



Original Research Article

Determinants of Undernutrition among Primary School Children in Rural Puducherry

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Abstract: Background: Growth monitoring is the best indicator for the nutritional and health status of children. In the South-East Asia Region, more than 50% of children were underweight. The present study was done to assess the determinants of under-nutrition among school children from 6 to 10 years age and to compare the growth pattern with WHO standard reference. **Materials and methods:** This is a cross-sectional study done among all the eligible children of 6 to 10 years age group in a Government Primary School in the Rural Field Practice Area of a private medical college in Puducherry, India. The data were collected by using pre-designed, semi-structured questionnaire and anthropometric measurements. Statistical analysis was with SPSS version 23. Chi-square test was applied to test the association of socio-demographic factors with undernutrition. **Results:** Out of 295 children screened, stunting was found to be 15.2%, wasting 40.7%, and underweight 41% of the children. Undernutrition was also found higher among the children with two or more siblings. Compared to WHO reference values, significant reduction in median weight-for-age and height-for-age was seen in both the boys and girls. **Conclusion:** Over all nutritional status children in the study area were poor. Maternal education and family size are significant determinants in affecting the health status of a child. Routine health screening together with some nutritional interventions is vital to improving the nutritional and health status of these children.

Keywords: Undernutrition, Determinants, Primary school children, WHO Growth Chart.

INTRODUCTION

Growth is the most reliable global indicator of a child's well-being, closely reflecting overall standards of living and the population's ability to meet fundamental needs such as nutrition, housing, and healthcare. Nutritional status, which is mostly measured by growth measurements, is important when evaluating a child's health. Nearly half of all fatalities in children under five are caused by malnutrition, which continues to be a major source of illness and mortality in underdeveloped countries [1]. Around 144 million children under five were stunted (too short for their age), 47 million were wasted (too

thin for their height), and 38.3 million were overweight worldwide in 2022, according to recent estimates [2].

The South-East Asia Region (SEAR), which still carries a disproportionate burden of child malnutrition, is home to more than half of the underweight children. Children with wasting rate of 18.7% in 2023, India in particular had the highest rate in the world, indicating severe undernutrition and enduring difficulties in spite of continuous interventions [3].

The high prevalence of undernutrition poses significant challenges to children's growth and survival. In addition to poverty, a number of other factors affect children's nutritional status, such as perinatal conditions, birth weight, delivery method, and common childhood illnesses like measles, acute respiratory infections, diarrhoea, and malaria. Birth order, family size, and maternal traits all have a significant impact on child nutrition. One of the most important components of strategies to fight malnutrition is maternal education [4].

School health services provide an essential platform for the early detection and treatment of children's health problems through regular health surveys, averting serious complications. This study aims to assess the health status of school children between the ages of 6 and 10, a crucial age group on the verge of puberty, who are essential to the welfare and future advancement of the country. This study also investigated how socio-demographic characteristics, such as the size of the family and the number of siblings, affect the children's nutritional status.

MATERIALS AND METHODS

This cross-sectional study was conducted in a Government Primary School under the Rural Field Practice Area of a private medical college in Puducherry. Universal sampling technique was applied. Prior to the data collection process, formal permission was received from the Head of the Institution of the participating school. Written informed consent was taken with from all the children's parents or legal guardians who were eligible before they were included in the study, once they were fully informed about the study's purpose and methodology. A professional research team consisting of trained medical doctors, interns, nurses, and social

workers made regular calls to the schools to conduct the data collection. Teachers and students were explained the significance and importance of the survey in the local language clearly in order to facilitate cooperation and minimize the absenteeism rate.

The data were collected by using pre-designed, validated semi-structured questionnaire. The interview was mainly focused on socio-demographic data, followed by anthropometric measurements. Inclusion criteria for the study included all children aged 6 to 10 years who were attending the Government Primary School on a regular basis during the survey. Those children who were absent for the entire period of the survey were excluded from the study. Family detail of the children was recorded from the official school registration records or student identity cards. Anthropometric measurements, i.e., height and weight, were taken carefully for all eligible children as per the guideline. The height was measured to the nearest 0.5 cm in portable Stadiometer. A standard weighing machine was calibrated against known weight regularly. The zero error were checked and removed before starting every day. Their weight was recorded to the nearest 0.5 Kilograms.

STATISTICAL ANALYSIS

The entire data collected was entered in Microsoft Excel and Statistical analysis was done using Epi info 7 version. Median, Percentage, range were used for the analysis of the data. Chi-square test was applied to assess the relationship between socio-demographic profile and under-nutrition. A value of $p < 0.05$ was considered as statistically significant. Growth pattern of the children was compared with the standards using WHO anthropolus software.

RESULTS

Out of 295 children, 140 (47.46%) were boys and 155 (52.54%) were girls. Prevalence of stunting, wasting, and underweight among the children was 15.2%, 40.7%, and 41%, respectively.

Table 1: Association between socio-demographic profile and under nutrition of children

Determinants	Total n=295 (%)	Stunting n (%)	Severe stunting n(%)	Wasting n (%)	Severe wasting n (%)	Underweight n (%)	Severe underweight n (%)
Total	295(100)	37(12.5)	8 (2.7)	61 (20.7)	59 (20)	83 (28.1)	38(12.9)
Mother's Education							
Illiterate	87 (29.5)	20(22.9)	4 (4.6)	37 (42.5)	19 (21.8)	53 (60.9)	27 (31)
Primary	101(34.2)	13(12.9)	2 (2)	4 (4.0)	24 (23.8)	21 (20.8)	5 (5)
10thstd	68 (23.0)	4 (5.9)	2 (2.9)	19 (27.9)	13 (19.1)	6 (8.8)	6(8.8)
12th std	23 (7.8)	0	0	1 (4)	2 (8.70)	2 (8.7)	0
Graduate	16 (5.4)	0	0	0	1 (6.2)	1 (6.2)	0
p-value		0.009		0.000		0.000	

Family size							
≤5	230(78)	29(12.6)	7 (3.1)	41 (18.2)	45 (20)	65 (28.3)	26 (11.6)
>5	65(22.0)	8 (12.3)	1 (1.5)	20 (30.8)	14 (21.5)	18 (27.7)	12 (18.5)
p-value		0.721		0.031		0.34	
Total siblings							
<2	183(62)	22 (12)	5 (2.7)	35 (19)	34 (18.6)	48 (26.2)	20 (11)
≥2	112(38)	15 (14)	3 (2.7)	26 (23.2)	25 (22.3)	35 (31.2)	18 (16.1)
p-value		0.760		0.183		0.085	

*chi square

The median weight of the participants corresponding to the age group was calculated and compared against the standard weight according to WHO reference values (2007). The difference in median weight-for-age between male and female participants was: Boys provided a greater median weight-for-age than girls in the age group 6-7.6 years. Boys and girls had the same median weight at 8.6 years and 9 years of age, after which the median weight of girls increased. There was a statistically significant difference in median weight-for-age between males and females at 9.6 years of age ($p=0.0046$) only (Figure 1, 2).

Similarly, The difference in median height-for-age between male and female participants: The boys were taller than girls up to the age of 6.6 years. When the children reached 7.6 years, both the groups were equal in terms of median height. Later, girls were taller than boys up to the age of 8.6 years. In the 10th year, the boys were taller than girls. Yet, no statistically significant difference between the median heights of the boys and girls was found between the age groups ($p>0.05$) (Figure 3, 4).

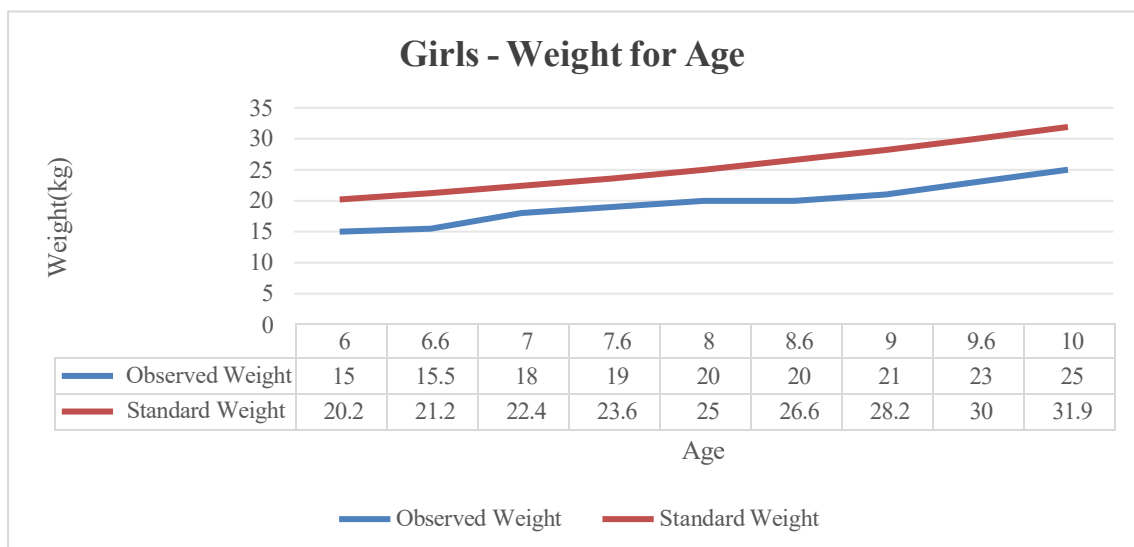


Figure 1: Comparison of observed weight for age of girls against the standard weight according to WHO reference values (2007)

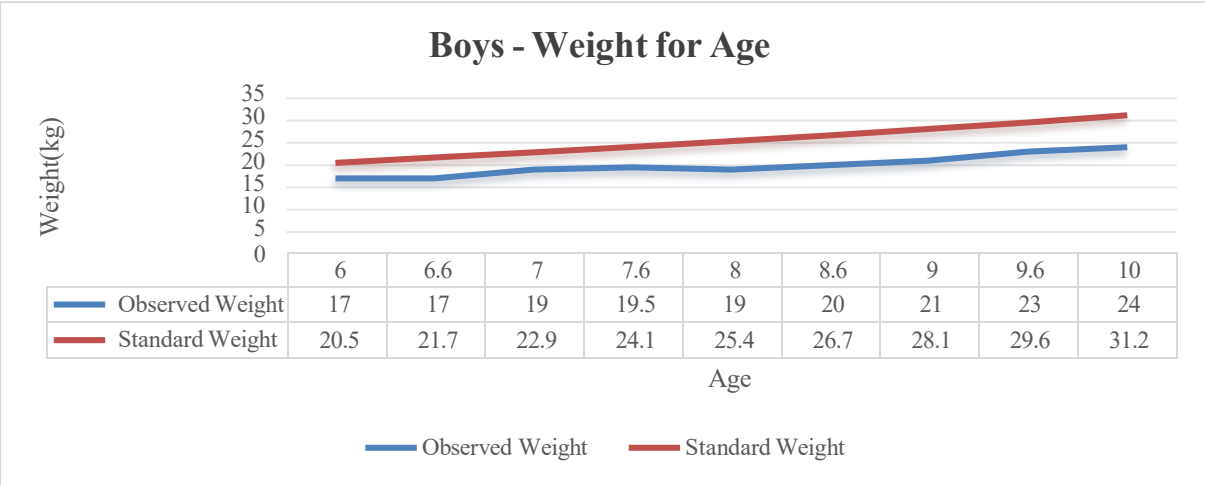


Figure 2: Comparison of observed weight for age of boys against the standard weight according to WHO reference values (2007)

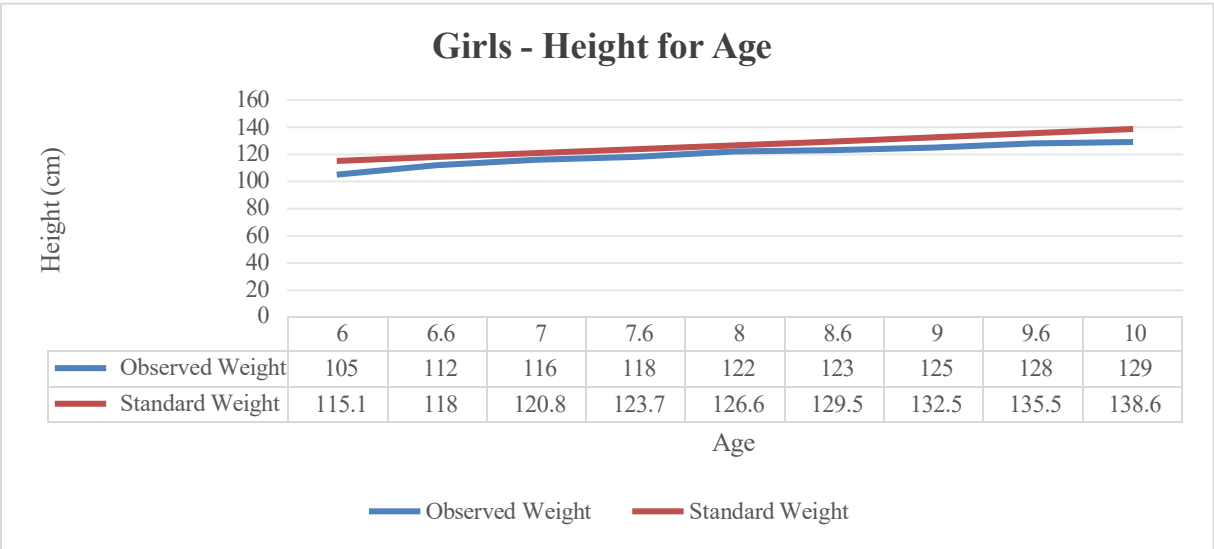


Figure 3: Comparison of observed Height for age of girls against the standard Height according to WHO reference values (2007)

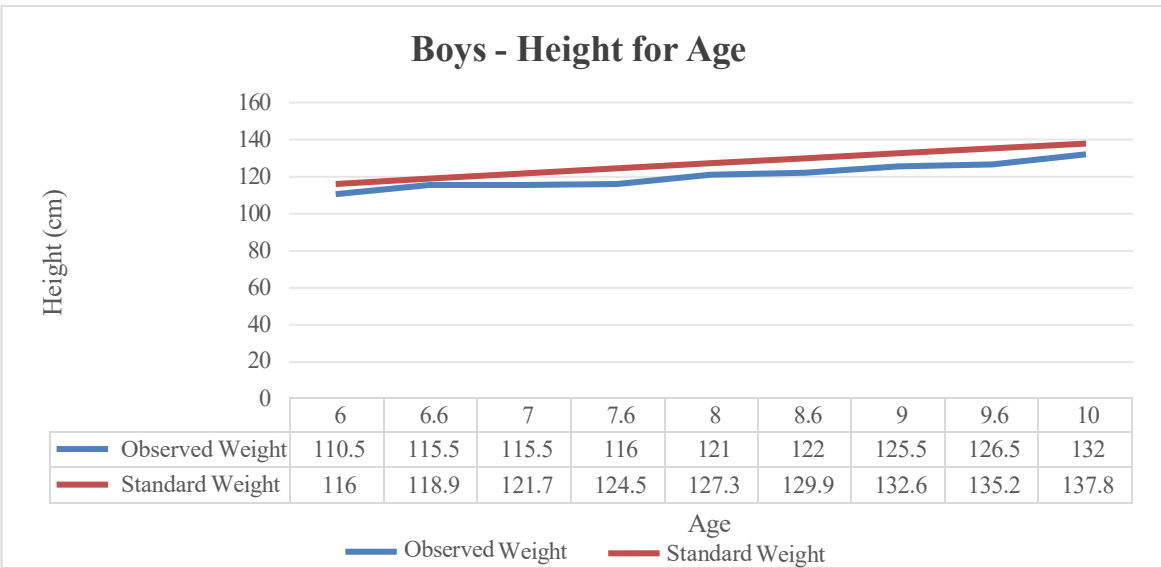


Figure 4: Comparison of observed Height for age of boys against the standard Height according to WHO reference values (2007)

DISCUSSION

Undernutrition is an alarming public health concern in children all over the world, particularly in developing nations. The present research aimed at assessing determinants of undernutrition among primary school children in the age group of 6 to 10 years in rural Puducherry. The findings revealed that there were significant association between nutritional status and maternal education and family size.

The present study found that a large number of children were undernourished, with 41% of them being underweight, 40.7% wasted, and 15.3% stunted. A recent Indian study by Ahmed et al. (2018) also found similar rates of undernutrition, thus reinforcing the fact that undernutrition is a significant public health problem even when interventions are available [5].

Maternal education has now emerged as an important determinant of child nutritional status. There was a clear pattern in the research that indicated the highest percentage of undernutrition in children whose mothers were uneducated. According to our research, 60.9% of children whose moms were illiterate were extremely underweight. This is consistent with the findings of Johri M et al. (2017) and Iftikhar et al. (2017), who emphasized the importance of maternal education in child health. More educated moms adopt better childcare habits, such as proper feeding and hygiene procedures, which ultimately lead to improved nutritional status [6, 7].

Nutritional status has been found to be influenced by family size. Compared to small families (18.2%), children in large families—those with more than five family members—had a greater prevalence of wasting (30.8%). This demonstrates how financial constraints and parents' lack of customized attention in large homes can have a negative impact on dietary intake and general wellbeing. This conforms to the study of Anato. (2022) in Ethiopia, which demonstrated the adverse impact of large family size on children's nutrition [8]. The current study further showed that children with two or more siblings reported higher percentages of underweight (31.2%), stunting (14%), and wasting (23.2%). Although it is statistical not significant in our study, the trend observed conforms to the study of Sharif et al. (2021), which showed that the larger the number of siblings, the higher the competition in a household for food and healthcare [9].

On comparison of the median height and weight of the children with World Health Organization (WHO) standard values set in 2007, overall weight-for-age and height-for-age decline was persistently observed in

male and female subjects in all the age groups. Deviation of the observed growth patterns from international standards reflects potential underlying nutritional deficiencies in the cohort studied, and hence, specific nutritional interventions are indicated. Earlier studies carried out in India have also provided similar findings wherein growth parameters of children were not ideal in comparison with WHO standards. Median weight-for-age in girls at 9.6 years was significantly higher than that of boys of the same age, a finding that is interesting and in agreement with some studies looking at gender-specific growth patterns, e.g., those by Kalyan et al. (2020) [10, 11].

Malnutrition-exposed children are at greater risk of infection, stunted growth, and impaired educational attainment. The findings emphasize the necessity of targeted public health interventions like nutritional supplementation schemes, health education schemes, and empowerment of mothers, particularly among those with low literacy skills.

CONCLUSION AND RECOMMENDATIONS

The present study shows the role of family size and maternal education as the significant determinants influencing the nutrition status of rural Puducherry's primary school children. Even after enforcing some public health interventions, the majority of the children in this area still remain affected by undernutrition. Hence, it becomes essential to implement periodic health checkups with community-based nutrition programs and specialized parental support interventions, particularly to empower mothers, to control undernutrition effectively. Efforts to address these multifactorial determinants through concerted multi-sectoral interventions are needed and can greatly enhance the health and overall well-being of the children in this vulnerable group.

LIMITATIONS

Socio-demographic data were collected through student record which might lead to recall or social desirability bias

Other parameters like dietary habits, micro nutrient deficiency, obesity can also be included to know the extent of the disease.

Children who were absent because of sickness were the most vulnerable one which was excluded.

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