Original Article

# Prevalence and Factors Associated with Growth Patterns of School Children in Karachi



**Nimra Akhtar[1], Saima Zainab[1], Zumaira Sualeh[1], Hiba Arif[1], Muhammad Asad Sualeh[2] and Syeda Jaweria Abeer[3]**

## ABSTRACT

**Objective:** To compare the nutritional status of school children related to growth patterns studying in public and private schools of Karachi.

**Study Design:** Cross sectional comparative study

**Place and Duration of Study:** This study was conducted at the Department of Community Medicine, Liaquat National Hospital and Medical College, Karachi from December 2021 to August 2022.

**Materials and Methods:** Cross sectional comparative study, Carried out among public and private school children. Non-probability purposive sampling was done to select 364 study participants from two private schools and four government schools. Height and weight of each participant was measured, which later plotted on CDC BMI-for-age growth chart. Mean and Standard Deviation was estimated for quantitative variable. Frequency and percentage was calculated for categorical variables. Student t-test was applied for finding mean differences among variables. Chi square and Fisher exact test was applied for finding association among categorical variables. A p-value of $< 0.05$ was considered as significant.

**Results:** A total of 364 participants were enrolled with mean age from 11 to 16 years. Taking into consideration BMI-for-age of the study subjects, 63.2% were healthy weight, 15.1% were underweight, 12.1% were overweight and 9.6% were obese. 58.2 % male students and 41.8% female students were observed in government schools.

**Conclusion:** This study will help the stakeholders in the local scenario to develop and improve school health services which are related to policies and programs.

**Key Words:** School Health Services, Growth Assessment, Nutritional Status, Body Mass Index, CDC growth chart

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## INTRODUCTION

School age is the lively growing period of childhood. Research indicates that health problems due to miserable nutritional status in school-age children are the most common causes of low school enrolment, high absenteeism, early dropout and unsatisfactory classroom performance.[1]

Malnutrition is the main global health problem of children which affects large numbers of children in developing countries.

[1.] Department of Community Medicine, Liaquat National Hospital and Medical College, Karachi.
[2.] SMO, Agha Khan Medical Centre, Karachi.
[3.] Health Facility Incharge, HANDS, Karachi. .

Correspondence: Nimra Akhtar, Lecturer of Community Medicine, Liaquat National Hospital and Medical College, Karachi.
Contact No: 03312858044
Email: nimraakhtar84@gmail.com

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So, the mental and physical well-being of these children is the most concern that can be achieved by adequate nutrition[2].

Malnutrition is the main global health problem of children which affects large numbers of children in developing countries.[3] Malnutrition among school-age children all over the globe is a major public health problem.[4]

Anthropometry of healthy children varies in different parts of the world, due to a diverse ethnicity and cultural background of families. Differences in the prevalence of underweight, overweight, and obesity have been observed among the school going children in different districts of Sindh.[5,6,7]

Karachi being the most populous megapolitan city, thorough evaluation of growth patterns of school going children is required before appropriate interventions to improve upon their nutritional status can be implied.[8]

School health is a cross-disciplinary field of study and a fundamental strategy that can be used to improve both health and education outcomes.[9]

Government policy-makers and program managers and private stakeholders in the health and education sectors are responsible for the health and well-being of children attending schools or similar educational establishments.

The administration should run campaigns to educate teachers how to improve diet of school children.[10]

This study will help decision makers in private and public sector of school organizations in developing and improving School health services policies and programs.

# MATERIALS AND METHODS

A cross sectional study was carried out from December 2021 to August 2022, on two private schools i.e. Credo school and Shah Wilayat public school campus I & II and four government schools i.e. Govt. boys Sec. School Shanti Nagar, Sharfabad govt. boys Sec. School, Manick Govt. Boys Sec. School and Maqbool-e-Aam Govt. Boys Girls Primary & Secondary School, Karachi, Pakistan. Ethical approval of the study was taken from Institutional Research Committee (IRC) of Liaquat National Hospital and Medical College (R.C-LNH-Community-Med-01/2022/03). Being the school children of grades VI and VII who are willing to participate in the study was the inclusion criteria of the study.

**Inclusion criteria:** School going children of Class VI and VII

**Exclusion Criteria:** School going Children suffering from chronic illness (long term medication) and Parents/school children refusing to give required information. A total number of 364 students were enrolled based on our inclusion criteria.

A questionnaire was designed on MS Word. Height of the subject was measured in erect position by measuring tape. Height and weight of the subjects was then plotted on Center for Disease Control CDC BMI-for-age growth charts designed separately for boys and girls of 2 to 20 years to assess their growth pattern.. In BMI-for-age percentile curves, 85th-95th percentile means the risk for overgrowth, >95th percentile indicates overweight, <5th percentile means underweight.[11]

Data was entered and analyzed by statistical package for social Science (SPSS) version 22. Mean and Standard Deviation was estimated for quantitative variable. Frequency and percentage were calculated for categorical variables. Student t-test was applied for finding mean differences among variables. Chi square and Fisher exact test was applied for finding association among categorical variables. A p-value of <0.05 was considered as significant with 95% confidence interval.

# RESULTS

Three hundred and sixty-four participants were enrolled in the study. The mean age of study participants was 12.27±0.85 ranges from 11 to 16 years. The mean value of siblings and family size were 2.09±1.01 and 5.07±1.05. The mean of parent's monthly income was 67948.72±60643.43. Most of the study participants were male 212(58.2%). Out of all participants, 200(54.9%) lived in nuclear family. Private Job was found as the most common father's occupation. We observed 284(78%) of their mothers were house wives. About 163(44.8%) had positive parent's medical history. Out of which 72 (19.8%) had diabetes, 54(14.8%) had hypertension, 29(8%) had arthritis and 8(2.2%) had other different diseases. None of them were smoker. The mean weight, height and body mass index for age of all study participants was found to be 42.28±10.99 kg, 150.04±11.36 cm and 18.59±4.20 kg/m² respectively. According to CDC BMI category it was observed that 230 (63.2%) were healthy weight, 55(15.1%) were underweight, 44(12.1%) were overweight and 35(9.6%) were obese. The detail descriptive statistics of all study participants is presented in Table-1.

**Table 1: Socio-demographic characteristics of school children, Karachi, Pakistan (n=364)**

| Variables | N | Percentage (%) |
|---|---|---|
| ***Gender:*** Male | 212 | 58.24% |
| Female | 152 | 41.76% |
| ***Age:*** Male | 12.34 ± 0.96 (12 Years & 04 months) | |
| Female | 12.16 ± 0.66 (12 Years & 02 months) | |
| ***Children Studying in:*** | | |
| Government Schools | 182 | 50.00% |
| Private Schools | 182 | 50.00% |
| ***Family Structure:*** | | |
| Nuclear Family | 200 | 54.95% |
| Joint Family | 164 | 45.05% |
| ***Family Size:*** | | |
| <= 4 family members | 123 | 33.79% |
| 5 - 6 family members | 209 | 57.42% |
| 7 -8 family members | 30 | 8.24% |
| >= 9 family members | 2 | 0.55% |
| ***No. of siblings:*** | | |
| <= 2 | 251 | 68.96% |
| 3 - 4 | 104 | 28.57% |
| >=5 | 9 | 2.47% |
| ***Fathers' Occupation:*** | | |
| Un-employed | 20 | 5.49% |
| Private Jobs | 188 | 51.65% |
| Government Jobs | 66 | 18.13% |
| Businessmen | 90 | 24.73% |
| ***Mother Working Status:*** | | |
| Housewife | 284 | 78.02% |
| Working Women | 80 | 21.98% |
| ***Family Monthly Income:*** | | |
| <= Rs.25,000/- | 66 | 18.13% |
| >Rs.25,000/- to <=Rs. 50,000/- | 95 | 26.10% |
| > Rs.50,000/- to <=Rs.100,000/- | 162 | 44.51% |
| > Rs.100,000/- | 41 | 11.26% |

It was observed that there is a significant mean difference in ages, parent's monthly income and BMI for school going children ($p< 0.05$) as reflected in Table 02. The mean age was found to be 12.55±0.99 in government and 11.98±0.58 in public schools. Males were predominant in government as compared to private schools. According to the CDC BMI category and our observation it was found out that healthy weight, over weight and obese participants were observed in private schools as compared to government schools while underweight participants was observed more in government school.

The results of multivariate logistic regression analysis demonstrates that malnutrition status (Underweight, Wasting, and Stunting) and its four sub- categories based on its severity like normal, mild, moderate and severe, have positive & significant effect in government sector schools (p-value<0.05) as compared to private sector schools where underweight and wasting do not have any significant effect (p-value>0.05).

**Table No.2: Association of Gender, Measurement and BMI characteristics with School Categories Karachi, Pakistan (n=364).**

| Variables | Schools Categories | | P-value |
|---|---|---|---|
| | Government Sector | Private Sector | |
| Mean Age | 12.55 ± 0.98 | 11.98 ± 0.58 | <0.001* |
| Gender | | | |
| Male | 120 (65.93%) | 92 (50.55%) | 0.028 |
| Female | 62 (34.07%) | 90 (49.45%) | |
| Measurements | | | |
| Mean weight (in kg) | 41.04 ± 10.72 | 43.52 ± 11.16 | 0.031 |
| Mean height (in cm) | 150.89 ± 11.03 | 150.25 ± 9.75 | 0.560 |
| BMI | 17.91 ± 3.26 | 19.48 ± 4.87 | <0.001* |
| Categories under BMI | | | |
| Underweight | 123 (67.58%) | 97 (53.30%) | 0.029 |
| Normal weight | 51 (28.02%) | 65 (35.71%) | |
| Overweight | 7 (3.85%) | 13 (7.14%) | |
| Obese | 1 (0.55%) | 7 (3.85%) | |

*p-vale <0.05, Chi-square test and independent sample t-test applied

**Table No. 3: Multivariate logistic regression analysis of malnutrition severity against schools Categories of Karachi, Pakistan (n=364).**

| **Malnutrition Status in** | **Malnutrition Severity against** | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Underweight** | | | | **Wasting** | | | | **Stunting** | | | |
| | Normal | Mild | Mode-rate | Severe | Normal | Mild | Mode-rate | Severe | Normal | Mild | Mode-rate | Severe |
| **Government Schools** | 0.002 | 0.010 | 0.002 | 0.049 | 0.000 | 0.001 | 0.029 | 0.000 | 0.000 | 0.004 | 0.000 | - |
| **Private Schools** | 0.090 | 0.098 | 0.090 | 0.464 | 0.106 | 0.977 | 0.954 | 0.106 | 0.000 | 0.303 | 0.000 | - |

***Significant at p-value <0.05**

# DISCUSSION

The level of education in a country determines its socio-economic development. The value of education is widely recognized.[11] The government provides education services at a lower cost than the private sector.[12] Physical activity during this stage of development will strengthen the fundamental abilities required for healthy and active adulthood. Agility, balance, coordination, and endurance are examples of these abilities.[13] In Norway, like in many other countries, children and adolescents are categorized by birth year in school and sports. Those who engage in the same age group in sports or who are enrolled in the same grade level will have a one-year age difference by definition. The age gap within the same age group is referred to as the relative age difference.[14]. This factor, in addition to and in interaction with other factors such as experience, gender, and genetics, will affect how individuals of the same age develop and mature differently. Therefore, the relative age difference can have both positive and negative effects on the athletic and academic performance of an individual.[15,16,17]

In this study according to sex-specific BMI-for-age, 7.7 percent of government school students were found to be overweight, and 4.4% were found to be obese. These results exceeded those discovered in a study conducted by Remesh A et al.[18] Tanveer M et al. reported that in Pakistani school-aged children, underweight, overweight, and obesity were prevalent.[19]

### Recommendations

1. This study showed that the prevalence of obesity and overweight in school children in developing countries such as Pakistan is increasingly high, especially in large cities such as Karachi.
2. The comparison of public sector and private sector revealed that obesity and overweight is more prevalent in the private schools where students belong to higher socio-economic status as compared to students of public sector.

## CONCLUSION

In the light of this study, it is further concluded that policy makers must adopt measures on exigency basis to fill the gap between private and public sector school going children by starting food support program and availability of sports and physical activities for both groups.

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**Author's Contribution:**

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|---|---|
| Concept & Design of Study: | Nimra Akhtar |
| Drafting: | Saima Zainab, Zumaira Sualeh |
| Data Analysis: | Hiba Arif, Muhammad Asad Sualeh, Syeda Jaweria Abeer |
| Revisiting Critically: | Nimra Akhtar, Saima Zainab |
| Final Approval of version: | Nimra Akhtar |

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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