

THE CURIOUS CASE OF CHILD MALNUTRITION IN INDIA

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DOI: 10.46609/IJSSER.2023.v08i08.026 URL: <https://doi.org/10.46609/IJSSER.2023.v08i08.026>

Received: 10 August 2023 / Accepted: 31 August 2023 / Published: 5 September 2023

ABSTRACT

Despite many positive socioeconomic changes and public health policies, the nutritional status of Indian children under age five remains unimpressive. This paper compares the nutritional status of Indian children under age five using Demographic and Health Survey data from 2005-2006 and 2019-2021. Between 2006 and 2021, mean z-scores improved for underweight, stunting, and wasting. Percentages of underweight and acutely underweight children decreased from 38 to 30 percent and 15 to 10 percent, respectively. Stunting dropped from 44 to 35 percent, and acute stunting declined from 21 to 15 percent. Wasting stayed at 18 percent, and acute wasting increased from six to seven percent. To improve nutritional status faster, the government must emphasize nutrition education to encourage the consumption of a balanced diet and redesign public health policies to strengthen a balanced diet rich in micronutrients.

Keywords: z-score, stunting, wasting, underweight, India

1. Introduction

Despite an almost twofold increase in per capita income¹ and a greater than five percent² increase in average growth of per capita income in India, improvement in children's nutritional status was quite disappointing between 2006 and 2021. The percentages of children under age five who were underweight and stunted decreased from 38 to 30 and 44 to 35, respectively, but the percentage of wasted children remained at 18 between 2006 and 2021 (Ministry of Health and Family Welfare 2006a, 2022). Children's nutritional status in India was even poorer than in Bangladesh, a neighboring country with a per capita income of almost four-fifths of India's in

¹ GDP per capita, PPP (constant 2017 international \$) was 3245.3 in 2005 and 6165.7 in 2020. The data were collected from World Bank DataBank.

² Data on GDP per capita annual growth from 2005 to 2019 were collected from World Bank DataBank. The growth of 2020 is excluded due to the severe economic effect of the pandemic.

2020³. 30 percent of children were underweight in India compared to 22 percent in Bangladesh; 35 percent were stunted compared to 31 percent, and 18 percent were wasted compared to 8 percent in 2017 (Ministry of Health and Family Welfare 2017; National Institute of Population Research and Training (NIPORT) 2020). Malnutrition was prevalent among all economic classes and places of residence: 43 and 20 percent of children were underweight; 46 and 23 percent of children were stunted, and 23 and 16 percent of children were wasted in the lowest and the highest wealth index, respectively in 2021 (Ministry of Health and Family Welfare 2022). In India in 2021, 27 percent of urban children and 34 percent of rural children were underweight; 30 percent of urban and 37 percent of rural children were stunted, and 19 percent of urban and 20 percent of rural children were wasted (Ministry of Health and Family Welfare 2022).

The Indian government has implemented several policies to improve the health status of children. To enhance food security and reduce food price volatility, the Indian government began providing major staple foods at fair-price shops through Public Distribution System (PDS) in 1947. India launched the Integrated Child Development Services (ICDS) in 1975 to provide child and maternal health care services. Children under age three receive supplementary food in the form of take-home rations. Children between three and six years old receive morning snacks and hot cooked meals 300 days per year (National Institute of Public Cooperation and Child Development 2006). The National Nutritional Policy (NNP) was initiated in 1993 and provides recommendations to improve food security, the nutritional status of food, and dietary diversity (Ministry of Human Resource Development 1993). The National Rural Health Mission (NRHM) (Ministry of Health and Family Welfare 2006b) and National Urban Health Mission (NUHM) (Ministry of Health and Family Welfare 2013) were launched in 2006 and 2013, respectively, to provide affordable health services to the rural and urban poor. NRHM and NUHM merged to become the National Health Mission (NHM) in 2013. In 2017, the government of India launched *Ayushman Bharat Yojana* (Healthy India Policy) to provide Universal Health Coverage at the primary, secondary, and tertiary levels. Despite these efforts, children's nutritional status is still rather alarming in India.

In this paper, I examine the nutritional status of Indian children under age five using Demographic and Health survey data for 2005-2006 and 2019-2021. I use the z scores of weight-for-age, length/height-for-age, and weight-for-length/height as indicators of nutritional status.

The remainder of the paper is organized as follows: Section 2 describes the methods. Section 3 discusses the results. Section 4 provides a discussion, and Section 5 concludes.

³ GDP per capita, PPP (constant 2017 international \$) was 4871.4 in Bangladesh and 6165.7 in India in 2020. The data are collected from World Bank DataBank.

2. Methods

I use the data on child age, height, weight, sex, and interview date from the Children's data/Record (KR) folder of the Demographic and Health Survey of 2005-2006 and 2019-2021.

I use WHO Anthro version 3.2.2 to obtain the summary statistics and graphs for children's nutritional status. WHO Anthro provides the mean and standard deviation of z scores of weight-for-age, length/height-for-age, and weight-for-length/height. This software provides the percentage of children below -2SD and -3SD of the mean z scores. Additionally, this software graphs the distribution of z scores.

3. Results

Table 1: Mean and Standard Deviation of z-score, 2006 and 2021

	Weight-for-age		Height/Length-for-age		Weight-for-Height/Length	
	Mean	SD	Mean	SD	Mean	SD
All						
2005	-1.65	1.34	-1.67	1.75	-0.89	1.38
2021	-1.37	1.35	-1.3	1.84	-0.76	1.53
Female						
2005	-1.65	1.34	-1.65	1.76	-0.88	1.36
2021	-1.32	1.34	-1.25	1.84	-0.74	1.51
Male						
2005	-1.65	1.34	-1.69	1.75	-0.9	1.41
2021	-1.41	1.36	-1.35	1.84	-0.78	1.55

Table 1 presents the mean and the standard deviation (SD) of the z score of weight-for-age, height/length-for-age, and weight-for-height/length for all, female and male children under age five in 2006 and 2021. Ideally, the z-score has a mean equal to zero and an SD equal to one. The mean z-scores for all variables are negative, indicating that Indian children under age five have lower weight-for-age, height/length-for-age, and weight-for-height/length than WHO's standard.

The mean z-scores for all observations, female and male, improved for all variables between 2006 and 2021. The standard deviation increased in 2021 for all variables except weight-for-age for female, indicating a higher dispersion of the z-scores in 2021 compared to 2006.

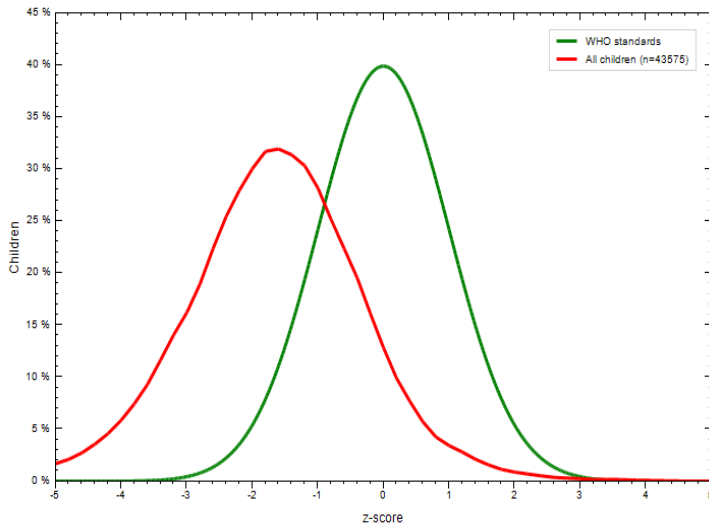
Table 2: Nutritional Status, 2006 and 2021

	Weight-for-age Percentage below - 2SD (Underweight)	Length/Height -for-age Percentage below -2SD (Stunting)	Weight-for- Length/Height t Percentage below -2SD (Wasting)	Weight-for- age Percentage below -2SD (Acute Underweight)	Length/Height -for-age Percentage below -2SD (Acute Stunting)	Weight-for- Length/Height t Percentage Below -3D (Acute Wasting)
All						
2005	38	44	18	15	21	6
2021	30	35	18	10	15	7
Female						
2005	38	43	18	15	21	6
2021	29	34	17	9	14	7
Male						
2005	38	44	19	15	21	7
2021	31	36	19	11	16	8

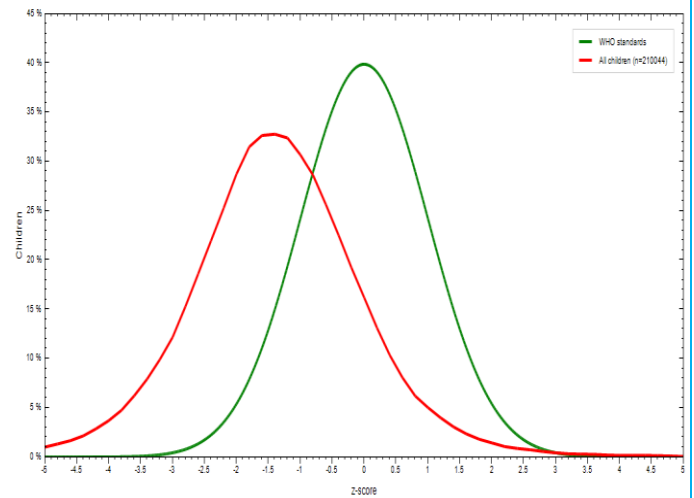
Table 2 presents the percentage of children below -2SD and -3SD of z- scores of weight-for-age, length/height-for-age, and weight-for-length/height for all, female and male children under age five in 2006 and 2021. The percentages of children below- 2SD and -3SD of weight-for-age represent the categories of underweight and acutely underweight, respectively. The percentages below -2SD and -3SD represent stunting and acute stunting; wasting and acute wasting for height/length-for-age and weight-for-height/length, respectively. The percentages of underweight and acutely underweight; stunting and acute stunting decreased between 2005 and 2021 for all,

female and male children. The percentage of wasting remained constant for all children and male children but decreased for female children between 2006 and 2021. For acute wasting, the percentages increased for all, female and male children in the same period.

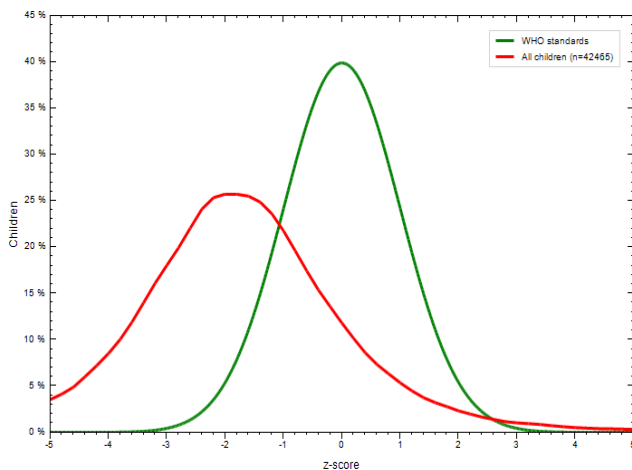
Figure 1. Distribution of z-scores



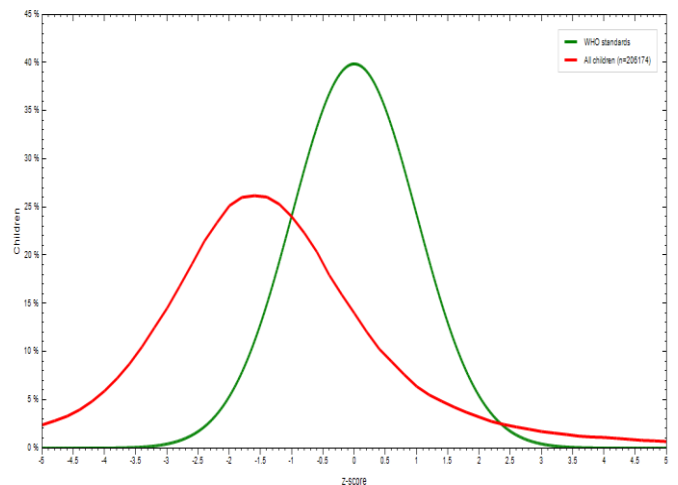
Weight-for-age: 2006



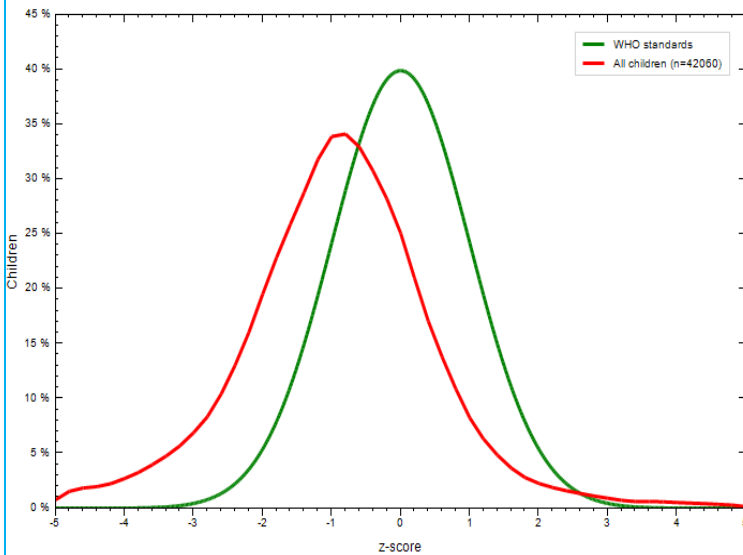
Weight-for-age: 2021



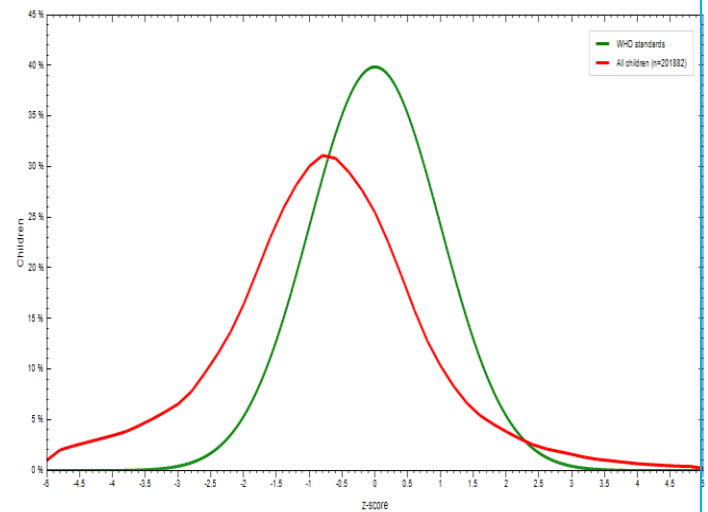
Length/height-for-age: 2006



Length/height-for-age: 2021



Weight-for-length/height: 2006



Weight-for-length/height: 2021

Figure 1 represents the distribution of z-scores of weight-for-age, length/height-for-age, and weight-for-length/height for children under age five against the WHO standard. The mean z-scores for all three categories are zero according to the WHO standard. Forty percent of children had mean z-scores consistent with the WHO standard for all three categories in 2006 and 2021. In India, only 12.5 percent of children had zero weight-for-age z-scores in 2006, and it increased to 16.5 percent in 2021. The mean z-scores of weight-for-age were -1.65 and -1.37 in 2006 and 2021, respectively. For the height/length-for-age, only 12 and 14 percent of children had zero mean z-scores in 2006 and 2021, respectively. The mean z-scores of height/length-for-age were -1.67 and -1.3 in 2006 and 2021, respectively. Only 25 percent of children had zero weight-for-height/length z-scores, and the percentage increased slightly to 25.5 in 2021. The mean z-score for weight-for-height/length was -0.89 in 2006, and it increased to -0.76 in 2021.

4. Discussion

Income (Alderman 2012; Garrett and Ruel 1999; Joe, Mishra, and Navaneetham 2009; Pal 1999; Prakash and Jain 2016; Pulok, Sabah, and Enemark 2016; Yamano, Alderman, and Christiaensen 2005), mother’s education (Gaiha and Kulkarni 2005; Garrett and Ruel 1999; Joe et al. 2009; May and Timaeus 2014; Prakash and Jain 2016; Smith and Haddad 2001; Yamano et al. 2005), mother’s autonomy (Eklund, Imai, and Felloni 2007; Gaiha and Kulkarni 2005; Imai 2013; Shroff et al. 2011), parents’ education (Kassouf and Senauer 1996; Pulok et al. 2016), sanitation

facilities (Cuesta 2007; Gaiha and Kulkarni 2005; Khan and Azid 2011) are major determinants of children's nutritional status. Several changes took place in India between 2006 and 2021: India's socioeconomic condition improved; per capita real GDP almost doubled; the literacy rate increased from 78 percent to 84 percent for men and from 55 percent to 72 percent for women (Ministry of Health and Family Welfare 2006, 2022); women with ten or more years of schooling increased from 22 to 41 percent (Ministry of Health and Family Welfare 2006, 2022); and mothers' decision-making power for large household purchases, decisions to visit family and relatives and spending the husband's earnings increased from 47 to 77 percent, 54 to 79 percent and 64 to 75 percent, respectively.⁴ During that period, use of improved sanitation facilities and better water sources increased from 29 to 69 percent and 88 to 96 percent, respectively (Ministry of Health and Family Welfare 2006, 2022). In addition, India's various public programs distributed free and subsidized food and provided free and subsidized public health care. Despite these impressive improvements and government efforts, children's nutritional status improved at only a sluggish rate.

The lack of nutrition education and a balanced diet are two important determinants of the poor nutritional status of Indian children. Nutritional education is still lacking for a large percentage of the population. Only 70 percent of women receive nutrition and health education during pregnancy, and, in 2021, only 84 percent received nutrition and health education during breastfeeding.⁵ Even with impressive economic growth and demographic changes, only a tiny percentage of the population consumes a balanced diet consisting of carbohydrates, animal and plant proteins, vegetables and fruits, and milk and/or milk products. Only six percent of children between ages one and five ate a balanced diet in 2021,⁶ and the percentages are not very different across different wealth indexes: only three percent of children in the poorest wealth index ate a balanced diet, and almost seven percent in the richest wealth index had a balanced diet. Government policies tend to relate nutrition to caloric intake and not to the intake of important micronutrients, thus leading to the design of supplementary foods that contain mostly carbohydrates.

Children's nutrition strongly correlates with cognitive development (Glewwe et al. 2017; Sánchez 2017) and test scores (Jamison 1986; Spears 2012). The poor nutritional status of Indian children will affect the quality of human capital and impair economic growth in the future.

⁴ Author's calculation using the data from Children's File/Record of DHS 2005 – 2006 and 2019 – 2021.

⁵ Author's calculation using the data from Children's Record of DHS 2019 – 2021.

⁶ Author's calculation using the data from Children's Record of DHS 2019 – 2021.

5. Conclusion

Although nutrition to counteract underweight and stunting improved in India, the improvement remained very sluggish. As of 2021, 30 percent of children were underweight, 35 percent stunted, and 18 percent wasted. India's economy has grown at a fast pace for the last 15 years. Additionally, women's education and decision-making power, sanitation and water sources, antenatal care, and institutional delivery have improved. Despite all of these positive changes, the nutritional status of children lags behind. While the government needs to keep investing in education, infrastructure, and maternal health, it must make nutritional education a higher priority to encourage the consumption of a balanced diet and redesign government policies to provide a balanced supplementary diet rich in micronutrients.

Acknowledgements

The author sincerely thanks Rena Henderson for her editing services.

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