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Anthropometric Assessment Of Nutritional Status Of Preschool Children In The Hanji Community Of Dal Lake, Srinagar (Jammu And Kashmir)

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ARTICLE INFO	ABSTRACT

Background: Preschool years (2–6 years) are critical for physical growth and cognitive development, and adequate nutrition during this period is essential for long-term health. Malnutrition remains a persistent public health concern in India, with marginalized communities particularly at risk. The Hanji community of Dal Lake, Srinagar, is a water-bound population with limited access to health and nutrition services, making preschool children highly vulnerable to undernutrition.
Objective: To assess the anthropometric status and prevalence of underweight, stunting, and wasting among preschool children (2–6 years) in the Hanji community of Dal Lake, Srinagar, and to identify gender differences in nutritional outcomes.
Methods: A descriptive cross-sectional study was conducted among 400 preschool children using a structured questionnaire. Anthropometric measurements—weight, height, and mid-upper arm circumference (MUAC)—were collected following WHO standard procedures. Nutritional indices (weight-for-age Z-score [WAZ], height-for-age Z-score [HAZ], weight-for-height Z-score [WHZ], and BMI-for-age Z-score [BMIZ]) were calculated. Data were analyzed using SPSS, and differences by age and gender were assessed using t-tests, ANOVA, and chi-square tests.
Results: Mean body weight, height, and MUAC increased significantly with age ($p < 0.001$), reflecting normal growth patterns. However, z-scores indicated persistent mild undernutrition across all age groups. Boys had significantly higher weight and MUAC than girls, while height and z-scores showed no significant gender differences. Overall, 31.8% of children were underweight (boys 25.0%, girls 38.0%), 29.5% were stunted, and 20.1% were wasted, with no significant sex differences for stunting or wasting. MUAC-based malnutrition was observed in 14.0% of children, with comparable prevalence in boys and girls.
Conclusion: Malnutrition, both chronic and acute, is prevalent among preschool children of the Hanji community, with female children showing greater vulnerability to underweight. Targeted interventions, including supplementary feeding, nutrition education, and routine anthropometric monitoring, are recommended to improve the nutritional status of this marginalized population.

Keywords: Anthropometry, Preschool children, Malnutrition, Underweight, Stunting, Wasting, Hanji community, Dal Lake

Introduction

The preschool years, typically between ages 2 and 6, represent a critical period of rapid physical growth and cognitive development (NEP, 2020; UNESCO-UIS, 2012; WHO, UNICEF, & World Bank Group, 2018). Adequate nutrition during this stage is essential for brain development, immune function, and long-term well-being, enabling children to achieve their full developmental potential (Black et al., 2013; Roberts et al., 2022). Conversely, poor nutrition in early childhood can result in undernutrition, stunting, wasting, micronutrient deficiencies, and increased susceptibility to infections (UNICEF, 2019). Given its profound impact on individual and societal health, assessing the nutritional status of preschool children remains a priority in public health, particularly in low- and middle-income countries such as India, where childhood undernutrition continues to be a persistent challenge despite decades of intervention programs.

Malnutrition encompasses a broad spectrum of nutritional inadequacies, including energy-protein undernutrition (stunting, wasting, underweight), micronutrient deficiencies, and overnutrition manifested as overweight and obesity (Silva et al., 2015). These conditions not only affect physical and cognitive growth but also compromise immune function, increasing susceptibility to infectious and non-infectious diseases (Acharya et al., 2015). The long-term consequences of early-life malnutrition include reduced productivity and increased economic burden, which hinder national development goals (Striessnig & Bora, 2020). Recognizing and addressing both undernutrition and overnutrition during early childhood is therefore essential for the prevention of chronic nutrition-related disorders in later life (Yan et al., 2018). The Joint Malnutrition Estimates (JME) released in April 2021 highlight that global progress remains inadequate to meet the World Health Assembly (WHA) nutrition targets for 2025 and the Sustainable Development Goals (SDGs) for 2030. According to the data, only about one-fourth of countries are currently on track to achieve the goal of reducing stunting by half by 2030. Moreover, for nearly half of the countries, there is insufficient data to assess progress toward meeting the target for reducing wasting. Globally, an estimated 149.2 million children are affected by stunting, 45.5 million suffer from wasting, and 38.9 million are classified as overweight (UNICEF, WHO, & World Bank, 2021). The latest 2025 estimates indicate that 150.2 million children under five are affected by stunting, while wasting threatens the lives of approximately 6.6% of children under five, or 42.8 million children globally (UNICEF, WHO, & World Bank, 2025).

Anthropometry, the measurement of body size and composition is a widely used and reliable method for assessing nutritional status in children. Common anthropometric measurements include weight, height, and mid-upper arm circumference (MUAC), which serve as indicators of current nutritional status and nutrient reserves. Weight-for-age (underweight), height-for-age (stunting), weight-for-height (wasting), and BMI-for-age are expressed as z-scores, representing the number of standard deviations from a reference population (FANTA, 2016; Bogin & Marcos, 2023). These measurements provide critical data for evaluating both acute and chronic forms of malnutrition and for monitoring the effectiveness of nutrition programs at the community and population level.

The Global Nutrition Report indicates that over 17% of Indian children under five years of age are wasted, and more than 34% are stunted (Development Initiatives, 2021). Data from the National Family Health Survey (NFHS-5) show that approximately 36% of children are stunted, 19% are wasted, and 32% are underweight (International Institute for Population Sciences [IIPS] & ICF, 2021). As per the State Nutrition Profile (SNP) 2021 released by NITI Aayog in association with the UNICEF, International Food Policy Research Institute (IFPRI) over 15 lakh children are suffering from acute malnutrition-related ailments including stunted growth in Jammu and Kashmir (Christopher et al., 2022). A report released by NFHS-5 (National Family Health Survey) in 2019-2021 it was seen that the nutritional status of children in Jammu and Kashmir has worsened since NFHS-4 (2015-2016). The percentage of children who are stunted (27%) has also not changed in the four years. The percentage of children who are wasted increased from 12% to 19% and the children who are underweight increased from 17% to 21% Among the top 5 highest burden districts Srinagar was at second place in stunting third place in wasting (IIPS & Ministry of Health and Family Welfare, 2020).

One such group that remains largely overlooked is the **Hanji community** of Dal Lake, Srinagar, a water-bound population primarily engaged in fishing and boat-based trade. Their unique ecological environment, economic instability, and low access to services contribute to increased risk of malnutrition among preschool children (Manzoor et al., 2022). Factors such as limited dietary diversity, inadequate feeding practices, low maternal literacy, and poor sanitation further compound these risks, leaving children vulnerable to both acute and chronic undernutrition (Ruel & Alderman, 2013).

Given the scarcity of research on this marginalized population, the present study was undertaken to **assess the anthropometric parameters of preschool children (2–6 years) in the Hanji community of Dal Lake, Srinagar (Jammu and Kashmir)**. The study aims to evaluate their nutritional status using standard WHO growth indices and to highlight the prevalence of stunting, wasting, and underweight. The findings are expected to provide evidence for community-specific interventions and to inform the design and implementation of child health initiatives under ICDS, POSHAN Abhiyan, and other nutrition programs in the region.

Materials and Methods

- **Study Design and Area**

A descriptive cross-sectional study was conducted from September 2023 to March 2024 among preschool children (2–6 years) of the Hanji community residing in the Dal Lake area of Srinagar, Jammu and Kashmir.

The Hanji are a traditional water-bound population engaged in fishing and boat-based trade, characterized by low socioeconomic status and limited access to health and nutrition services.

- **Study Population and Sampling**

The study included 400 preschool children and their mothers or caregivers. Sample size was estimated using Cochran's formula (Cochran, 1977), assuming a 95% confidence level, 5% margin of error, and 50% population proportion, yielding a minimum of 384, which was rounded to 400 to account for non-responses. A multi-stage purposive sampling technique was used to select Hanji-dominated *mohallas* and eligible households.

- **Inclusion criteria:** Children aged 2–6 years residing in the area for ≥6 months and belonging to the Hanji community.
- **Exclusion criteria:** Children with chronic illnesses or disabilities affecting nutritional status.

- **Data Collection**

Data were collected using a structured, pre-tested questionnaire. Anthropometric measurements (weight, height, and mid-upper arm circumference) were recorded using calibrated instruments following WHO standard procedures. Nutritional indices—Weight-for-Age (WAZ), Height-for-Age (HAZ), Weight-for-Height (WHZ), and BMI-for-Age (BMIZ)—were computed using ENA for SMART (2020) software (available at www.nutrisurvey.net/ena/ena.html), based on WHO Child Growth Standards (2006).

- **Statistical Analysis**

Data were entered in Microsoft Excel and analyzed using IBM SPSS Statistics, Version 22. Descriptive statistics (mean, SD, percentage) summarized data, and inferential tests (Chi-square, *t*-test, and ANOVA) assessed group differences. A *p*-value <0.05 was considered statistically significant.

- **Ethical Considerations**

Verbal informed consent was obtained from all participants after explaining study objectives. Confidentiality and anonymity were maintained, and participation was voluntary.

Results

The results of the present study showed a fairly balanced distribution across age groups: 26.7% were 2-3 years old, 28.0% were 3-4 years, 18.8% were 4-5 years, and 26.5% were 5-6 years. Regarding gender, slightly more children were female (52.0%) than male (48.0%).

The socio-economic profile of the participants indicated that the majority belonged to the lower-middle class (42.5%) and middle class (28.2%), with a smaller proportion in the upper-middle class (9.3%). No children were from the upper class, and 20.0% belonged to the lower class, highlighting that most families belonged to economically vulnerable groups.

Maternal education was low, with 50% of mothers being illiterate and only 6.7% having education beyond higher secondary. Most mothers were housewives (59.0%), while 21.5% engaged in family occupations (e.g., fishing, boating, floating market trade), and 16.5% were self-employed. Paternal education showed a similar trend, with 40.5% illiterate and 15.8% educated beyond higher secondary. Fathers predominantly worked as labourers (44.0%) or in family occupations (25.8%), with 20.5% self-employed and 9.7% in government or private sector jobs.

Housing conditions reflected socio-economic status, with 28.8% of families living in pucca houses, 15.7% in semi-pucca, and the rest in katcha or wooden/tin structures. Nuclear families were slightly more common (55.0%) than joint families (45.0%). Household size varied, with the largest proportion (43.8%) having six or more members.

Table 1. Socioeconomic Characteristics of the Respondents (n = 400)

Variable	Category	Frequency (n)	Percentage (%)
Age	2-3 years	107	26.7
	3-4 years	112	28.0
	4-5 years	75	18.8
	5-6 years	106	26.5
Gender	Male	192	48.0
	Female	208	52.0
Socio-economic class [Per-capita income (Rs./month)] *(updated B.G. Prasad, 2023)	I Upper class (8763 and above)	0	0.0
	II Upper-middle class (4381.5–8675.3)	37	9.3
	III Middle class (2630–4294)	113	28.2
	IV Lower-middle class (1314.5–2541.27)	170	42.5
	V Lower class (<1314.5)	80	20.0
Mother's education	Illiterate	200	50.0

	Middle School	117	29.3
	High School	56	14.0
	Higher secondary and above	27	6.7
Mother's occupation	House wife	236	59.0
	Family occupation**	86	21.5
	Self employed	66	16.5
	Government/ private employee	12	3.0
Father's education	Illiterate	162	40.5
	Middle School	103	25.7
	High School	72	18.0
	Higher secondary and above	63	15.8
Father's occupation	Labourer	176	44.0
	Family occupation**	103	25.8
	Self employed	82	20.5
	Government/ private employee	154	38.5
Type of house	Pucca	115	28.8
	Semi-pucca	63	15.7
	Katcha	68	17.0
	Wooden/tin shed	68	17.0
Type of family	Nuclear	220	55.0
	Joint	180	45.0
Total family members	3	26	6.5
	4	84	21.0
	5	115	28.7
	≥6	175	43.8

* Updated B. G. Prasad socioeconomic status classification for the year 2023 (Akram et al., 2023).
**Family occupation includes fishing, boating, aquatic farming, or floating market trade.

Mean weight, height, and mid-upper arm circumference (MUAC) increased progressively with age, reflecting expected growth patterns. Mean weight increased from 12.31 ± 2.47 kg at 2-3 years to 17.35 ± 2.86 kg at 5-6 years, while mean height increased from 90.79 ± 8.00 cm to 111.05 ± 7.31 cm. MUAC similarly showed an age-related increase from 124.02 ± 11.63 mm to 133.73 ± 12.92 mm. These differences were statistically significant for weight (F = 80.798, p = 0.000), height (F = 135.056, p = 0.000), and MUAC (F = 15.162, p = 0.000).

However, derived anthropometric indices—BMI-for-age Z-score (BMIZ), weight-for-age Z-score (WAZ), height-for-age Z-score (HAZ), and weight-for-height Z-score (WHZ, calculated for children under five)—did not differ significantly across age groups (BMIZ: F = 0.832, p = 0.477; WAZ: F = 1.081, p = 0.357; HAZ: F = 0.901, p = 0.441; WHZ: F = 0.880, p = 0.416).

Table 2. Age-wise Comparison of Anthropometric Variables among Preschool Children (n = 400)

Variable	2-3 years (n=107)	3-4 years (n=112)	4-5 years (n=75)	5-6 years (n=106)	F-value	p-value
Weight (kg)	12.31 ± 2.47	13.74 ± 2.24	16.11 ± 2.76	17.35 ± 2.86	80.798	0.000
Height (cm)	90.79 ± 8.00	98.10 ± 8.12	105.27 ± 7.25	111.05 ± 7.31	135.056	0.000
MUAC (mm)	124.02 ± 11.63	128.30 ± 12.71	134.12 ± 11.90	133.73 ± 12.92	15.162	0.000
BMIZ	-0.69 ± 2.13	-0.80 ± 1.61	-0.56 ± 1.13	-0.93 ± 1.49	0.832	0.477
WAZ	-1.27 ± 1.65	-1.34 ± 1.26	-0.99 ± 1.17	-1.25 ± 1.26	1.081	0.357
HAZ	-1.26 ± 2.27	-1.18 ± 1.71	-0.88 ± 1.47	-0.99 ± 1.37	0.901	0.441
WHZ*	-0.93 ± 1.58	-1.03 ± 1.19	-0.77 ± 1.09	-	0.880	0.416

* WHZ calculated only for children under 5 years (n = 294)

The sex-disaggregated analysis of anthropometric variables among preschool children (n = 400) is summarized in Table 3. Male children (n = 192) had a significantly higher mean weight (15.21 ± 3.16 kg) compared to females (n = 208; 14.33 ± 3.30 kg; t = 2.737, p = 0.006). Mid-upper arm circumference (MUAC) was also significantly greater in males (132.25 ± 13.69 mm) than females (127.32 ± 11.72 mm; t = 3.858, p = 0.000).

Although males had slightly higher mean height (101.80 ± 11.22 cm) than females (100.11 ± 10.64 cm), the difference was not statistically significant (t = 1.546, p = 0.123). Similarly, derived anthropometric indices—BMI-for-age Z-score (BMIZ), weight-for-age Z-score (WAZ), height-for-age Z-score (HAZ), and weight-for-height Z-score (WHZ, calculated for children under five) did not differ significantly between sexes (BMIZ: t = 1.654, p = 0.099; WAZ: t = 1.271, p = 0.204; HAZ: t = 0.078, p = 0.944; WHZ: t = 0.649, p = 0.517).

The prevalence of underweight (WAZ < -2) among the children was 31.8%. Gender-wise analysis showed that 25.0% of boys and 38.0% of girls were underweight, with this difference being statistically significant (χ^2 = 7.176, p = 0.0074). Moderate underweight (WAZ between -2 and -3) affected 21.8% of the total sample, including 16.7% of boys and 26.4% of girls (χ^2 = 5.046, p = 0.027). Severe underweight (WAZ < -3) was observed in 10.0% of children, comprising 8.3% of boys and 11.5% of girls; this gender difference was not statistically significant (χ^2 = 0.811, p = 0.368). These results indicate a significant burden of underweight, with girls disproportionately affected in the overall and moderate categories.

Table 3. Sex-wise Comparison of Anthropometric Variables among Preschool Children (n = 400)

Variable	Male (n=192)	Female (n=208)	t-value	p-value
Weight (kg)	15.21 ± 3.16	14.33 ± 3.30	2.737	0.006
Height (cm)	101.80 ± 11.22	100.11 ± 10.64	1.546	0.123
MUAC (mm)	132.25 ± 13.69	127.32 ± 11.72	3.858	0.000
BMIZ	-0.62 ± 1.64	-0.89 ± 1.68	1.654	0.099
WAZ	-1.14 ± 1.27	-1.31 ± 1.44	1.271	0.204
HAZ	-1.09 ± 1.82	-1.10 ± 1.70	0.078	0.944
WHZ*	-0.86 ± 1.24	-0.96 ± 1.34	0.649	0.517

* WHZ calculated only for children under 5 years (n = 294)

Overall stunting (HAZ < -2) was observed in 29.5% of children. Among boys, 27.1% were stunted, while 31.7% of girls were stunted; the difference was not statistically significant (χ^2 = 0.825, p = 0.364). Moderate stunting (HAZ between -2 and -3) affected 17.5% of children (boys: 14.6%, girls: 20.2%; χ^2 = 1.804, p = 0.179), and severe stunting (HAZ < -3) was present in 12.0% of children (boys: 12.5%, girls: 11.5%; χ^2 = 0.020, p = 0.887). These results suggest a substantial prevalence of chronic undernutrition in the population, with no significant gender disparity.

Among children under 5 years (n = 294), the prevalence of wasting (WHZ < -2) was 20.1%, with boys at 20.9% and girls at 19.4% (χ^2 = 0.031, p = 0.860). Moderate wasting (WHZ between -2 and -3) was observed in 10.9% of children (boys: 12.2%, girls: 9.7%; χ^2 = 0.264, p = 0.607), and severe wasting (WHZ < -3) in 9.2% (boys: 8.6%, girls: 9.7%; χ^2 = 0.012, p = 0.915). No significant gender differences were noted, indicating comparable levels of acute malnutrition between boys and girls.

Using Mid-Upper Arm Circumference (MUAC) cut-offs, the overall prevalence of malnutrition (MUAC < 125 mm) was 14.0%, with 12.0% of boys and 15.9% of girls affected (χ^2 = 0.950, p = 0.329). Moderate malnutrition (MUAC 115–124 mm) was observed in 11.8% of children (boys: 10.4%, girls: 13.0%; χ^2 = 0.409, p = 0.522), while severe malnutrition (MUAC < 115 mm) affected 2.3% of children (boys: 1.6%, girls: 2.9%; χ^2 = 0.306, p = 0.580). These findings indicate that MUAC-based acute malnutrition was present in a minority of children, with no significant differences between sexes.

Table 4. Prevalence of Underweight, Stunting, and Wasting among Preschool Children

Nutritional Indicator	Category	All (n)	Boys (n)	Girls (n)	χ^2	p-value
Underweight (WAZ)	Overall (< -2 z)	127 (31.8%)	48 (25.0%)	79 (38.0%)	7.176	0.0074**
	Moderate (-2 to ≥ -3)	87 (21.8%)	32 (16.7%)	55 (26.4%)	5.046	0.027*
	Severe (< -3)	40 (10.0%)	16 (8.3%)	24 (11.5%)	0.811	0.368
Stunting (HAZ)	Overall (< -2)	118 (29.5%)	52 (27.1%)	66 (31.7%)	0.825	0.364
	Moderate (-2 to ≥ -3)	70 (17.5%)	28 (14.6%)	42 (20.2%)	1.804	0.179
	Severe (< -3)	48 (12.0%)	24 (12.5%)	24 (11.5%)	0.020	0.887
Wasting (WHZ, <5 yrs)	Overall (< -2)	59 (20.1%)	29 (20.9%)	30 (19.4%)	0.031	0.860
	Moderate (-2 to ≥ -3)	32 (10.9%)	17 (12.2%)	15 (9.7%)	0.264	0.607
	Severe (< -3)	27 (9.2%)	12 (8.6%)	15 (9.7%)	0.012	0.915
MUAC Category	Overall malnutrition (<125 mm)	56 (14.0%)	23 (12.0%)	33 (15.9%)	0.950	0.329
	Moderate (115–124 mm)	47 (11.8%)	20 (10.4%)	27 (13.0%)	0.409	0.522
	Severe (<115 mm)	9 (2.3%)	3 (1.6%)	6 (2.9%)	0.306	0.580

*WHZ calculated only for children under 5 years (n = 294).(**) p < 0.01, (*) p < 0.05

Discussion

The anthropometric analysis of preschool children revealed clear age-related increases in measured growth parameters. Mean body weight rose significantly from 12.31 kg at 2-3 years to 17.35 kg at 5- 6 years, while mean height increased from 90.79 cm to 111.05 cm across the same age span. Mid-upper arm circumference (MUAC) also increased significantly, reflecting gains in muscle mass and fat stores with age. These trends are consistent with WHO growth standards, which indicate steady increments in weight, height, and MUAC during the preschool years (World Health Organization, 2006).

Despite these increases in absolute measurements, derived z-scores (BMIZ, WAZ, HAZ, and WHZ) did not differ significantly across age groups, indicating that children's relative growth status remained below WHO reference standards. Mean z-scores near or below –1 SD for weight and height suggest persistent mild-to-moderate undernutrition across all age groups, a pattern reported in other underprivileged communities (Chilapur & Natekar, 2022; Duwarah et al., 2015; Jacob et al., 2016).

Gender-wise comparisons showed that boys had significantly higher mean body weight and MUAC than girls ($p < 0.01$), indicating slightly better muscle mass and possibly dietary intake. However, height and all z-scores were comparable between sexes, suggesting that chronic malnutrition and stunting affect boys and girls similarly. These findings align with national evidence: a secondary analysis of NFHS-5 data indicated negligible gender differences in HAZ, WAZ, WHZ, and BMI-for-age among preschool children (Pandurangi et al., 2023).

The study highlights a substantial burden of malnutrition in the Hanji community. The prevalence of underweight (WAZ < -2) was 31.8%, closely aligning with findings by Mandal et al. (2014), who reported that 30.5% of children aged 1–5 years were underweight in a comparable Indian setting. A recent study by Jaleel et al. (2025) similarly documented a high prevalence of undernutrition among preschool children in the urban slums of West Bengal. with A noteworthy observation in the present study is the pronounced gender disparity, with nearly two-fifths of girls classified as underweight compared to one-fourth of boys, indicating that female preschool children are disproportionately affected by undernutrition. This trend is consistent with findings from Gupta et al. (2022), who similarly reported a higher prevalence of underweight among girls relative to boys in their study population. Such observations suggest that female preschool children in marginalized communities may face compounded nutritional disadvantages, warranting focused attention in public health and nutrition programs aimed at early childhood.

Stunting, an indicator of long-term nutritional deprivation, was observed in 29.5% of children in the present study (Table 4.10), reflecting a substantial burden of chronic undernutrition in the Hanji community. This prevalence is comparable to that reported by Singh et al. (2016) in a hilly tribal district of North India (27.4%) and by Kaur et al. (2018), who found 31.3% of preschool children to be stunted, closely aligning with our findings. Unlike underweight, stunting rates did not differ significantly by gender, suggesting that chronic undernutrition in this population is a widespread issue affecting both boys and girls equally. This observation aligns with existing evidence indicating that linear growth faltering is predominantly driven by persistent undernutrition, poor sanitation, environmental enteropathy, and recurrent infections (Mbuya & Humphrey, 2016), factors that exert similar effects on both sexes during early childhood.

Wasting, indicative of acute malnutrition was found in 20.1% of the children among the sample (Table 4.11) who were falling in age group of 2-5 years. In a related study conducted by Sukla and Borkar (2018), to assess the nutritional status of preschool children in rural Chhattisgarh it was found that 28.5% of children were wasted. This aligns with the findings of the current study, further supporting the idea that substantial proportion of children are suffering from wasting in marginalized areas. The lack of significant gender difference suggests that short-term nutritional shocks, such as seasonal food shortages or illness episodes, impact boys and girls similarly (Dwivedi et al., 2023). However, when assessed using MUAC cut-offs (table 4.12), the prevalence of malnutrition in the present study was 14.0% (11.8% moderate and 2.3% severe). Although girls showed slightly higher rates of both overall and severe malnutrition compared to boys, these differences were not statistically significant. Nonetheless, MUAC which is recognized as a sensitive indicator for detecting acute malnutrition in community settings (Kumar et al., 2018) proved valuable in capturing at-risk children who may not always be identified through weight-for-height measures alone (Mehta et al., 2019; Roberfroid et al., 2015).

Overall, the findings highlight a dual burden of chronic and acute malnutrition within this marginalized population. This pattern is consistent with several national and international studies that have assessed the nutritional status of children in marginalized communities and similarly reported high levels of malnutrition among the majority of participants (Demilew and Abie, 2017; Raikhola et al., 2021; Rajput et al., 2017; Samdarshi et al., 2020; Zahoor et al., 2018). The prevalence levels observed in our study not only surpass WHO-recommended targets but also align with state and national averages (IIPS and ICF, 2021), underscoring persistent gaps in achieving nutritional security despite the long-standing implementation of ICDS and other health interventions. These findings suggest that existing programs may not be adequately addressing the complex socio-economic and environmental factors driving undernutrition in such settings.

Summary and Conclusion

Anthropometric assessments among preschool children of the Hanji community revealed significant age-related growth in body weight, height, and mid-upper arm circumference (MUAC) ($p < 0.001$), reflecting normal physical growth patterns. However, standardized z-scores (WAZ, HAZ, WHZ, BMIZ) indicated persistent mild undernutrition across all age groups. Male children had significantly higher body weight and MUAC than females, while height and standardized nutritional indices showed no significant sex differences. Overall, 31.8% of children were underweight, with a higher prevalence among girls (38.0%) compared to boys (25.0%). Stunting affected 29.5% of children, with comparable prevalence across genders, and wasting

was observed in 20.1% of children, again with no significant sex differences. MUAC-based assessment showed 14.0% prevalence of malnutrition, with similar patterns in boys and girls.
The findings indicate that malnutrition remains a major public health concern in the Hanji community, affecting a substantial proportion of preschool children. Both chronic (stunting) and acute (wasting) undernutrition were prevalent, suggesting long-term dietary inadequacies and episodic nutritional deficits. Female children exhibited slightly higher susceptibility to underweight, although other anthropometric measures showed minimal gender disparities. The overall patterns underscore persistent nutritional vulnerability despite normal age-related growth in weight, height, and MUAC, highlighting gaps in the effectiveness of existing nutrition programs.
Targeted nutritional interventions, including supplementary feeding and fortified foods, should prioritize underweight children, particularly girls. Strengthening community nutrition programs such as ICDS, enhancing parental nutrition education, and routine anthropometric and MUAC monitoring are crucial. Addressing underlying socioeconomic determinants, including food insecurity and maternal education, is essential to sustainably improve the nutritional status of preschool children in marginalized communities.

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