Nutritional Status of Children Under 5 Years Using Gomez's Classification

Niharika Vardhan Saxena[1], Dipanshu Kumar[2], Priya Mishra[3], Reshu Karnwal[4]

[1,2,3,4]Department of Applied Medical Sciences, Quantum University, Roorkee

Abstract

Objective: To assess the malnutrition status of the children <5 years of age in the Uttarakhand region.

Methods: The descriptive cross-sectional research study on 55 children aged <5 years was conducted in the Hasanpur and Mandawar village. The data was collected by using tools like socio demographic profile, breast feeding practices and Anthropometric assessment like height, weight, BMI and MUAC) of the children. Gomez's Classification was centred on assessing wasting in children.

Result: The result showed that out of 55 children 10.9% showed mild wasting, 43.63% moderate wasting and 40% showed severe wasting. The assessment of Mid Upper Arm Circumference (MUAC) measurements in children indicated that 8% displayed severe malnutrition, 27% exhibited moderate malnutrition, and 65% maintained a normal nutritional status. 43.63 % were moderately underweight and were severely underweight. Breastfeeding was received by 86.6% of the children.

Conclusion: The study concludes that most of the children were malnourished.

Keywords: Anthropometry, Breastfeeding, Malnutrition, Underweight.

INTRODUCTION

Malnutrition is an issue affecting children under the age of five, which has implications, for public health. As per the World Health Organization (WHO) malnutrition encompasses deficiencies excesses or imbalances in a person energy or nutritional intake [1]. It comprises two categories: undernutrition and overnutrition. Undernutrition includes conditions such as being underweight for age, stunting (being shorter than expected for age) wasting (being underweight for height) and inadequate intake of vitamins and minerals. On the other hand, overnutrition refers to individuals who're either overweight or obese [1,2].

Children who suffer from malnutrition face an increased risk of mortality and are more susceptible, to childhood illnesses. They may experience poor performance in school and have limited earning potential and ace a likelihood of developing non communicable diseases later in life. The consequences of nutrition can begin during pregnancy. Persist across generations. When mothers are malnourished, they are more likely to give birth to babies with birth weight who may experience growth and development. Recognizing this evidence, the WHO has established goals to reduce the prevalence of children by 40% and keep childhood wasting below 5% by 2025. The United Nations (UN) has officially introduced the UN Decade of Action, on Nutrition with the objective of expediting progress, between 2016 and 2025[3,4].

Weight-for-age (WFA), height-for-age (HFA), and weight-for-height (WFH) are the primary indicators

used for measuring undernutrition [5]. This means that some underweight children may also exhibit signs of stunting or wasting, and certain children may experience all three forms of anthropometric failure—stunting, wasting, and underweight. Gomez Classification, an early system used to categorize protein-energy malnutrition in children, is based on the percentage of expected weight for age. According to this classification, a weight percentage over 90% is considered normal, 76–90% indicates mild (first-degree) malnutrition, 61–75% indicates moderate (second-degree) malnutrition, and less than 60% indicates severe (third-degree) malnutrition [6].

OBJECTIVE

The present study was conducted with the aim to assess the malnutrition among 1–5-year-old Childrens by measuring anthropometric assessment (Height, Weight, BMI and MUAC), breast feeding practices and nutrition status by Gomez's classification.

METHODOLOGY

A descriptive cross-sectional research design was implemented to evaluate malnutrition among children aged below 5 years in Hasanpur and Mandawar villages in Uttarakhand. The study employed stratified sampling to select 55 children who met the inclusion criteria, and prior to data collection, permission was obtained from the respondents. A semi-structured questionnaire was utilized to gather socio-demographic data, breastfeeding information, and weaning practices of the children.

Anthropometric measurements were conducted to evaluate the nutritional status of the children. These measurements included assessing height, weight, BMI (Body Mass Index) [7], and MUAC (Mid Upper Arm Circumference) [8].The standard value of MUAC and BMI is given in Table 1 and Table 2 respectively. The nutritional status of the children was assessed using their BMI. Height measurement involved instructing children to stand barefoot against a wall with feet parallel and joined together, ensuring that their head and buttocks touched the wall. The length of children under 24 months was measured in a supine position. Salter's scale was used for weight measurement, and mid-arm circumference was assessed using Shakir's tape at the midpoint of the upper arm. Before use, it was confirmed that the pointer was aligned with zero on the scale. Mid Upper Arm Circumference (MUAC) was employed to measure the nutritional status of children aged below 5 years, with standard values guiding the assessment.

Table 1: Standard value of MUAC (Middle Upper Arm Circumference)

Indication	MUAC range	Colour indicator
Severe Malnourished	<12.5	Red
Moderately Malnourished	12.5-13.5	Yellow
Normal	>13.5	Green

Table 2: Standard value of BMI (Body Mass Index)

Nutritional Category	BMI Range (Kg/m^2)
Underweight	<16.5
Normal	16.5-23.0
Overweight	23.0-28.0
Obese	>28

Gomez's Classification is centred on assessing wasting in children through weight retardation. It positions the child based on their weight in comparison to a normal child of the same age. The standard value for Gomez's Classification is:

Table 3: Standard classification of Gomez's Law [9]

Grade of undernutrition	Type of undernutrition	% of weight for Age
Normal	Normal	>90
I	Mild	75-89.9
II	Moderate	60-74.9
III	Severe	<60

Weight-for-age is an indicator reflecting the overall nutritional status, specifically measuring underweight in relation to the normal weight of a child at that age.

Weight for age (%) = (Weight of a child/Weight of a normal child of that age) × 100

Weight-for-age is an indicator reflecting the overall nutritional status, specifically measuring underweight in relation to the normal weight of a child at that age.

The completeness and consistency of the data were verified. Initial processing included tasks such as editing, organizing, coding, and inputting the gathered data into the Statistical Package for Social Science (SPSS) version 19.0. Subsequently, a combination of descriptive and inferential statistical analyses was utilized to scrutinize the collected data. The findings were then presented in diverse tables. Nutritional status was evaluated using both Gomez classification and Mid Arm Circumference (MUAC).

RESULT

The study encompassed a total of 55 children aged below 5 years. In Table 4, Approximately 41.81% of the families resided in semi-urban areas. The gender distribution analysis revealed that female children constituted 50.9%, while male children accounted for 49.1% of the total study subjects. The mean age of the children was 3.22 years. Infants made up 10.9% of the participants, toddlers comprised 29.1%, and preschoolers constituted 60%. In terms of socio-economic status, the population was divided between upper-middle class (36.36%) and lower-middle class (63.63%).

Table 4: Frequency and percentage of socio demographic characteristics of population.

S.No.	Socio demographic Variables	Frequency	Percentage (%)
1	**Age** Infants Toddlers Preschoolers	6 16 33	10.9% 29.1% 60%
2	**Gender** Male Female	27 28	49.1% 50.9 %

3	**Socio-economic-Status** Upper middle class Lower middle class	20 35	36.36% 63.63 %

Table 5 presents statistics on breastfeeding behaviour. Among the children, 60% were delivered through a normal vaginal birth, while 40% were delivered via caesarean section (c-section). A substantial 70% of mothers demonstrated awareness of the dietary requirements for sustaining both maternal and infant health during breastfeeding. Exclusive breastfeeding for less than six months was observed in 13.4% of mothers, while 86.6% exclusively breastfed their infants between six to twelve months. Overall, 90% of mothers exclusively breastfed their babies during the initial six months of life. Additionally, 26.6% of women adhered to cultural dietary practices during the breastfeeding period.

Table 5: Frequency of breast-feeding practices among participants.

S. No.	Questionnaire	Percentage (%)

1)	**How was your child delivered?**
	  a) Through a normal vaginal birth
	  b) caesarean section (c-section)
		60%
		40%

2)	**Do you feel well-informed about the dietary requirements for maintaining both your health and your baby's health during breastfeeding?**
	  a) Yes
	  b) No
		70%
		30%

3)	**How long did you exclusively breastfeed your child?**
	  a) <6 months
	  b) 6-12 months
	  c) >12 months
		13.3%
		86.6%
		0%

4)	**Did you exclusively breastfeed your child during the first six months of their life?**
	  a) Yes
	  b) No
		90%
		10%

5)	**Are there any traditional or cultural dietary practices you follow during the breastfeeding period?**
	  a) Yes
	  b) No
		26.6%
		73.3%

Figure 1 Illustrates the distribution of MUAC values across various categories. The standard range for MUAC is greater than 13.5 cm. The evaluation of MUAC measurements in children revealed that 8% of them exhibited severe malnutrition, 27% showed moderate malnutrition, and 65% had a normal nutritional status.
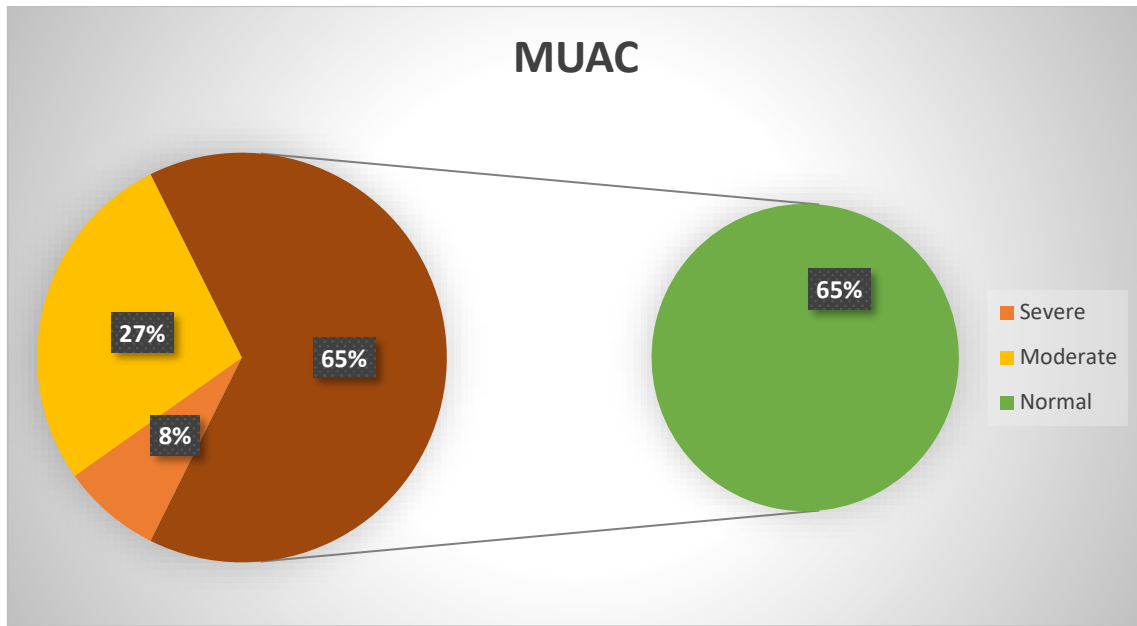
Figure 1: MUAC distribution among different categories

In our study, Figure 2 assessed the nutritional status of the population using Body Mass Index (BMI) and found that a substantial 80% of individuals were underweight, with only 2% classified as normal weight, 18% as overweight, and no individuals falling into the obese category. These findings underscore the prevalence of underweight individuals within the population and highlight the need for specific interventions to address this nutritional imbalance.
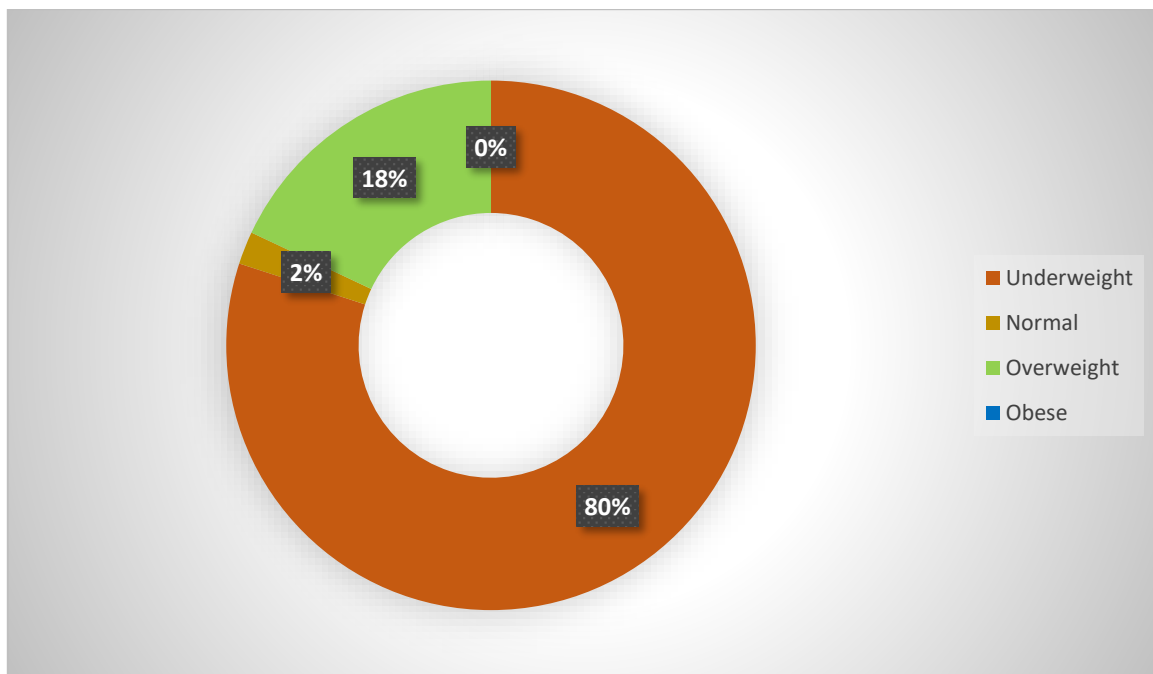

Figure 2: Prevalence of BMI among participants

In our study, the Gomez classification is to evaluate the nutritional status of the children and the distribution among participants is presented in Table 7.

Table 7: Frequency and percentage of wasting according to Gomez's law.

Grade of Undernutrition	Frequency (n)	Percentage (%)
Normal	3	5.45%
Mild (I)	6	10.9%
Moderate (II)	24	43.63%
Severe (III)	22	40%
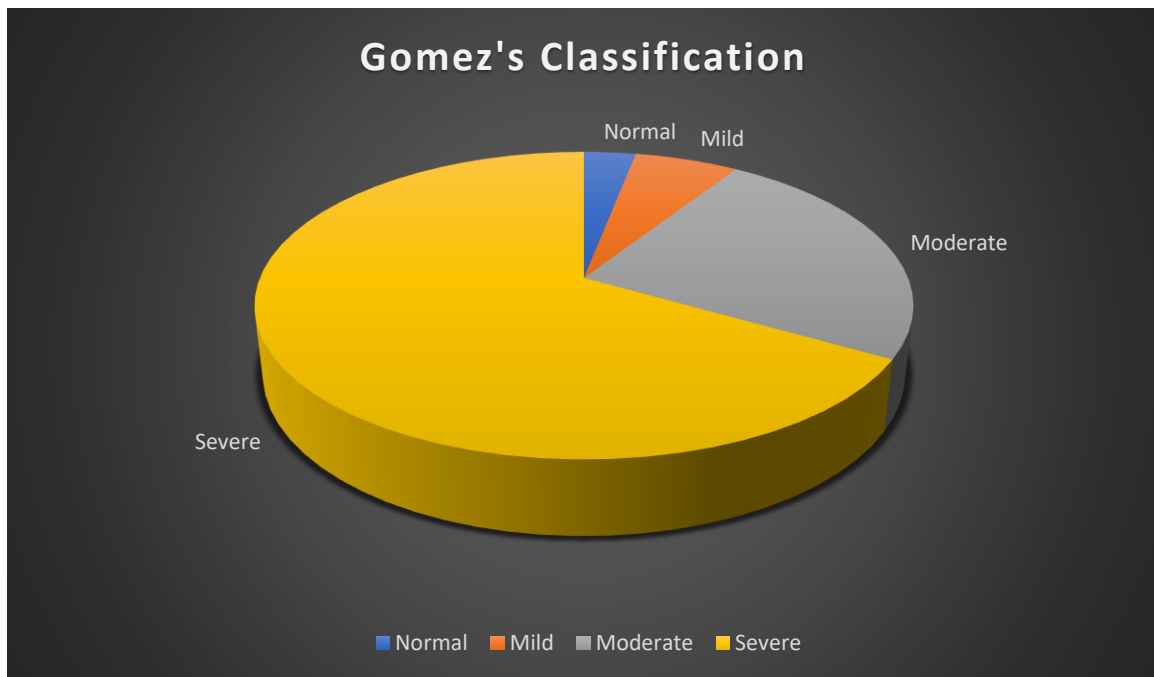
Figure 3: Prevalence of weight for age of the children

The results indicate that (Figure 3) 5.45% of individuals have a normal nutritional status, 10.9% exhibit mild malnutrition, 43.63% show moderate malnutrition, and 40% suffer from severe malnutrition. These findings underscore a significant prevalence of malnutrition, especially in the moderate and severe categories, within the study population. This emphasizes the immediate need for targeted interventions to address this pressing public health concern.

DISCUSSION

The current study, conducted in the Bhagwanpur town, Tehsil, and Taluka of Haridwar district in Uttarakhand, has offered valuable insights into the nutritional status of the study population. Our findings indicated an overall prevalence of underweight, stunting, and wasting at 18.3%, 31.6%, and 20.1%, respectively, which is notably lower than the national averages.

The alignment of our results with the National Family Health Survey (NFHS) [10] fact sheet for the state of Uttarakhand may be attributed to better maternal and childcare indicators and higher female literacy in the state, as evidenced by NFHS data. Significantly, maternal education plays a crucial role in nutritional outcomes; children born to mothers lacking knowledge of breastfeeding and weaning practices exhibited higher rates of underweight compared to those born to educated mothers who were aware of such practices.

While our study is constrained by its small sample size and the absence of information on underlying causative and associated factors for malnutrition, it corroborates the findings of NFHS 4 data for the state. This research lays a vital groundwork for understanding nutritional challenges in the Bhagwanpur region, informing targeted interventions and policy decisions to address malnutrition and enhance the health and well-being of the local population. Future investigations with larger sample sizes and comprehensive assessments of contributing factors are warranted to formulate effective strategies for combating malnutrition in this region.

A study conducted by Abu Rehan (2020) [11] to assess undernutrition and its sociodemographic correlates in under-five children in urban and rural areas of Rishikesh, Uttarakhand, reported similar findings. The study depicted a prevalence of underweight, stunting, and wasting as 37.3%, 43.3%, and 24.5%, respectively, in under-five children. The present study indicated that stunting and wasting were more prevalent in children from lower socioeconomic classes. These findings align with studies conducted by Shaili Vyas et al. [12] in Uttarakhand and Striessnig E et al. [13] through the analysis of NFHS-4 data.

As demonstrated in the present study, stunting was not significantly affected by the caste of the family, while wasting was more prevalent in the schedule caste (32.0%). Similar findings were observed by Chaudhary P et al. [14] (2017) in Jaipur, where the prevalence of stunting and wasting was nearly equal in joint families (44.2%) and nuclear families (42.7%).

References

1. World Health Organization. (2021, December). Malnutrition: Key facts.
2. Maleta, K. (2006). Undernutrition. Malawi Medical Journal, 18,189–205.
3. de Onis, M., Dewey, K. G., Borghi, E., et al. (2013). The World Health Organization's global target for reducing childhood stunting by 2025: rationale and proposed actions. Maternal & Child Nutrition, 9, 6–26.
4. United Nations System Standing Committee on Nutrition (UNSCN). (2017). UNSCN Discussion Paper - By 2030, end all forms of malnutrition and leave no one behind (pp. 1–32).
5. World Health Organization Multicentre Growth Reference Study Group. (2006). WHO child growth standards based on length/height, weight, and age. Acta Paediatrica Supplement, 450, 76–85.
6. Assessment of Nutritional Status of Under-Five Children in an Urban Area of South Delhi, India. (n.d.). *Indian Pediatrics, 58(11), 987–991.
7. World Health Organization. (2007). WHO BMI chart for children.
8. World Health Organization. (n.d.). WHO MUAC chart for children below 5 years. WHO child growth chart standards.
9. Gomez, F., Galvan, R. R., Cravioto, J., & Frenk, S. (1955). Malnutrition in infancy and childhood, with special reference to kwashiorkor. Advances in Pediatrics, 7,131–169.
10. International Institute for Population Sciences (IIPS) and ICF. (2017). National Family Health Survey (NFHS-4), India, 2015-16: State Fact Sheet Uttarakhand.
11. Khatib, N., Gaidhane, S., Gaidhane, A. M., et al. (2020). A study to assess undernutrition and its sociodemographic correlates in under-five children in urban and rural areas of Rishikesh, Uttarakhand. Journal of Family Medicine and Primary Care, 9(9), 4980–4984.
12. Vyas, S., Kandpal, S. D., & Semwal, J. (2017). A study on undernutrition and its socioeconomic correlates among toddlers in a rural area of Uttarakhand, India. International Journal of Community Medicine and Public Health, 3,1043–1048.

13. Striessnig, E., & Bora, J. K. (2020). Under-five child growth and nutrition status: spatial clustering of Indian districts. Spatial Demography, 8(1), 1–22.

14. Chaudhari, P., & Agrawal, M. (2019). Malnutrition, and associated factors among children below five years of age residing in slum area of Jaipur city, Rajasthan, India. Asian Journal of Clinical Nutrition, 11,1–10.