Original Article

DOI: 10.7860/IJNMR/2025/76458.2443

Paediatrics Section

Comparison of WHO Growth Standards with 2019 Indian Synthetic Growth Charts in Children under Five Years of Age: A Cross-sectional Study from Rural Area of Karnataka, India

SHALINI YADHAV[1], AS JAGADISH[2], R PREMALATHA[3], B RAVICHANDER[4]

BY-NC-ND

ABSTRACT

Introduction: Growth monitoring is a crucial screening tool that aids in the early diagnosis of various nutritional, chronic systemic and endocrine diseases. The choice of reference charts used to measure different measures of nutritional status can significantly impact the accuracy of these indicators, which, in turn, affects the assessment of government initiatives aimed at improving healthcare outcomes.

Aim: To compare the World Health Organisation (WHO) and 2019 Indian synthetic growth charts in children under five years of age from rural area of Karnataka, and to study the nutritional status of predominantly breastfed infants less than six months of age using the two charts.

Materials and Methods: This cross-sectional study was conducted at MVJ Medical College and Research Hospital, Bengaluru, Karnataka, India, from July 2022 to July 2024. The study included a sample size of 1,252 children between the ages of 0-60 months who presented to the Outpatient Department (OPD) or attended Anganwadi centres. Demographic details such as name, age, sex, birth weight, and gestation at birth were collected using a predesigned proforma. Anthropometric parameters were measured. The measured variables (height, weight, and Body Mass Index (BMI)) were plotted on both the WHO charts and the 2019 Indian synthetic charts and classified accordingly. A paired t-test was used to compare the mean values between variables, while McNemar's test was used to compare the proportions for the variables.

Results: Of the 1,252 children included in the study, 764 (61%) were males and 488 (39%) were females. Mean birth weight of the subjects was 2.85±0.44 kg. On WHO charts, the mean Z scores for height, weight and BMI was -1.28±1.54, -1.18±1.12, and -0.58±1.32 whereas on Synthetic charts, it was -0.61±1.36, -0.58±1.34, and 0.36±1.70, respectively. The analysis revealed a significant difference in Z scores when measured by WHO charts and synthetic charts (p-value <0.001).

Conclusion: The use of synthetic growth charts may be more suitable for Indian children when compared to the WHO charts, as suggested by statistically significant difference in Z scores of measured variables.

Keywords: Anthropometry, National family health survey, Nutritional status, Obesity

INTRODUCTION

Malnutrition is defined by the WHO as deficiencies, excesses, or imbalances in an individual's energy and/or nutrient intake [1]. Undernutrition has been connected to almost 45% of mortality in children younger than five years of age. The problem of the double burden of malnutrition faced by low- and middle-income nations, which is undernutrition combined with overweight and obesity, is currently on the rise [2].

Growth monitoring is a screening method used to identify endocrine, chronic systemic and nutritional disorders at an early on [3]. In order to examine the nutritional status of children under five years of age, the WHO 2006 growth charts [4] have been widely utilised as a single global benchmark. For much of the developing world, these charts are often more "aspirational" than realistic [5]. Research has suggested that in countries where national or local charts are accessible and child development patterns deviate from WHO charts, it could be more suitable to resort to local resources instead of needlessly categorising healthy children as stunted, underweight, or wasted [5]. However, creating growth benchmarks using the cutting-edge technique of synthetic anthropometry, which takes into account both local growth factors and worldwide trends, might be a more appropriate approach [6].

Some countries, like Germany, Romania and Indonesia, have lately accepted synthetic growth charts (SC) as national benchmarks [7-9]. Using regression equations and key and auxiliary ages, the Hermanussen M and Burmeister J, approach was used to produce synthetic references [10]. The choice of reference charts employed influences the range of nutritional status measurements. This can affect national data used to gauge the effectiveness of government programmes, as well as nutritional indicators used in clinical treatment [3].

The right choice of growth charts and meticulous growth monitoring is integral to preventive paediatrics. Previous studies were based on retrospective data [5-7]. Present focused on the rural children under five years of age. Details on birth weight and infant and young child feeding practices were also collected. Comprehensive standard operative procedures were followed by the investigator for undertaking anthropometric measurements reducing measurement bias.

As there are very few studies [5-7] reported in literature, authors intend to assess the applicability of WHO versus synthetic growth references for the assessment of nutritional status of Indian children. The specific objectives were to compare the WHO and the 2019 Indian synthetic growth charts in children under five years of age from rural area of Karnataka, and to study the nutritional status of predominantly breastfed infants less than six months of age using the two charts.

MATERIALS AND METHODS

This cross-sectional study was conducted at MVJ Medical College and Research Hospital, Hoskote, Bangalore, Karnataka, India, from July 2022 to July 2024. The study was conducted after obtaining Ethical Committee clearance (MVJMC&RH/IEC-99/2022).

Inclusion criteria: Healthy children aged between 0-60 months who attended the OPD/Anganwadi centres and were exclusively breastfed during the first six months were included in the study.

Exclusion criteria: Children whose mothers had history of smoking or alcohol consumption, any child with chronic illness, history of acute illness that leads to deviation from normal growth pattern, children with known endocrine or other systemic dysfunction and any child with chronic drug usage known to impair growth were excluded from the study.

Sample size: A minimum sample of 1,252 children was deemed sufficient to achieve 80% power of study at 5% level of significance (alpha) and 10% margin of error (beta), using NFHS-5 data on prevalence of malnutrition published in 2019-2020 [11].

Study Procedure

Children between 0-60 months who fulfilled eligibility criteria were included in the study after providing informed consent. Children attending the OPD at our Medical College and those visiting Anganwadi centres were included. Details such as name, age, sex, birth weight, gestation at birth, and infant and young child feeding practices were collected and recorded in a predesigned proforma. Anthropometric parameters, including weight, height, and BMI, were measured based on participant manual of facility-based care of severe acute malnutrition given by the Ministry of Health and Family Welfare [12].

Recumbent length was measured for children less than two years, with standing height measured thereafter [12]. Length was measured using an infantometer with a headboard and sliding footpiece placed on a stable, level table. One person stood behind the headboard and positioned the child on the measuring board, supporting the head and placing it against the headboard. The crown of the head was placed against the headboard and the line of sight was perpendicular to the measuring board. The other person placed one hand on the shins or knees and pressed gently, and placed the footpiece firmly against the feet. The length was measured up to the last completed 0.1 cm and recorded.

Height (stadiometer up to 0.1 cm accuracy) and body weight (Flat scale up to 100 g accuracy) were measured using standard protocols. BMI was calculated using the formula: BMI=weight (kg)/ height (m)^2 [2]. The measured growth variables were plotted on both the WHO charts [4] and 2019 Indian synthetic charts [13].

WHO categorises the prevalence of malnutrition in a population as follows: for underweight, <10% -low, 10-19% -medium, 20-29% -high, and >30% -very high; for stunting, <20% -low, 20-29% -medium, 30-39% -high, and >40% -very high; for wasting, <5% -acceptable, 5-9% -poor, 10-14% -serious, and >15% -critical [5]. These categories were used to calculate the prevalence of malnutrition as per WHO vs Synthetic references.

STATISTICAL ANALYSIS

Data was analysed using Statistical Package for the Social Sciences (SPSS) version 22.0 software. Descriptive statistics for demographic and anthropometric characteristics was calculated by gender and age categories. Categorical data was represented in the form of frequencies and proportions. Continuous data was represented in the form of mean and standard deviation. A paired t-test was used to compare differences between mean Z scores for height-for-age and weight-for-age derived from the WHO and synthetic charts. McNemar's test of proportion was used to test significance between proportion of stunted, underweight and wasted as classified by WHO Charts and Indian synthetic charts. The p-value <0.05 were considered significant.

RESULTS

In the study, 397 (31.7%) children were in the age group <six months, 243 (19.4%) were in the age group of 6 to 12 months, and 612 (48.9%) were in the age group of one to five years. Among them, 488 (39%) were females and 764 (61%) were males. Based on the birth weight and gestation at birth, children were plotted on intergrowth charts and classified into Appropriate for Gestational Age (AGA), Small for Gestational Age (SGA), or Large for Gestational Age (LGA). In our study, 1,006 (80.4%) were AGA, 215 (17.2%) were SGA, and 31 (2.5%) were LGA. In the present study, 1,163 (92.9%) of the parents had followed infant and young child feeding practices [Table/Fig-1].

Parameters		Count (%)
Age	<6 months	397 (31.7)
	>6-12 months	243 (19.4)
	>12 months-5 years	612 (48.9)
Sex	Female	488 (39)
	Male	764 (61)
AGA/SGA/LGA	AGA	1006 (80.4)
	LGA	31 (2.5)
	SGA	215 (17.2)
Followed IYCF	Yes	1163 (92.9)
	No	89 (7.1)

[Table/Fig-1]: Demographic distribution.
AGA: Appropriate for gestational age; LGA: Large for gestational age; SGA: Small for gestational age; IYCF: Infant and young child feeding

Anthropometric parameters distribution: Mean birth weight of the subjects was 2.85±0.44 kg. Mean weight was 8.68±3.52 kg. Mean height/length was 73.79±15.81 cm. Mean head circumference was 43.57±4.28 cm. Mean BMI was 15.40±2.13 (kg/m^2) [Table/Fig-2].

Parameters	Mean±SD	Minimum	Maximum
Birth weight (kg)	2.85±0.44	1.80	4.50
Height (cm)	73.79±15.81	11.80	118.00
Weight (kg)	8.68±3.52	2.32	19.70
Head circumference (cm)	43.57±4.28	32.00	58.00
BMI (kg/m^2)	15.40±2.13	8.20	25.00

[Table/Fig-2]: Anthropometric parameters distribution.

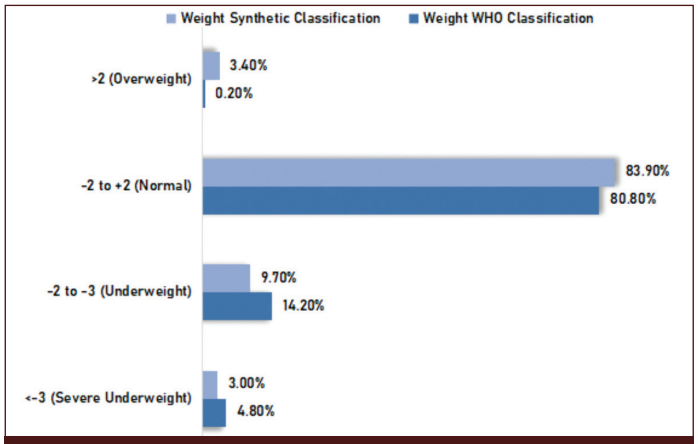
Mean Z scores on WHO vs synthetic charts: A significant difference was observed between Height Z, Weight Z, BMI Z, and

Weight for Height Z scores when measured by WHO chart and synthetic charts (p-value <0.001) [Table/Fig-3].

Parameters	Mean±SD	Minimum	Median	Maximum
Height Z (WHO)	-1.28±1.54	-9.68	-1.38	6.70
Height Z (SYN)	-0.61±1.36	-7.42	-.76	6.45
Weight Z (WHO)	-1.18±1.12	-8.03	-1.21	2.36
Weight Z (SYN)	-0.58±1.34	-7.87	-.58	4.01
Head circumference Z (WHO)	-0.85±1.32	-11.55	-.99	6.81
BMI Z (WHO)	-0.58±1.45	-7.20	-.67	5.17
BMI Z (SYN)	0.36±1.70	-6.64	0.24	7.97
W/H Z (WHO)	-0.50±1.48	-7.80	-.62	7.33
W/H Z (SYN)	0.22±1.39	-5.90	0.02	8.60

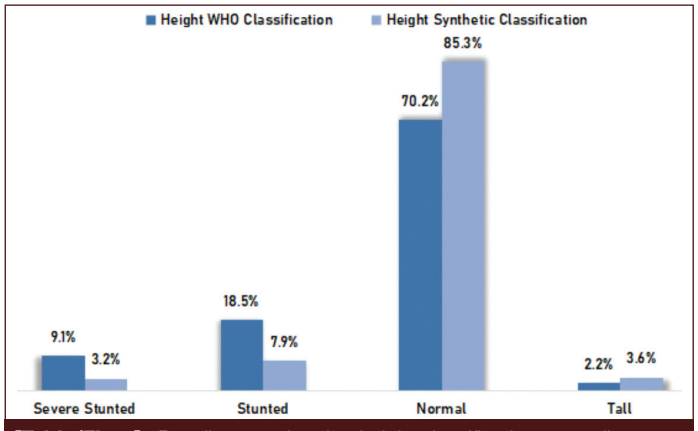
[Table/Fig-3]: Anthropometric parameters distribution based on WHO and Synthetic charts (SYN).
W/H: Weight for height; SYN: Synthetic; WHO: World health organisation

Weight classification according to WHO and synthetic charts: Based on weight Z scores, the WHO chart indicated that 60 (4.8%) were severe underweight, 178 (14.2%) were underweight, 1,012 (80.8%) had normal weight, and 2 (0.2%) were overweight. On Synthetic chart, 38 (3%) were severe underweight, 121 (9.7%) were underweight, 1,051 (83.9%) had normal weight, and 42 (3.4%) were overweight [Table/Fig-4].



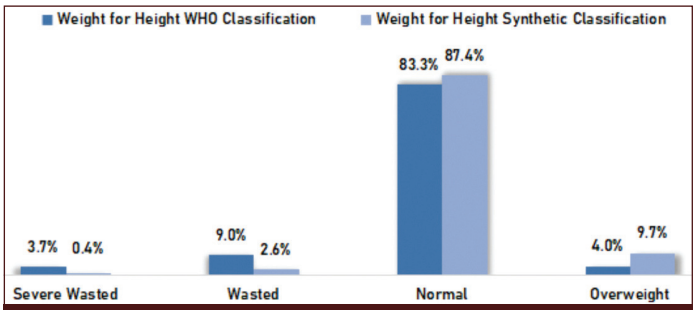
[Table/Fig-4]: Bar diagram showing weight classification according to WHO and synthetic charts.

Height classification according to WHO and synthetic charts: Based on height Z scores, the WHO chart indicated that 114 (9.1%) were severely stunted, 232 (18.5%) were stunted, 879 (70.2%) had normal height, and 27 (2.2%) were tall. On synthetic chart, 40 (3.2%) were severely stunted, 99 (7.9%) were stunted, 1,068 (85.3%) had normal height, and 45 (3.6%) were tall [Table/Fig-5].



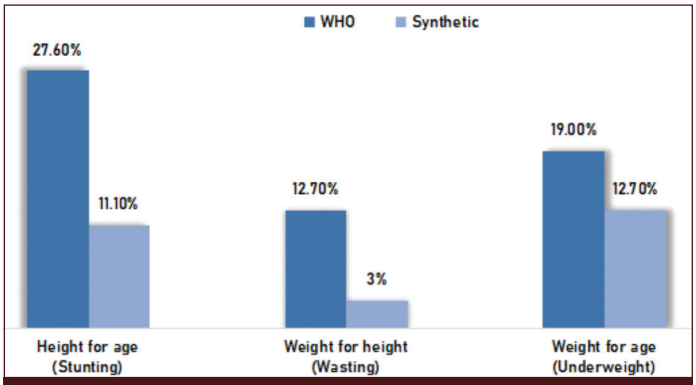
[Table/Fig-5]: Bar diagram showing height classification according to WHO and synthetic charts.

Weight for height classification according to WHO and synthetic charts: Based on weight for height Z scores, the WHO chart indicated that 46 (3.7%) had severe wasting, 113 (9%) had wasting, 1,043 (83.3%) were normal, and 50 (4%) were overweight. In synthetic chart, 5 (0.4%) had severe wasting, 32 (2.6%) had wasting, 1,094 (87.4%) were normal, and 121 (9.7%) were overweight [Table/Fig-6].



[Table/Fig-6]: Bar diagram showing weight for height Classification according to WHO and synthetic charts.

Category of malnutrition using WHO vs synthetic charts: In the study, based on WHO chart, 346 (27.6%) had stunting and belonged to medium WHO category. A total of 159 (12.7%) had wasting and belonged to severe WHO category. A total of 238 (19%) were underweight and also belonged to medium WHO category. Based on SYN chart, 139 (11.1%) children had stunting and belonged to the category. A total of 37 (3%) had wasting and belonged to acceptable category, and 159 (12.7%) were underweight and belonged to medium category [Table/Fig-7].



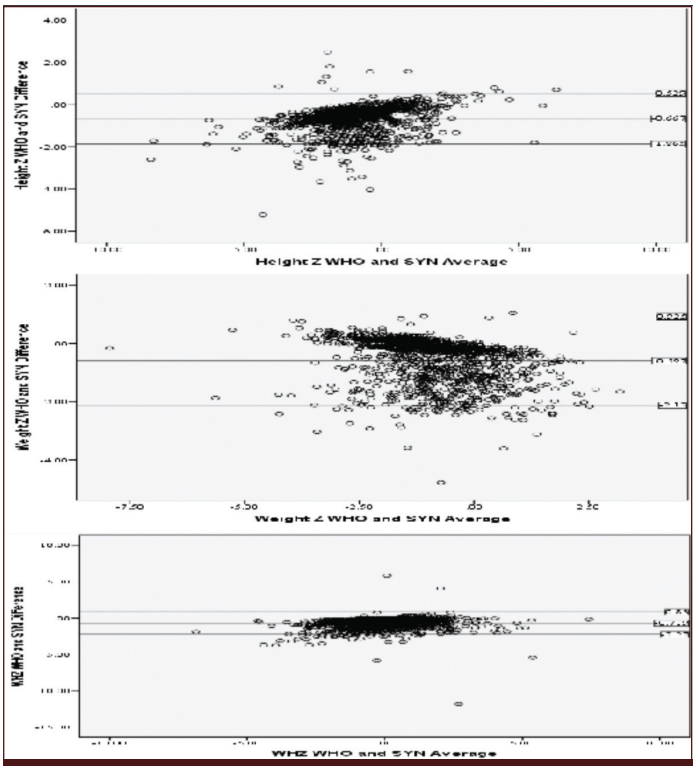
[Table/Fig-7]: Percentage and category of malnutrition using WHO vs synthetic charts.

Infants under 6 months- Mean Z scores: Infants under six months thrived well on the synthetic charts, with mean Z scores for length, weight and weight for length near to zero on synthetic charts, suggesting normal growth. A significant difference in Z scores was noted for length, weight, and weight for length when measured by WHO and synthetic charts (p-value <0.001) [Table/Fig-8].

Parameters	Mean±SD	Minimum	Maximum
Height Z (WHO)	-1.33±1.66	-9.15	6.70
Height Z (SYN)	-0.14±1.49	-7.42	6.45
Weight Z (WHO)	-1.37±1.22	-6.57	2.36
Weight Z (SYN)	0.15±1.24	-4.70	4.01
BMI Z (WHO)	-0.91±1.54	-7.20	5.17
BMI Z (SYN)	1.09±2.05	-6.30	7.97
W/H Z (WHO)	-0.44±1.81	-7.80	7.33
W/H Z (SYN)	0.91±1.57	-5.90	8.60

[Table/Fig-8]: Mean Z scores of infants under six months on WHO vs Synthetic Charts.
WHO: World health organisation; SYN: Synthetic charts; W/H: Weight for height

To assess the agreement between the WHO charts and synthetic references, Bland-Altman plot analysis was done. The agreement was found to be better for WHZ than HAZ and WAZ. The references showed low agreement at both the ends of mean difference. The mean difference between WHO and synthetic HAZ was -0.668±0.611, for WAZ it was -0.597±0.777, and for WHZ it was -0.720±0.791 [Table/Fig-9].



[Table/Fig-9]: Bland Altman Plot for HAZ (Height for age Z), WAZ (Weight for age Z) and WHZ (Weight for height Z).

DISCUSSION

Growth references are among the most commonly used and valuable tools for assessing the general wellbeing of individuals, groups of children and the communities in which they live and for tracking progress in reaching a range of health and other broader goals related to social equity [14]. Present study compared the nutritional status of children under five years of age using WHO growth standards and 2019 Indian Synthetic Charts. It was seen that Indian children between six months to five years had higher prevalence of stunting, wasting, and underweight when assessed using WHO charts as compared to Synthetic charts.

On the synthetic references, infants thrived well in the first six months, with mean Z scores of all parameters near to zero i.e., -0.14, 0.15, and 0.91 for length, weight, and weight for length, respectively which was clinically significant, suggesting normal growth. On the other hand, on WHO Charts mean Z scores for length, weight, and weight for length were much lower, -1.33, -1.37, and -0.44. With regards to BMI-for-age cut-offs, WHO showed increased rates of malnutrition (19%) as compared to the synthetic chart (12.7%). Proportion of overnutrition identified by WHO was lower (0.2%) as compared to synthetic references (3.4%).

As per NFHS-5 data, the prevalence of stunting, wasting and underweight in Karnataka were 35.4, 19.5%, and 32.9%, whereas on using synthetic references, the prevalence was 11.1%, 3%, and 12.7%. This difference in prevalence of rates of undernutrition and overnutrition may be due to difference in the methodology adopted, operational definitions, instruments used, sample size studied and geographical area involved in the study [15].

The mean Z scores±SD in present study were -1.28±1.54, -1.18±1.12 and -0.50±1.48 for height, weight and weight for height on WHO charts, whereas on Synthetic charts, it was 0.61±1.36, -0.58±1.34 and 0.22±1.39, respectively which was similar to study by Khadilkar V et al., where it was -1.42±1.78, -1.54±1.32 and -0.84±1.41 for height, weight, and weight for height on WHO charts, and -1.1±1.55, -1.42±1.57 and -0.33±1.21 on the synthetic charts, respectively [5]. Similar results were found in study by Mehta S et al., [2].

The mean Z±SD scores of infants below six months in present study was -1.33±1.66, -0.44±1.81 and -1.37±1.22 for stunting, wasting, and underweight on WHO charts, whereas it was -0.14±1.49, 0.91±1.57 and 0.15±1.24 on synthetic charts, respectively. Similar to present study, Khadilkar V et al., reported mean Z scores of -0.44±2.08, -0.89±1.84 and -1.16±1.56 for stunting, wasting, and underweight on WHO charts, and Z scores of 0.06±1.78, 0.38±1.73 and -0.06±1.59 on Synthetic charts, respectively [5]. The prevalence of stunting, wasting, and underweight by WHO and synthetic cut-offs were 27.6%, 12.7%, and 19%, compared to 11.1%, 3%, and 12.7%, respectively. Khadilkar V et al., reported that the prevalence of stunting and wasting changed from high to medium (height for age: 38% to 27%) and from critical to poor (weight for height: 18% to 9%) when the assessment reference changed from WHO to synthetic charts [5].

John J et al., in their cross-sectional study, included 500 children under five years of age, of which 271 were boys and 229 were girls [3]. The WHO and IAP charts regarding weight were comparable for both boys and girls. The WHO growth standards showed 68 children to be stunted (15.76%), as compared to the IAP growth charts which showed 39 children (8.45%) as stunted, the difference of which was statistically significant (p-value=0.003). Present study reported a prevalence of 27.6% for stunting on WHO charts, whereas on Synthetic charts it was 11.1%.

Synthetic growth charts have been adopted as national references in countries such as Indonesia, Romania and Germany. A marked mismatch exists between height and weight data on WHO standards and country-specific synthetic references. Present study reported significant difference in Z scores for all parameters on WHO and synthetic references. The difference in the assessments between the WHO growth standards and local growth references may be due to environmental, genetic, or epigenetic factors and local growth charts may be more appropriate for growth monitoring [2].

Natale V et al., in their systematic review of growth, compared data from the WHO's Multicentre Growth Reference Study (MGRS) with data from studies performed in 55 countries or ethnic groups. Weight varied more than height; but the low MGRS means were seen as endorsing slenderness in the midst of an obesity epidemic. The mean head circumference varied widely among the different groups. The study suggested that populations with small average body sizes would not fit well into the WHO charts, and these groups would require their own charts for optimal analysis of growth [16].

Limitation(s)

Present study was a cross-sectional study, so causal inferences could not be drawn. Data was collected from a single rural area of Karnataka and the children were not followed-up. A longitudinal study might have been more beneficials. Socio-economic classification of children could have helped in better analysis of the study population.

CONCLUSION(S)

The use of Indian synthetic growth references for monitoring growth of children under five years of age may be more appropriate. The study showed significant difference in Z scores between WHO and synthetic charts. Infants less than six months of age had mean Z scores close to zero on synthetic charts, suggesting normal growth. Use of appropriate charts will prevent inappropriate classification of children as underweight, stunted and wasted and thus will help to reduce the burden on healthcare facility.

REFERENCES

[1] Malnutrition [Internet]. [cited 2022 Nov 03]. Available from: https://www.who.int/news-room/fact-sheets/detail/malnutrition.

[2] Mehta S, Oza C, Karguppikar M, Khadilkar V, Khadilkar A. Field testing of synthetic growth charts in 1–60-month- old Indian children. Indian J Endocrinol Metab. 2022;26(2):180-85. Doi: 10.4103/ijem.ijem_9_22.

[3] John J. Comparison of World Health Organization growth standards with Indian Academy of Pediatrics growth charts of under-five children in a rural area of Puducherry. Med J DY Patil Univ. 2017;10:22-25.

[4] World Health Organization. The WHO Child Growth Standards [Internet]. www.who.int. 2009. [cited 2022 Sep 08]. Available from: https://www.who.int/tools/child-growth-standards/standards.

[5] Khadilkar V, Ekbote V, Gondhalekar K, Khadilkar A. Comparison of nutritional status of under-five Indian children (NFHS 4 Data) using WHO 2006 charts and 2019 Indian synthetic charts. Indian J Endocrinol Metab. 2021;25(2):136-41. Doi: 10.4103/ijem.IJEM_18_21. Epub 2021 Sep 8. PMID: 34660242; PMCID: PMC8477744.

[6] Hermanussen M, Stec K, Aßmann C, Meigen C, Van Buuren S. Synthetic growth reference charts. Am J Hum Biol. 2016;28:98-111.

[7] Pulungan AB, Julia M, Batubara JR, Hermanussen M. Indonesian National (in synthetic growth charts. Res artic “Indonesian Natl Synth Growth Charts” Acta Sci Paediatr. 2018;1:20-34.

[8] Pascanu I, Pop R, Barbu CG, Dumitrescu CP, Gherlan I, Marginean O, et al. Development of synthetic growth charts for Romanian population. Acta Endocrinol (Copenh). 2016;12:309-18.

[9] Hermanussen M, Aßmann C, Wöhling H, Zabransky M. Harmonizing national growth references for multi-centre surveys, drug monitoring and international postmarketing surveillance. Acta Paediatr Int J Paediatr. 2012;101:78-84.

[10] Hermanussen M, Burmeister J. Synthetic growth charts. Acta Paediatr Scand. 1999;88:809-14.

[11] NFHS-5. National Family Health Survey (NFHS-5) 2019-20 India. Int Inst Popul Sci ICF. 2017;1-192. [cited 2022 Sep 08]. Available from: http://rchiips.org/NFHS/NFHS-4Reports/India.pdfhttp://rchiips.org/nfhs/NFHS-5_FCTS/India.pdf.

[12] Ministry of Health and Family Welfare [Internet]. [cited 2022 Sep 08]. Available from: https://www.nhm.gov.in/images/pdf/programmes/child-health/IEC-materials/PARTICIPANT-MANUAL_FBCSA- Malnutrition.pdf.

[13] Khadilkar V, Khadilkar AV, Kajale N. Indian growth references from 0-18-year-old children and adolescents - A comparison of two methods. Indian J Endocrinol Metab. 2019;23(6):635-44. Doi: 10.4103/ijem.IJEM_555_19. PMID: 32042700; PMCID: PMC6987783.

[14] de Onis M, Garza C, Victora CG, Onyango AW, Frongillo EA, Martines J. The WHO multicentre growth reference study: Planning, study design, and methodology. Food Nutr Bull. 2004;25(1 Suppl):S15-S26. Doi: 10.1177/15648265040251S103. PMID:15069916.

[15] Sahu SK, Kumar SG, Bhat BV, Premarajan KC, Sarkar S, Roy G, et al. Malnutrition among under-five children in India and strategies for control. J Nat Sci Biol Med. 2015;6:18-23.

[16] Natale V, Rajagopalan A. Worldwide variation in human growth and the World Health Organization growth standards: A systematic review. BMJ Open. 2014;4(1):e003735. Doi: 10.1136/bmjopen-2013-003735. PMID: 24401723; PMCID: PMC3902406.

PARTICULARS OF CONTRIBUTORS:

1. Junior Resident, Department of Paediatrics, MVJ Medical College and Research Hospital, Bangalore Rural, Karnataka, India.
2. Professor, Department of Paediatrics, MVJ Medical College and Research Hospital, Bangalore Rural, Karnataka, India.
3. Professor and Head, Department of Paediatrics, MVJ Medical College and Research Hospital, Bangalore Rural, Karnataka, India.
4. Professor and Principal, Department of Paediatrics, MVJ Medical College and Research Hospital, Bangalore Rural, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr Shalini Yadhav,
#4375/A, 4th Cross, A Block, 2nd Stage, Rajajinagar, Bangalore, Karnataka, India.
E-mail: shlnyadhav@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]

- Plagiarism X-checker: Oct 23, 2024
- Manual Googling: Mar 12, 2025
- iThenticate Software: Mar 26, 2025 (22%)

ETYMOLOGY: Author Origin

EMENDATIONS: 7

AUTHOR DECLARATION:

- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. NA

Date of Submission: **Oct 22, 2024**
Date of Peer Review: **Jan 09, 2025**
Date of Acceptance: **Mar 28, 2025**
Date of Publishing: **Jun 30, 2025**