

## ORIGINAL ARTICLE

**Anthropometric Profile of Children Attending Anganwadi Centers Under Integrated Child Development Services (ICDS) Scheme In Doiwala Block**Gagan Deep Kaur<sup>1</sup>, Pradeep Aggarwal<sup>2</sup>, Rakesh Kakkar<sup>3</sup><sup>1</sup>Post Graduate Resident, <sup>2</sup>Associate Professor, <sup>3</sup>Professor, Department of Community Medicine, Himalayan Institute of Medical Sciences, Dehradun, Uttarakhand, India

<a href="#">Abstract</a>	<a href="#">Introduction</a>	<a href="#">Methodology</a>	<a href="#">Results</a>	<a href="#">Conclusion</a>	<a href="#">References</a>	<a href="#">Citation</a>	<a href="#">Tables / Figures</a>
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**Corresponding Author**

Address for Correspondence: Pradeep Aggarwal, Department of Community Medicine, Himalayan Institute of Medical Sciences, Dehradun, Uttarakhand, India  
E Mail ID: drpradeep\_aggarwal@hotmail.com

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**Abstract**

**Introduction** In any community, Mothers and Children constitutes not only priority group, but they are also a “Vulnerable” or “Special-risk Group”. Similarly in India our biggest problem is malnutrition among under five year old children. To break the vicious cycle of malnutrition, morbidity reduced learning capacity and mortality India launched the Integrated Child Development Services (ICDS) Scheme in 1975. It is the foremost symbol of India’s commitment to her children **Rationale:** Forty percent of the world's severely under-nourished under-five children live in India so the present study was conducted to assess the nutritional status of children availing the services under Integrated Child Development Service Scheme in Uttarakhand. **Objective:** To estimate the level of nutrition in children attending Anganwadi centers of Doiwala block. **Methods:** Out of these Seven ICDS project areas, Doiwala Block was chosen for the study purpose since it is also the field practice area of Department of Community Medicine, HIMS. 19 AWC was selected by using Simple Random Sampling technique in Doiwala block. All the children aged between 3- 6years attending Anganwadi centers were included in community based, cross sectional study. Predesigned pretested anthropometric survey tool with local adaptability and minor modification for local suitability was adopted to collect information pertaining to growth monitoring of the children [Adopted from WHO child growth standard 2006]. Children were weighed, and their height and MUAC were recorded. Weight for age, height for age and MUAC for age was calculated using WHO growth references .Nutritional status according to the WHO Child Growth Standards was analysed using WHO Anthro statistical software. **Results:** 200 children were surveyed. From the total population 110 are males and 90 are females. After the analysis of weight for age with anthro software it was found that 20.9% of children lie within -2 SD with a mean of -0.98 and SD of 1.14. In case of height for age 30.9% of children lie within -2 SD with a mean of -0.92 and SD 1.87. BMI for age 25.8% of children lie within -2SD with a mean of -1.58 and SD 1.3. MUAC for age 30% of children lie within -2SD. **Conclusion:** As per anthropometric calculation the burden of malnutrition was high among children attending Anganwadi centers. This raises concern about the children who are not allowed to attend the Anganwadi centers on regular basis due to various reasons. Burden of malnutrition among children attending Anganwadi centers can be tackled by enhancing the quality of mid-day meal programme especially on high protein and caloric intake.

**Key Words**

Anganwadi centers; ICDS; Nutritional Status; WAZ; HAZ; MUACAZ

**Introduction**

The period between weaning and the age of five is nutritionally regarded as the most vulnerable period of the life cycle because that is when rapid growth,

loss of passive immunity and the development of the immune system against infection occur. Additionally, environmental changes can also affect child nutrition. Thus, monitoring the nutritional status of

children is a fundamental instrument for measuring the population's health (1).

Nutritional status is the best indicator of the global well-being of children. Worldwide, there are more than 150 million underweight and more than 200 million stunted preschool children (2,3). In India malnutrition among children remains a significant problem in India constituting 48%, 43%, and 20% of children under 5 years of age stunted, underweight, and wasted, respectively. The proportion of children who are severely undernourished is also notable—24%, severely stunted and 16%, severely underweight. Mortality rates of under 5 children is 2.5 times higher among moderately underweight and 5 times higher in severely underweight (4).

Lack of food is not the sole cause of malnutrition. Lack of awareness and knowledge about feeding amount, frequency, type of food, etc., contributes significantly to poor nutritional status among children (5).

The Government of India launched the Integrated Child Development Services (ICDS) in 1975 in recognition of the importance of early childhood care as the foundation of human development. The ICDS has expanded over the years and is now one of the world's largest and unique outreach programmes responding to the challenges of meeting the holistic needs of a child. Over the years the programme has undergone many transformations in terms of scope, content and implementation, but the primary goal of breaking the inter-generational cycle of malnutrition, reducing morbidity and mortality caused by nutritional deficiencies, reaching out to children, pregnant women lactating mothers and adolescent girls have remained unaltered (6).

Weight for Age is the most widely used index for assessment of undernutrition in clinical practice and the only one used by the Integrated Child Development Services (ICDS) programme in India. With the progress of undernutrition or malnutrition, weight is first affected, and subsequently height is affected as well. The ICDS programme uses its vast network of primary childcare centres and workers known as Anganwadi workers to monitor children's growth by weighing at monthly intervals. Weight is then plotted for each child on World Health Organization growth charts, which are adopted from WHO child growth standard 2006. This aids in early recognition of malnutrition and implementation of required corrective measures (7).

Weight-for-height is an excellent indicator of recent nutritional status, whereas height-for-age is more indicative of long-term nutrition, which will have an effect on stature. Children who are undernourished are shorter and weigh less than their well-nourished peers (8). Although the mid upper arm circumference (MUAC) is used as a proxy to assess wasting in children. It is widely used mainly due to its relative independence of age in one to five year-old children; however, the age-independence of MUAC has been disputed. The MUAC of <12.5 and <13.5 cm has been used to detect severe and moderate malnutrition respectively (9).

According to Singh (10), every third child in India is underweight. Gardner and Halweil (11), however, state that 53% of children in India are underweight. Rajalakshmi (12) has further pointed out that 60% to 70% of Indian children of 1 to 4 years of age do not reach their full growth potential.

Monitoring and evaluation is backbone for success of any health programme or project, as they provide valuable information about functioning and trace the direction of ongoing programme or project. As the nutritional status of children availing the services under Integrated Child Development Service Scheme is a proxy indicator for functioning of programme. This forms the rationale behind the present study

### Aims & Objectives

- To estimate the level of nutrition in children attending Anganwadi centers of Doiwala block
- To measure the anthropometric parameters
- To correlate the anthropometric parameters with WHO Child Growth Standards

### Material and Methods

The study was conducted by the Department of Community Medicine, Himalayan Institute of Medical Sciences (HIMS), Swami Ram Nagar, Dehradun to assess the level of nutrition in children attending Anganwadi centers of Doiwala block Centers in Dehradun district.

**Study Design:** Type of Study: Community based, Cross sectional study. Study Population: All the children registered for supplementary nutrition and Preschool education were included in study. Thus, a sample size of 200 children aged 3 to 6 years was included in the study. **Study Period:** 15 June to 15 September, 2014. **Sample size and Sampling Methods:** The study universe will comprise of seven ICDS project areas in District Dehradun i.e. – Dehradun Urban, and one in each six Community

Developmental Blocks - Kalsi, Chaktara, Doiwala, Raipur, Raiwala, Sahaspur.

Out of these Seven ICDS project areas, Doiwala Block was chosen for the study purpose since it is also the field practice area of Department of Community Medicine, HIMS. This Doiwala block comprises of five Nyaypanchayat, out of which one Nyaypanchayat Markham grant was selected randomly. Markham grant consist of 19 villages. 1 Anganwadi center was chosen from every village to study the nutritional status of children. If any Anganwadi will be found non-functional due to unavailability of staff or registered beneficiaries then adjacent Anganwadi will be chosen.

#### Selection of Subjects-Inclusion Criteria:

- All the Anganwadi centers selected by Simple Random Sampling in Doiwala block will be included in the study
- All the children registered for supplementary nutrition and Preschool education were included in study.
- Informed oral consent was taken from the mothers of children who were examined.
- Anganwadi centers should be fully functioning.

#### Exclusion Criteria:

- Any Anganwadi found non-functional due to unavailability of staff or registered beneficiaries then adjacent Anganwadi will be chosen.
- Children who could not be tracked after three visits of investigator were excluded from study.

**Study Tools:** Predesigned pretested anthropometric survey tool with local adaptability and minor modification for local suitability was adopted to collect information pertaining to growth monitoring of the children [Adopted from WHO child growth standard 2006] The weight, height/length and Mid-Upper Arm Circumference (MUAC) of the selected child was recorded and converted into three summary indices of nutritional status: weight for age z score, height for age z score, weight for height z score and MUAC for age z score by using WHO Anthro 2011 software version 3.2.2, January 2011.

According to WHO criterion based on standard deviation (SD) units, children who were more than two SDs below the reference median were considered undernourished, that is, underweight, stunted, and wasted. Every effort was made to get high order of accuracy in measurements by employing standardized methods.

Anthropometric measurements

Weight was measured in kilograms with the help of Salter weighing machine (Salter England Model No. 235 6S, United Nations Children's Fund which has a range of 25 kg with an accuracy to 100 g) scales for all the respondents, while height was measured in centimeters with stadiometer (seca 217 graduation up to 1mm) and MUAC was measured in cm with the help of non stretching measurable tapes. Anthropometric measurements were performed according to World Health Organization (WHO) recommendations. The nutritional status of the children was evaluated according to weight-for-age, height-for-age, weight for height and MUAC for age tables identifying stunting and wasting, and the results were compared with the distributions provided by the 2007 WHO growth references. The anthropometric indices were expressed as z-scores

## Results

The total number of registered children (3-6 years) in the surveyed Anganwadi Centres (AWCs) was 250. Out of 250, 20 (8%) children belonged to the age group of 5 - 6 years. These 20 children were excluded from the study as they had stopped coming to AWCs. The reason for such a drop-out from AWCs could be that they got admission in primary schools and therefore were not coming to the AWCs anymore. Secondly, the growth monitoring at AWCs is done only upto 5 years of age. Thus, the actual study population comprised of 230 children of 0 - 5 years age group. Out of 230 registered children belonging to age group of 3 - 5 years in the surveyed AWCs, only 200 (91.7%) could be included in the survey, 30 (15 %) could not be taken up in the survey due to their non-availability at the AWCs despite of repeated visits (i.e., Three consecutive visits).

There were 110 boys and 90 girls in our study sample. Boys were 5.0% more than girls. 68.5% children were of age group 36-47 months, followed by 31.5% children in 48-60 months age group ([Table-1](#)) ([Figure2](#)). By distributing children according to sex in different age groups we have 40.5% males and 28% of females in 36-47 years age group ([figure-1](#)). Hindu children comprised 68.5% of population. The Parameters used to assess undernutrition among the children were stunting (HAZ) and wasting (WAZ), (MUACZ).

All the data was imported into Anthro software. Height for age z scores (HAZ), Weight for age z scores (WAZ) and MUAC for age z scores were obtained after analyzing the data with software. These three

parameters were calculated by dividing the sample into different age group intervals, by sex cluster and by religion cluster of the children. The results obtained were compared within these intervals ([Table-2](#)). The data presented in table-2 reflects an alarming trend for both stunting and wasting. 47%, 25% and 31.5% of children were below -2SD for HAZ, WAZ and MUAC age z scores respectively. The percentage of children below -3SD for HAZ, WAZ and MUAC age z scores were 16.5%, 6%, and 3% respectively. The largest no of children were clustered in the stunted and wasted categories i.e. below -2SD ([Table 2](#)). Only 20.9%, 30.9% and 30% lie within -2SD to +2SD i.e. Normal for HAZ, WAZ and MUAC for age z scores

Out of 68.5% children in 36-47 years age group 46%, 28.5% and 27.7% were below -2SD for HAZ, WAZ and MUAC age z scores respectively i.e. in stunted and wasted categories. 9.5%, 6.6% and 3.6% children were below -3SD for HAZ, WAZ and MUAC age z scores i.e. in severe stunted and severe wasted categories. 48-60 years age group had 31.5% children in which 9.5%, 6.6% and 3.6% were below -2SD. 23.3% of children in 48-60 years of age group were below -3SD i.e. in severe stunted category which reflects an alarming trend ([Table 2](#)).

There were significant differences between the proportions of boys and girls in stunted, severely stunted, wasted and severely wasted categories. The percentage of girls in the stunted category was 57.3%, compared with 44.1% for boys, while the values were 34.2% and 28.1% in the wasted category. Similar trend was observed in severe stunting and severe wasting category which contained 14.1% boys, 19.1% girls, 5.4% boys and 6.7% girls in severe stunting and severe wasting category. When sex was divided into different age groups it was observed that percentage girls in stunted category of 36-47 age group, 48-60 years age group was 55.4 and 64.5% as compared to boys which was 39.5% and 58.6% in respective age groups. The trend was reversed in wasting category which contained 21.4% girls as compared to 33.3% boys below -2SD ([Table 2](#)). The nutritional situation of children of Hindu religion was slightly better than that of Muslim children. Among Hindu's 48.1% and 28.8% of children were stunted (HAZ) and wasted (WAZ) as compared to Muslim children in which 57.5% and 42.5% were in stunting and wasted category.

The effect of different variables on the nutritional status of the children was assessed by using mean z scores and Standard deviation to calculate t value from independent t test. There is significant effect of age and sex on both stunting and wasting ([Table 3 and 4](#)).

WHO child growth standard 2006 growth curves show us a standard distribution of population.

We compared our study sample curves of height for age, weight for age, mid upper arm circumference curve for age with WHO child growth standard curves. It was observed that in all the three cases our sample growth curves were shifted to left side of standard WHO growth curve which denotes our study sample had higher prevalence of stunting and wasting ([figure-2, 3, and 4](#))

## Discussion

The underfed still outnumber the overfed in the developing world among Asian, African and Latin American population. In spite of economic advances in the region, undernutrition remains significant problem in many Asian countries. Comparison of the nutritional status of the children in the study area with the results of other similar studies worldwide demonstrates that levels of under nutrition in Children of Doiwala block of District Dehradun are alarming. Among children in a peri-urban area of Alexandria, Egypt, Wierzbka et al. (13) reported prevalence rates of only 19% for stunting, 3% for wasting, and 7% for underweight, as compared with rates of 47.0% for stunting and 31.5% for wasting in our study. Alanderson A Ramalho et al reported prevalence of low HAZ was 12.2% (1). Mohammed Imran et al reported 47.3% of children were underweight in rural Bangalore (14). Similar study in India by Shamim Haider et al reported that 30.81% are moderately underweight and 3.61% are severely underweight in 3-6 years age group (15). Saikul Islam et al reported the prevalence of stunting and wasting was 30.4% and 21.6% respectively followed by prevalence of severe stunting and severe wasting was 7.0% and 8% respectively (16). Overall prevalence of stunting (47.0%) and wasting (31.5%) in the present study was more than the prevalence of stunting (46.5%) and wasting (46%) in Uttar Pradesh as observed in NFHS-3 (17).

Anuradha et al reported the prevalence of 31.8% of severe stunting and 29.1% severe wasting. They observed significant differences between the proportions of boys and girls in stunted category.

The Percentage of girls in the stunted category was 17.0%, compared with 14.8% for boys, while the values were 16.1% and 13% in the wasted category. In our study it was observed that the percentage of girls in the stunted category was 57.3%, compared with 44.1% for boys, while the values were 34.2% and 28.1% in the wasted category. Similar trend was observed in severe stunting and severe wasting category which contained 14.1% boys, 19.1% girls, 5.4% boys and 6.7% girls in severe stunting and severe wasting category (8).

### Conclusion and Recommendation

As per anthropometric calculation the burden of malnutrition was high among children attending Anganwadi centers. This raises concern about the children who are not allowed to attend the Anganwadi centers on regular basis due to various reasons. Burden of malnutrition among children attending Anganwadi centers can be tackled by enhancing the quality of mid-day meal programme especially on high protein and caloric intake.

### Limitation of the study

As Dehradun district has 6 rural blocks and one urban. To know the real situation of nutritional status of children attending anganwadi centers all blocks should be studied. As in our study we could include only Doiwala block so results cannot be generalized.

### Authors Contribution

GDK: Data collection, sampling, manuscript writing; PA: Data Entry and Analysis, critical inputs in manuscript drafting, RK: Concept designing, finalization of manuscript and provided critical inputs.

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**Tables**

**TABLE 1 DEMOGRAPHIC CHARACTERISTICS OF STUDY POPULATION**

Variable		Number	Percentage
Sex	Male	110	55
	Female	90	45
Age	36-47 M	137	68.5
	48-60 M	63	31.5
Religion	Hindu	154	77
	Muslim	42	21
	Sikhism	4	2

**TABLE 2 PERCENT STUNTING (HEIGHT-FOR-AGE HAZ) AND WASTING (WEIGHT-FOR-AGE WAZ) IN SAMPLE POPULATION-BASED Z-SCORES (WHO GROWTH REFERENCE 2007) AVAILABLE AT: [HTTP://WWW.WHO.INT/GROWTHREF/EN](http://www.who.int/growthref/en)**

Variable		Height for Age Z score				Weight for Age Z score				MUAC for Age Z score			
		< -3SD	< -2SD	Mean	SD	< -3SD	< -2SD	Mean	SD	< -3SD	< -2SD	Mean	SD
<b>Total Children (36-60)</b>		16.5	47	-1.91	1.39	6	31.5	-1.51	0.98	3	25	-1.56	1.39
<b>Age in different groups</b>	36-47 M	9.5	46	-1.71	1.28	6.6	28.5	-1.41	1	3.6	27.7	-1.59	0.81
	48-60 M	23.3	61.7	-2.45	1.42	5	40	-1.79	0.87	1.7	20	-1.52	0.65
<b>Sex</b>	Male	14.4	44.1	-1.78	1.5	5.4	34.2	-1.53	0.99	0.9	19.8	-1.53	0.66
	Female	19.1	57.3	-2.08	1.23	6.7	28.1	-1.49	0.97	5.6	31.5	-1.61	0.87
<b>Males in diff age groups</b>	36-47 M	6.2	39.5	-1.5	1.34	4.9	33.3	-1.47	0.99	0	21	-1.52	0.67
	48-60 M	27.9	58.6	-2.55	1.71	6.9	37.9	-1.73	0.98	3.4	17.2	-1.54	0.68
<b>Females in diff age group</b>	36-47M	14.3	55.4	-2.02	1.15	8.9	21.4	-1.33	1	8.9	37.5	-1.69	0.98
	48-60M	29	64.5	-2.36	1.1	3.2	41.9	-1.85	0.76	0	22.6	-1.49	0.64
<b>Religion</b>	Hindu	18.1	48.1	-1.88	1.5	5.6	28.8	-1.46	0.97	3.8	26.3	-1.56	0.79
	Muslim	10	57.5	-2.03	0.81	7.5	42.5	-1.73	0.97	0	22.7	-1.66	0.64

**TABLE 3 ASSOCIATION OF VARIABLES BETWEEN DIFFERENT AGE GROUP**

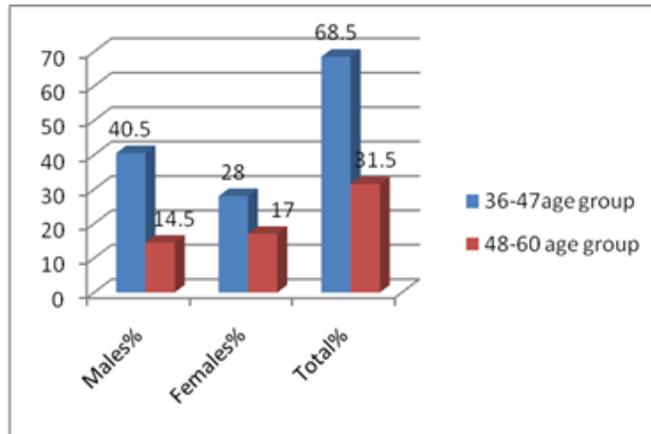
Variables	Mean Z Score		Standard Deviation		t value	P value	Significance
<b>Age groups</b>	36-47 M n-137	48-60 M n-63	36-47 M n-137	48-60 M n-63			
<b>HAZ</b>	-1.71	-2.45	1.28	1.42	-3.8694	0.001	Significant
<b>WAZ</b>	-1.41	-1.79	1.0	0.87	-2.828	0.0052	Significant
<b>MUAZ</b>	-1.61	-1.53	0.87	0.66	0.6621	0.5088	Not Significant

**TABLE 4 ASSOCIATION OF VARIABLES BETWEEN DIFFERENT SEXES**

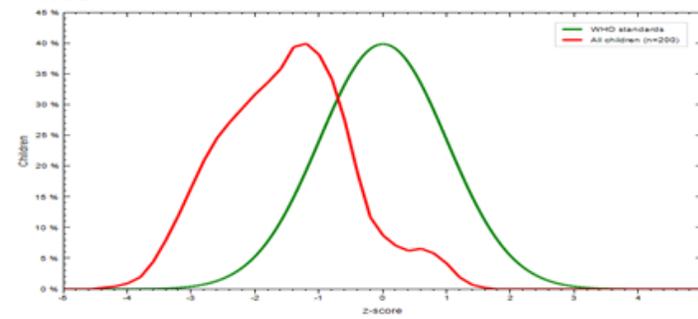
Variables	Mean Z Score		Standard Deviation		t value	P value	Significance
<b>Age groups</b>	Female	male	Female	male			
<b>HAZ</b>	-2.08	-1.78	1.23	1.5	4.403	0.0001	Significant
<b>WAZ</b>	-1.49	-1.53	0.97	0.99	-2.928	0.0055	Significant
<b>MUAZ</b>	-1.59	-1.52	0.81	0.65	0.7176	0.47	Not Significant

**Figures**

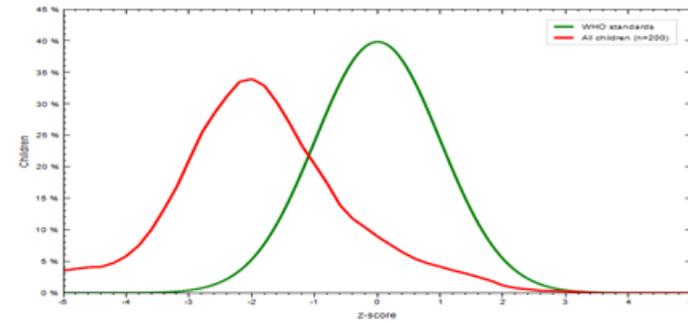
**FIGURE 1 DISTRIBUTION OF REGISTERED CHILDREN IN AWC ACCORDING TO SEX IN DIFFERENT AGE GROUPS**



**FIGURE 2 HAZ GROWTH CURVE**



**FIGURE 3 WAZ GROWTH CURVE**



**FIGURE 4 MUACAZ GROWTH CURVE**

