



## Assessment of Anthropometry Measurements of Pre School Children According to Age and Gender in Tirupati, Andhra Pradesh

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### Abstract

Pre-schoolers start to show independent nature and are generally fussy eaters. Pre - school age which coincides with to 2-6 years is vulnerable because of rapid growth rate, during this stage. Young children need more attention and care for the physical and psychological development. Physical growth, development and well-being are directly related to the nutritional status. Anthropometric indicators can be used as a screening device to identify children at risk of under-nutrition or over-nutrition, followed by a more elaborate investigation using other techniques. The Literature found relationship between the age, gender and anthropometry profile of children. The present study was conducted to understand the relationship among demographic data like age, gender and anthropometric indices of pre - school children. The study sample were 321 pre-school children (Boys-178 and Girls-143), attending Anganwadis in Tirupati urban of Andhra Pradesh State. The Results revealed that when compared with WHO standards. All the ages from 2-6 years the boys and girls height was less than the standards. As per the 'Z' scores 25 to 30 percent of boys and girls were below normal. The data alarms the need of alteration to collection the deprived growth in pre-school children. Good nutrition is still possible to achieve the deprived growth, to which the mothers have patience and follow indigenous traditional foods.

**Keywords:** Age; Gender; Anthropometry; Nutritional status; Pre-School Children

### Introduction

Children are most important as they are the future citizens. Providing an optimal physical, social, psychological and emotional development is important for a healthy nation. A child's future health depends on proper nutrition during early year of life [1]. Studies have shown that under nourishment, child stunting, child wasting, and child mortality reflect deficiencies in calories as well as in important micronutrients. India is home to the largest number of underweight and stunted children in the world [2]. Malnutrition is the leading cause of morbidity and mortality among children under the age of five in the world. It has been reported that malnutrition is characterized by a several of problems like stunted growth, weight loss, low intelligence, weak resistance to infection and poor social development and in extreme cases undesirable malnutrition can lead to death [3,4]. According Global Hunger Index (2023), India is experiencing a severe micronutrient deficiency. According GHI (2023), India's position is 111<sup>th</sup> out of 125 countries. Whereas, neighbouring Pakistan fall under 102<sup>th</sup>, Bangladesh 81<sup>th</sup>, Nepal 69<sup>th</sup> and Sri Lanka 60<sup>th</sup> rank faring better than India in the index. When

GHI 2023 is compared against GHI 2022, India slipped four notches from its 107<sup>th</sup> position [5]. Global Hunger Index, 2023 reporting literature showed that nutritional problems among children cause major morbidity and mortality in India. There are several causes of this problem, including poor diet, disease, and a failure to meet micronutrient needs during pregnancy and lactation.

The corona pandemic has left a severe impact on nutritional status of people all over the world including young children. To assess the nutritional status of children below 6 years of age, the present study was conducted with the following objectives:

### Objectives

- To assess the height of sample pre - school children against age and WHO standards
- To assess the weight of sample pre - school children against age and WHO standards
- To classify nutritional status of children based on Z - scores.

## Materials and Methods

### Tools

- General Information Schedule (Developed by Investigator).
- Anthropometry Data (Standard Procedures)

### Sample

The Sample of the study were pre-school children studying in Government Schools (Anganwadi) of Tirupati urban of Andhra Pradesh State. With the approval from the Child Development Project Officer (CDPO), Tirupati Urban, three hundred and twenty one children (321), (Boys - 178 and Girls - 143) in the age group of 2-6 years were identified using systematic stratified random sampling technique from fifteen Anganwadis in Tirupati. The sample children's height and weight were measured using standard procedures for measurements. Weight was measured to nearest 100 gms using digital scale. Height was measured to nearest 1 mm using a non-stretchable tape.

## Results and Discussion

The data was collected, pooled, tabulated and presented in the following tables:

Variables	Numbers	Percentage
Gender		
Boys	178	55.45
Girls	143	44.55
Total	321	100.00
Age of the Children (Years and Months)		
2-2.11	76	23.67
3-3.11	103	32.08
4-4.11	78	24.29
5-5.11	50	15.57
>5.11	14	4.39
Total	321	100.00

**Table 1:** Distribution of Sample According to the Gender and Age.

From table 1 it is clear that the sample constituted 55.45 percent of boys and 44.55 percent of girls. Among 321 sample, nearly one third (32.08 percent) were in the age group of 3-3.11 months, around one fourth (23.67 and 24.29 percent) of sample children were in the age ranges of 2 -2.11 months and 4-4.11 months. 15.57 percent were in the age group of 5-5.11 months and very few (4.39 Percent) were in the age group of above 5.11 months.

It divulges from table 2 that when compared with the WHO standards, Sample boys belonging to all age groups except that of 3 to 3.11 months were found to be below to standards of WHO.

Age in the Children (Years and Months)	Numbers	Mean Height of Boys (Cms)	
		Mean ± S. D	WHO Standards
2-2.11	34	85.7 ± 9.82	87.82-95.4
3-3.11	42	96.1 ± 9.81	96.1-102.8
4-4.11	38	101.7 ± 9.83	103.3-109.4
5-5.11	21	108.9 ± 10.07	110.0-115.5
> 5.11	08	113.8 ± 8.6	116.0

**Table 2:** Mean Height of Sample Anganwadi Boys According to the Age and WHO Standards.

Whereas, children belonged to 3 to 3.11 months recorded mean height of 96.1 ± 9.81 which is in the range of WHO standards (96.1-102.8). Thus, the present data shows that majority of boys had stunted growth. In a study conducted at Mysore, Lokesha, *et al*, (2017), also reported that according to height for age, 46% of pre-school children were having normal height and 54% of preschool children were mildly and moderately impaired [6].

Age in the Children (Years and Months)	Numbers	Mean Height of Girls (Cms)	
		Mean ± S. D	WHO Standards
2-2.11	42	88.4 ± 9.88	86.4-94.4
3-3.11	61	93.3 ± 9.9	95.1-102.1
4-4.11	40	98.5 ± 9.8	102.7-108.9
5-5.11	29	108.8 ± 10.1	109.4-114.6
> 5.11	06	108.5 ± 8.3	115.1

**Table 3:** Mean Height of Sample Anganwadi Girls According to the Age and WHO Standards.

It divulges from table-3 that when compared with WHO standards, sample girls belonged to all age group except that of 2 to 2.11 months were found to be below the standards of WHO. Whereas, sample girls belonged to 2 to 2.11 months recorded mean height of 88.4 ± 9.88 which is in the range of WHO standards (86.4-94.4). Along with sample boys, sample girls also had stunted. The mean standard deviation is 9.88% which says ±, hence more than 88.4% of girls are also less height to standards.

Weight of pre-school children is also an important indicator to assess the nutritional status of children.

It is known from table 4 that when compared with WHO standards sample boys belonged to 2 to 2.11 months and 4 to 4.11 months were found to be above the standards of WHO. Whereas, children belonged to 3 to 3.11 and those who were above 5 years of age had mean weight below the WHO standards. The sample were from Anganwadi schools and majority belonged to lower middle and low income groups.

Age in Children (Years and Months)	Numbers	Mean Weight of Boys (Kgs)	
		Mean ± S. D	WHO Standards
2-2.11	34	14.2 ± 7.73	12.2-14.2
3-3.11	42	13.7 ± 7.85	14.3-16.2
4-4.11	38	14.8 ± 7.73	14.4-18.2
5-5.11	21	16.5 ± 8.01	18.3
> 5.11	08	17.1 ± 2.3	

**Table 4:** Mean Weight of Sample Anganwadi Boys According to the Age and WHO Standards.

In a study conducted at Sri Lanka, Galgamuwa, *et al.*, (2017) reported that overall high number of preschool children (35.6%) were observed with underweight, stunting (26.9%) and wasting (32.9%) and it was reported that undernutrition was more among

boys than girls. The author expressed that the reason may be low standard of living, high lack of infectious diseases and low purchasing ability, all of which have an effect on practices of children [7].

Age in Children (Years and Months)	Numbers	Mean Weight of Girls (Kgs)	
		Mean ± S. D	WHO Standards
2-2.11	42	14.4 ± 7.88	11.5-13.7
3-3.11	61	12.7 ± 7.83	13.9-15.9
4-4.11	40	13.6 ± 7.74	16.1-18.0
5-5.11	29	16.3 ± 6.5	18.2
> 5.11	06	15.75 ± 2.5	

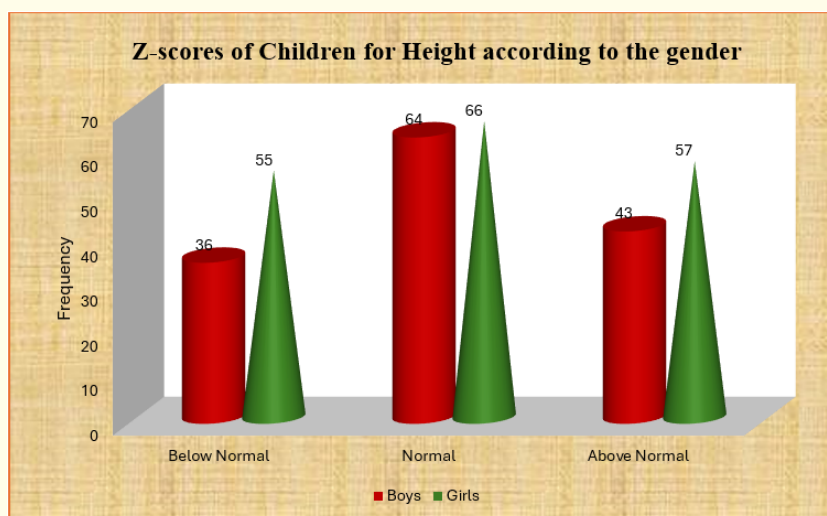
**Table 5:** Mean Weight of Sample Anganwadi Girls According to the Age and WHO Standards.

It divulges from table 5 that when compared with the WHO standards, sample girls belonged to all age groups 3 to 3.11, 4 to 4.11 and above 5 years were found to be below standards of WHO. Whereas, children belonged to 2 to 2.11 months recorded mean weight of 14.4 ± 7.88, which was more than WHO standards. The mean weight data of sample boys and girls showed that children

were up to the standards and above the standards up to 2 to 2.11 years. As the age progressed the weight of sample children were below the standards. The reason may be that by the time 3 years, children attend pre-school and food preference of children start and involve in play for more time.

S. No	Category	Boys		Girls	
		Number	Percentage	Number	Percentage
1.	Below Normal	36	25.17	55	30.89
2.	Normal	64	44.75	66	37.07
3.	Above Normal	43	30.08	57	32.04
4.	Total	143	100	178	100

**Table 6:** Z-score of Children for Height According to the Gender.



**Figure a**

The anthropometry data was converted into z scores based on the WHO Standards (2014).

Gender wise Distribution of Z-Scores according to height across different categories of malnutrition shows that 44.75 percent of sample boys and 37.07 percent of sample girls were in the normal categories of nutritional status. Next to it, 30.08 percent of boys and 32.04 percent of girls were in the categories of above normal nutritional status. One fourth of boys (25.17percent) and 30.89

percent of girls were in below normal category. As nearly one third of sample girls and fourth of sample boys recorded below normal status there is a need to explore the reasons for malnourishment among children.

Gender wise distribution of Z-Scores according to weight across different categories of malnutrition shows that 73.82 percent of boys and 75.0 percent of girls were in the normal category of nutritional status. Next to it, 16.10 percent of boys and 16.86 percent of

S.No	Category	Boys		Girls	
		Number	Percentage	Number	Percentage
1.	Below Normal	24	16.10	29	16.86
2.	Normal	110	73.82	129	75
3.	Above Normal	15	10.08	14	8.14
4.	Total	149	100	172	100

Table 7: Z-score of Children for Weight According to the Gender.

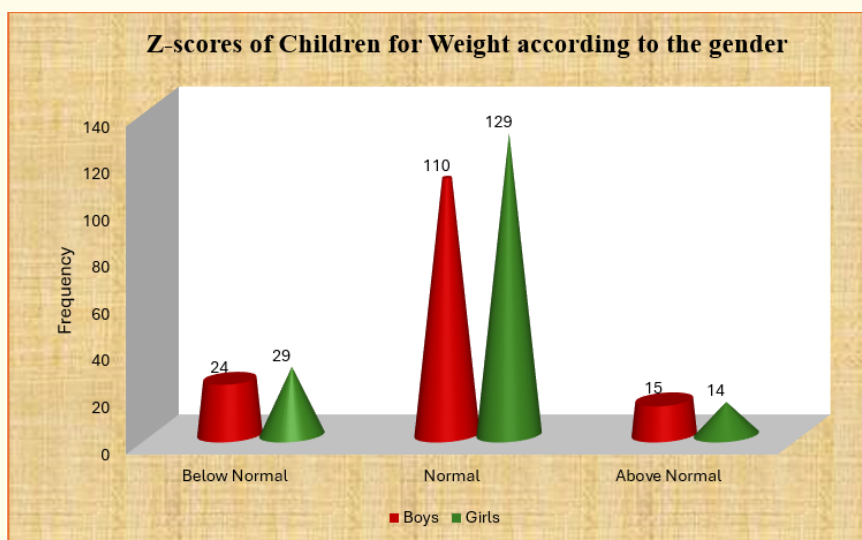


Figure b

girls were in the category of above normal nutritional status. Only few percent of boys (10.8 percent) and 8.74 percent of girls were in below normal category, which shows good nutritional status among sample children as per their weights.

From the above discussion following conclusions can be drawn.

**Conclusions**

- Irrespective of gender majority of sample children had stunted growth.
- As the age progressed the weight of sample children were found to be below the standards.

- As nearly one third of sample girls and one fourth of sample boys recorded below normal status according to height there is a need to explore the reasons for malnourishment among children.
- Only few percentage of boys (10.8) and 8.74 percent of girls were in below normal category, which shows good nutritional status as per weight.

**Implications**

This is a need for advice to intervene to improve children’s nutritional status by targeting in the below following ways

- Mother's education is an important factor for children nutritional status, education must be provided to all kind of mothers at all levels to improve mother's nutritional status and nutritional knowledge and dietary knowledge. Nutrition education to Anganwadi teachers and to mothers in Anganwadi centres.
- Majority of the preschool children in selected Anganawadis children were stunted and wasted. Hence the present study has given the evidence that health awareness should be created to improve the nutrition and information booklet is helpful to improve their nutrition status.
- Irrespective of government feeding programmes it is necessary to introduce awareness programs through community participation, involvement of NGOs and other sectors.

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