

Anthropometric Assessment of Nutritional Status Among Children 9-17 Years Associated with NGOs in Ajmer District

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Abstract

The present study was conducted to assess the anthropometric profile and nutritional status of children aged 9–17 years associated with non-governmental organizations (NGOs). A total of 420 children were selected using purposive sampling technique from selected NGOs in Ajmer district. Anthropometric measurements including height, weight, Body Mass Index (BMI), and Waist-to-Hip Ratio (WHR) were recorded using standardized methods to evaluate growth patterns and nutritional status. The collected data were analyzed to observe age-wise variations and overall trends among the study participants. The findings of the study revealed a gradual and consistent increase in height, weight, BMI, and WHR with advancing age, indicating normal growth progression among children. However, despite this positive trend, the observed values were found to be within lower to moderate ranges when compared to standard growth references. This suggests the presence of underlying nutritional limitations and possible dietary inadequacies among children residing in NGOs. The study emphasizes that anthropometric assessment serves as a simple, cost-effective, and reliable method for evaluating the nutritional status of children, especially in resource-limited settings. It also highlights the need for timely nutritional interventions and health programs to improve the overall growth and development of children belonging to vulnerable population groups. These findings can be useful for policymakers and health professionals in planning targeted nutrition strategies.

Keywords: anthropometry, nutritional status, children, body mass index, NGOs.

Introduction

Childhood and adolescence represent critical phases of human growth and development, marked by rapid physical, physiological, and psychological changes. Adequate nutrition during these stages plays a fundamental role in ensuring optimal growth, cognitive development, and long-term health outcomes. Nutritional deficiencies during this period can lead to stunted growth, weakened immunity, poor academic performance, and increased susceptibility to chronic diseases later in life. Therefore, assessing the nutritional status of children and adolescents is essential for identifying potential health risks and implementing timely interventions. Children associated with non-governmental organizations (NGOs) often belong

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to socio-economically disadvantaged backgrounds, where access to adequate food, healthcare, and proper living conditions may be limited. Such conditions increase their vulnerability to undernutrition and related health problems. In many cases, these children may not receive balanced diets, leading to deficiencies in essential nutrients required for proper growth and development. The issue of malnutrition among children in vulnerable settings continues to be a major public health concern, particularly in developing regions, where disparities in food availability and dietary practices are prevalent. Anthropometric assessment is widely recognized as a simple, cost-effective, and non-invasive method for evaluating growth patterns and nutritional status. It involves the measurement of physical parameters such as height, weight, Body Mass Index (BMI), and Waist-to-Hip Ratio (WHR), which serve as reliable indicators of nutritional well-being. These measurements reflect morphological variations resulting from physiological changes and help in identifying deviations from standard growth patterns. Despite its effectiveness, anthropometric assessment is often underutilized in monitoring and guiding nutrition-related interventions at both individual and community levels. In this context, the present study assumes significant importance as it focuses on assessing the anthropometric profile of children aged 9–17 years residing in NGOs of Ajmer district. By evaluating key indicators such as height, weight, BMI, and WHR, the study aims to provide a comprehensive understanding of their nutritional status. The findings of this study can contribute to the development of targeted nutritional and health interventions, thereby supporting improved growth outcomes and overall well-being among children belonging to vulnerable population groups.

Methodology

The present study was conducted to assess the anthropometric profile and nutritional status of children aged 9–17 years associated with selected non-governmental organizations (NGOs). The study followed a cross-sectional research design. A total of 420 children were selected using purposive sampling technique. The participants were included based on their availability and willingness to participate in the study. For better analysis, the respondents were categorized into two age groups, namely 9–12 years and 13–17 years.

Anthropometric measurements were carried out using standardized techniques to ensure accuracy and reliability. Height was measured as the vertical distance from the top of the head to the bottom of the feet using a standard measuring scale. The participants were asked to stand barefoot with their heels together and body properly aligned against a flat surface, and the measurements were recorded to the nearest 0.1 cm. Body weight was recorded using a properly calibrated digital weighing scale. The participants stood upright without shoes and without any external support, and the readings were recorded to the nearest 0.25 kg.

Body Mass Index (BMI) was calculated using the standard formula of weight in kilograms divided by the square of height in meters (kg/m^2). BMI was used as an important indicator to assess the nutritional status and associated health risks among the participants. In addition, Waist-to-Hip Ratio (WHR) was calculated to evaluate body fat distribution. Waist circumference was measured at the level of the umbilicus, while hip circumference was measured at the widest point of the hips using a non-stretchable measuring tape. The waist-to-hip ratio was calculated by dividing the waist measurement by the hip measurement.

The collected data were systematically compiled and analysed to assess variation in anthropometric parameters across different age groups. The obtained values were compared with standard reference classification for BMI and WHR to determine the nutritional status of the children. This methodological approach provided a comprehensive understanding of growth patterns and helped in identifying potential nutritional risks among children residing in NGOs.

Results and Discussion

Table:1 Mean Height, Body Weight and BMI of Children's (9-17 years)

Age (Years)	Height (m) Mean \pm S.D.	Weight (kg) Mean \pm S.D.	BMI (kg/m ²) Mean \pm S.D.
9	1.32 \pm 0.04	28.50 \pm 3.20	16.30 \pm 1.45
10	1.35 \pm 0.05	30.40 \pm 3.50	16.55 \pm 1.60
11	1.39 \pm 0.06	33.00 \pm 4.00	16.95 \pm 1.70
12	1.43 \pm 0.05	35.90 \pm 4.30	17.40 \pm 1.80
13	1.47 \pm 0.05	39.10 \pm 4.60	17.95 \pm 1.90
14	1.50 \pm 0.05	42.50 \pm 5.10	18.40 \pm 2.00
15	1.53 \pm 0.06	46.00 \pm 5.50	18.90 \pm 2.10
16	1.56 \pm 0.06	49.80 \pm 5.90	19.40 \pm 2.20
17	1.58 \pm 0.06	53.10 \pm 6.20	20.00 \pm 2.30

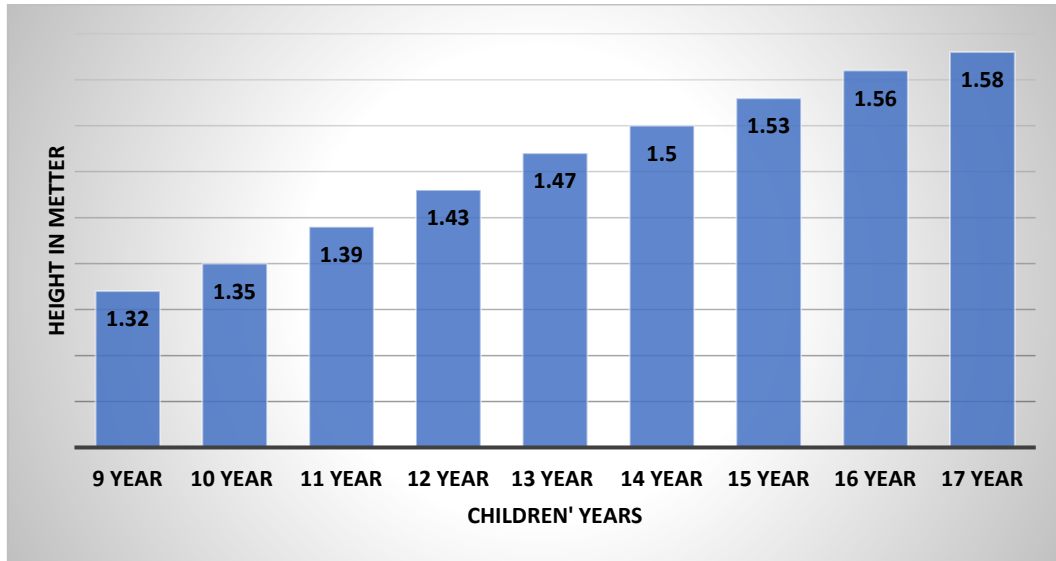
The data presented in Table 1 illustrate the age-wise distribution of mean height, body weight, and Body Mass Index (BMI) among children aged 9–17 years associated with NGOs. The findings indicate a consistent and gradual increase in all anthropometric parameters with advancing age, reflecting normal growth patterns among the study population.

The mean height of the children showed a steady rise from 1.32 m at 9 years to 1.58 m at 17 years. This progressive increase in height indicates a normal linear growth trend during childhood and adolescence. Similarly, body weight demonstrated a continuous upward trend, increasing from 28.50 kg at 9 years to 53.10 kg at 17 years, suggesting appropriate physical development with age. However, the observed values, although increasing, remained within moderate ranges, which may reflect underlying nutritional limitations among children from socio-economically disadvantaged backgrounds.

Body Mass Index (BMI), an important indicator of nutritional status, also exhibited a gradual increase from 16.30 kg/m² at 9 years to 20.00 kg/m² at 17 years. Although this trend aligns with expected growth patterns, the BMI values indicate a moderate nutritional status rather than optimal levels. This suggests that while growth is occurring, it may not be fully supported by adequate nutritional intake, possibly due to dietary insufficiencies and socio-economic constraints.

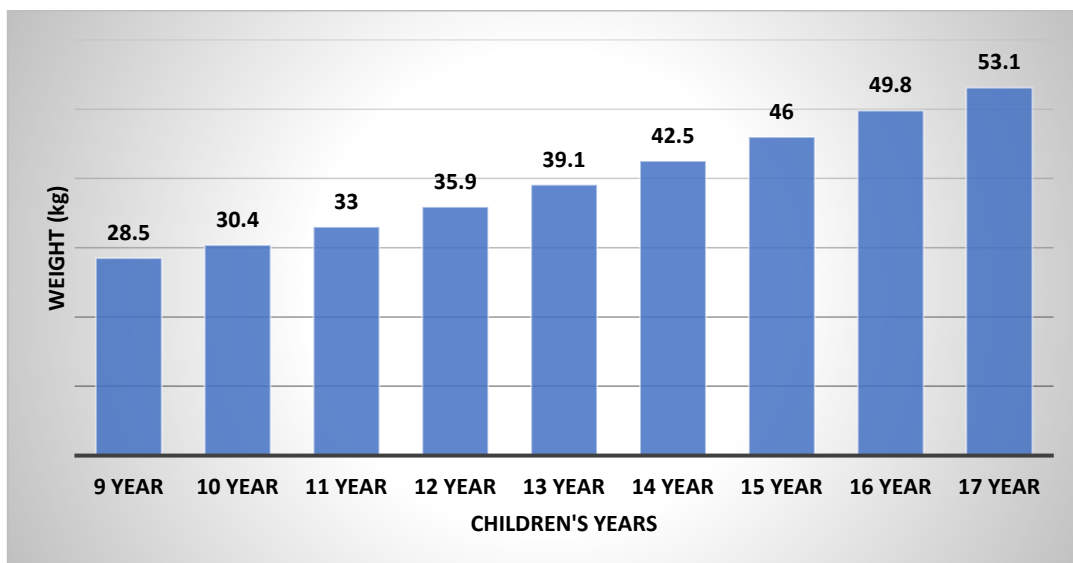
The Waist-to-Hip Ratio (WHR) further supports these findings by showing a steady increase from 0.78 at 9 years to 0.86 at 17 years. This indicates age-related changes in body fat distribution among the participants. The gradual rise in WHR reflects normal physiological development; however, it also highlights the importance of monitoring fat distribution patterns as an indicator of future health risks.

Height: The findings indicate a steady increase in mean height with age. The average height increased from 1.32 m at 9 years to 1.58 m at 17 years, reflecting normal growth patterns among children.



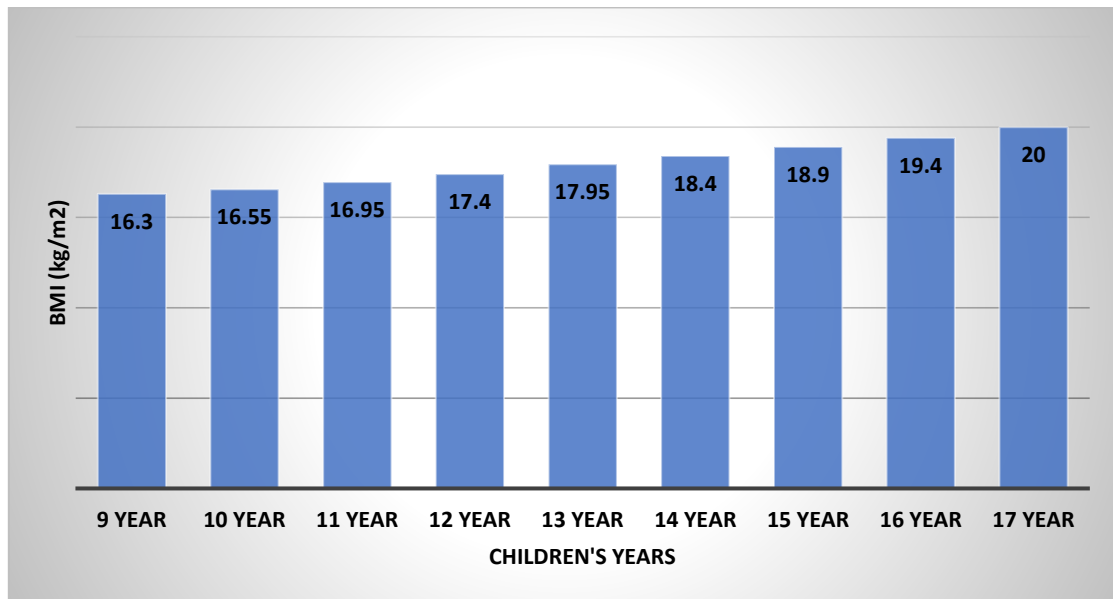
MEAN HEIGHT IN METTER OF THE RESPONDENTS

Weight: A consistent rise in body weight was observed with increasing age. The mean weight increased from 28.50 kg at 9 years to 53.10 kg at 17 years, indicating progressive physical development.



MEAN WEIGHT IN METTER OF THE RESPONDENTS

Body Mass Index (BMI): BMI values showed a gradual increase from 16.30 kg/m² at 9 years to 20.00 kg/m² at 17 years. Although the trend reflects normal growth, the values suggest moderate nutritional status, possibly influenced by socio-economic conditions.



MEAN BMI (kg/m²) OF THE RESPONDENTS

Waist-to-Hip Ratio (WHR): WHR increased progressively from 0.78 at 9 years to 0.86 at 17 years, indicating age-related changes in body fat distribution.

Table 2: Waist to Hip Ratio of Children's (9-17 years), n=420

Age (Year)	f (Number)	f (%)	Waist-to-Hip Ratio Mean ± S.D.
9	43	10.24	0.78 ± 0.03
10	47	11.19	0.79 ± 0.03
11	50	11.90	0.80 ± 0.04
12	52	12.38	0.81 ± 0.04
13	54	12.86	0.82 ± 0.04
14	49	11.67	0.83 ± 0.05
15	46	10.95	0.84 ± 0.05
16	40	9.52	0.85 ± 0.05
17	39	9.29	0.86 ± 0.06

The distribution of WHR values across different age groups reveals a consistent increase with age, with mean values ranging from 0.78 ± 0.03 at 9 years to 0.86 ± 0.06 at 17 years. The frequency distribution indicates that the sample was fairly distributed across age groups, allowing for a reliable assessment of trends. The increasing pattern of WHR suggests gradual

changes in body composition during adolescence, which is consistent with normal developmental processes.

Overall, the results indicate that although children exhibit normal growth trends in terms of height, weight, BMI, and WHR, the values remain within lower to moderate ranges when compared with standard references. This suggests the presence of underlying nutritional constraints among children residing in NGOs, likely influenced by limited dietary diversity and socio-economic factors.

Conclusion

The present study concludes that anthropometric parameters such as height, weight, Body Mass Index (BMI), and Waist-to-Hip Ratio (WHR) exhibit a consistent and progressive increase with advancing age among children aged 9–17 years associated with non-governmental organizations (NGOs). This gradual increase reflects a normal pattern of physical growth and development during the critical stages of childhood and adolescence. However, despite the presence of this expected growth trend, the observed anthropometric values largely fall within lower to moderate ranges when compared with standard growth references. This indicates that although children are growing, their growth may not be fully supported by adequate nutritional intake.

These findings suggest the existence of underlying nutritional constraints, which may be attributed to socio-economic disadvantages, limited access to balanced diets, and lack of dietary diversity among children residing in NGOs. Inadequate intake of essential nutrients during these formative years can adversely affect physical growth, immune function, and overall health status. Therefore, continuous monitoring of nutritional status becomes essential for early identification of risks associated with undernutrition.

The study further highlights that anthropometric assessment serves as a simple, reliable, and cost-effective tool for evaluating the nutritional status of children, particularly in resource-limited settings. It provides meaningful insights into growth patterns and helps in identifying deviations from normal standards. The findings emphasize the urgent need for implementing targeted nutritional interventions, including the provision of balanced and nutrient-rich diets, nutrition education programs, and regular health check-ups. Strengthening nutrition and health initiatives within NGOs can significantly contribute to improving the growth, development, and overall well-being of children belonging to vulnerable population groups.

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