

Methods: A cross-sectional design was employed among elementary school students in Zahedan. Anthropometric data (height and weight) were collected using standardized techniques. Socioeconomic information was gathered via parent-reported questionnaires. The impact of school nutrition – assessing both the frequency and quality of school-provided meals – alongside family income and other related factors, was analyzed using appropriate statistical methods.

Results: The findings revealed that children from lower-income families were significantly more prone to growth disorders, particularly short stature and undernutrition. Moreover, regular access to high-quality school meals was positively associated with improved growth indices, suggesting a protective effect against growth impairments. Notably, while maternal employment did not show a significant influence on growth outcomes, household income and home nutrition quality emerged as key determinants.

Conclusions: The study underscores the critical role of socioeconomic factors and effective school feeding programs in ensuring healthy growth among elementary school children in Zahedan. These results highlight the need for targeted interventions and supportive policies – such as enhancing school nutrition quality and providing economic assistance to low-income families – to mitigate growth disorders and promote better health outcomes in this vulnerable population.

Keywords: Growth Disorders, Childhood Nutrition, Socioeconomic Status, School Feeding Programs, Stunted Growth, Undernutrition, Elementary School Children, Zahedan, Public Health, Family Income

1. Background

Child growth is a fundamental indicator of public health and a critical marker for a nation's overall development. Proper physical growth – reflected in measures such as height and weight – is not only indicative of adequate nutrition and health care access but also mirrors the broader socioeconomic conditions within a community (1, 2). In recent decades, growth disorders including stunting, undernutrition, and

overweight/obesity have emerged as pressing concerns, particularly in regions facing economic challenges (3, 4).

These disorders can adversely affect cognitive development, academic achievement, and long-term economic productivity, thereby perpetuating cycles of poverty and poor health (5). In Zahedan, a city characterized by marked socioeconomic disparities and nutritional challenges, preliminary observations suggest an increasing prevalence of growth disorders among elementary school children (6, 7). Contributing

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factors may include limited access to high-quality nutrition both at home and in schools, food insecurity, and varying levels of healthcare support (8, 9). Moreover, environmental factors, such as living conditions and regional disparities, may further exacerbate these issues. The need to investigate these factors is urgent, as understanding the underlying determinants of growth impairments is essential for the formulation of targeted public health interventions (10, 11). By comparing local data with international studies from contexts like Pakistan and China, this research aims to provide a comprehensive insight into the multifaceted nature of growth disorders and to propose evidence-based strategies for improving child health outcomes in Zahedan.

2. Objectives

The primary objective of this study was to evaluate the prevalence of growth disorders among elementary school children in Zahedan. Secondary objectives included assessing the associations between growth disorders and factors such as family economic status, school feeding programs, maternal employment, and birth order.

3. Methods

A cross-sectional study design was employed to assess growth patterns among elementary school students in Zahedan. A stratified, multistage random sampling method was used to select a representative sample of students from first to sixth grades across various public schools in the region. Prior to initiating the study, ethical approval was obtained from the relevant institutional review board, and informed consent was secured from the parents or legal guardians of all participating children. Anthropometric data were collected by trained examiners using standardized and calibrated equipment. Height was measured to the nearest 0.1 cm using a stadiometer, with students standing shoeless and in an upright position, while weight was recorded to the nearest 0.1 kg using a digital scale, ensuring minimal clothing interference. Each measurement was taken twice, and the average of the two readings was used in the analysis to enhance reliability.

In parallel, socioeconomic data were obtained through structured, self-administered questionnaires distributed to parents. These questionnaires captured detailed information on family income, living conditions (with residential areas classified as central, peripheral, or suburban) (Table 1), maternal employment status, and participation in school feeding

programs. The results (Table 1) show that the P-value for both types of disorders is greater than 0.05, indicating that living location (suburban, central, affluent) does not have a significant effect on growth disorders.

Table 1. Chi-square Test Results for the Relationship Between Living Location and Growth Disorders

Growth Disorder Type	Chi-square Statistic	Significance Level (P-Value)
Weight disorder	2.68	0.6124
Height disorder	3.98	0.1367

Additional demographic variables, including the child's age, grade level, and birth order, were also recorded. Data entry was performed systematically using a secure database, and analyses were conducted with statistical software. Descriptive statistics (mean, standard deviation, frequency distributions) were calculated for both anthropometric and socioeconomic variables. To explore associations between categorical variables — such as family economic status, school feeding participation, and the occurrence of growth disorders (e.g., underweight, overweight, and stunting) — chi-square tests were applied. Additionally, Pearson correlation coefficients were computed to assess linear relationships between continuous variables, such as birth order and growth measurements. The level of statistical significance was set at $P < 0.05$, providing a robust framework for evaluating the multifaceted factors influencing child growth in Zahedan.

4. Results

The study found that both height and weight increased progressively with grade level for both boys and girls. Boys' mean weight increased from 22.85 kg in the first grade to 39.26 kg in the sixth grade, while girls' weight increased from 22.89 kg to approximately 39.75 kg. Similarly, boys' mean height rose from 121.53 cm to 148.83 cm, and girls' from 123.09 cm to 145.92 cm.

The prevalence of growth disorders, including both weight and height abnormalities, was higher among students in the upper grades. Chi-square analyses revealed significant associations between lower family economic status and increased prevalence of both weight ($P = 0.0092$) and height disorders ($P = 0.0182$). The results (Table 2) show that the P-value for height disorder is less than 0.05, indicating a significant relationship between economic status and short stature. This suggests that poor nutrition in low-income families may negatively affect children's height growth. Additionally, for weight disorder, the P-value is also less than 0.05, meaning that economic status has a significant effect on underweight and obesity.

Table 2. Chi-square Test Results for the Relationship Between Economic Status and Growth Disorders

Growth Disorder Type	Chi-square Statistic	Significance Level (P-Value)
Weight disorder	10.85	0.0092
Height disorder	8.01	0.0182

Additionally, receiving regular, quality school feeding was significantly associated with lower rates of weight disorders ($P = 0.021$), while the association with height disorders was notable though less robust. The results (Table 3) indicate that the P-value for both types of disorders is less than 0.05, meaning that the relationship between receiving school nutrition and growth disorders is statistically significant. These findings suggest that school-provided meals likely have a positive impact on reducing underweight and short stature in children. However, further assessment of the quality and quantity of school nutrition is necessary to optimize its effectiveness.

Table 3. Chi-square Test Results for the Relationship Between School Nutrition and Growth Disorders

Growth Disorder Type	Chi-square Statistic	Significance Level (P-Value)
Weight disorder	14.32	0.021
Height disorder	16.89	0.08

Maternal employment did not show a statistically significant impact on growth outcomes. The results (Table 4) indicate that the P-value for both types of disorders is greater than 0.05. This means that maternal employment (working or stay-at-home status) does not have a significant effect on growth disorders (underweight, obesity, or short stature). This result likely reflects the greater influence of other factors, such as family economic status and the child's overall diet quality.

Table 4. Chi-square Test Results for the Relationship Between Maternal Employment and Growth Disorders

Growth Disorder Type	Chi-square Statistic	Significance Level (P-Value)
Weight disorder	1.37	0.8496
Height disorder	4.46	0.1076

Furthermore, Pearson correlation analysis indicated a modest but significant relationship between birth order and short stature ($R = 0.15$, $P = 0.0044$), suggesting that later-born children may be at a slightly higher risk of stunting. The results (Table 5) show that the P-value for height disorder is less than 0.05, indicating a significant relationship between birth order and short stature. The positive correlation coefficient ($R = 0.15$) suggests that later-born children are slightly more likely

to experience short stature. However, for weight disorder, the P-value is greater than 0.05, showing that birth order does not have a significant effect on a child's weight.

Table 5. Pearson Correlation Results for the Relationship Between Birth Order and Growth Disorders

Growth Disorder Type	Chi-square Statistic	Significance Level (P-Value)
Weight disorder	-0.02	0.7247
Height disorder	0.15	0.0044

5. Discussion

The findings indicate a significant prevalence of growth disorders among elementary school children in Zahedan, particularly as they progress to higher grades. The results underscore the critical influence of socioeconomic status on child growth, with lower family income emerging as a key determinant of both undernutrition and stunting — an observation consistent with other developing regions (4, 5). The protective effect of quality school feeding programs highlights the potential of school-based nutritional interventions in mitigating these disorders (9). Although maternal employment did not appear to significantly affect growth outcomes in this study, previous research suggests that maternal education and occupation can influence child health indirectly (8). The modest association between birth order and short stature observed in our data is in line with some international findings that later-born children may receive fewer resources or attention (11). Limitations of the study include its cross-sectional nature, which restricts causal inferences, and the reliance on self-reported socioeconomic data, which may introduce bias. Future research should consider longitudinal designs and broader geographic sampling to better understand the dynamics of child growth in relation to socioeconomic and environmental factors.

Footnotes

Authors' Contribution: Acquisition of data, analysis and interpretation of data, and drafting of the manuscript: E. R.; Study concept and design, critical revision of the manuscript for important intellectual content, and administrative, technical, and material support: M. N.; Study concept and design, analysis and interpretation of data, critical revision of the manuscript for important intellectual content, statistical analysis, and administrative, technical, and material support: Gh. R.

Conflict of Interests Statement: The authors declare no conflict of interest.

Data Availability: The dataset presented in this study is available upon request from the corresponding author at the time of submission or after publication. The data are not publicly available due to lack of parental consent from the participants.

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Informed Consent: Written informed consent was secured from the parents or legal guardians of all participating children.

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