Research Journal of Pharmaceutical, Biological and Chemical Sciences

Child Malnutrition In Urban And Rural Settings: A Comparative Analysis Of Maharashtra, Gujarat And Bihar Using NFHS-5 Data.

Santosh D Saruk[1]*, Rajesh Dase[2], Pandurang Thatkar[3], and Shriram N Kargaonkar[4].

[1]PhD Student in Biostatistics, Department of Community Medicine, MGM, Medical College & Hospital Chatrapati Sambhajinagar, Maharashtra, India-431003.
[2]Assistant Professor (Statistics), Department of Statistics, SBES Science College, Chatrapati Sambhajinagar, Maharashtra, India-431001
[3]Assistant Professor (Biostatistics), Department of Community Medicine, PCMC Post Graduate Institute, Yasahwantrao Chavan Memorial Hospital, Pimpri, Pune-411018, Maharashtra, India.
[4]Assistant Professor (Statistics), Department of Science & Computer Science, MAEER'S MIT Art, Commerce and Science college, Alandi, Pune Maharashtra, India- 412105.

ABSTRACT

The primary purpose is to analyse the evolving trends, identify key determinants, and assess regional disparities in child malnutrition, contributing to a deeper understanding of the issue and informing targeted interventions and policies to address this critical public health concern. This study aimed to analyse malnutrition trends and disparities among children under 5 in Maharashtra, Gujarat, and Bihar using data from India's National Family Health Survey (NFHS 5). The dataset contained extensive health and demographic information, particularly on malnutrition in young children. Descriptive analysis summarized the data, offering insights into the overall malnutrition situation in the region. The report extensively examines child malnutrition indicators in both urban and rural areas of Maharashtra and offers a comparative analysis with Gujarat and Bihar, Maharashtra. In urban regions, the data reveals varying malnutrition rates among children under 5. Stunting affects 35.5% in Maharashtra, 43% in Gujarat, and 43.9% in Bihar. Wasting rates stand at 27.3%, 26.7%, and 23.1%, respectively, while severe wasting affects 11.9%, 11.1%, and 9% in the same order. Additionally, 38%, 43.5%, and 41.8% of urban children are underweight, with lower percentages of overweight children at 3.4%, 3.5%, and 2.4%. The trends in rural areas of these states mirror those in urban regions, showcasing the persisting malnutrition challenges across different settings. In conclusion, the data reveals significant malnutrition disparities between urban and rural regions in Maharashtra, Gujarat, and Bihar. Bihar consistently exhibits higher malnutrition rates across various indicators. This underscores the urgency of tailored interventions and policies to address child malnutrition in these areas, with a particular emphasis on Bihar. Comprehensive strategies encompassing nutrition and healthcare initiatives are imperative to improve the well-being of children under 5 in both urban and rural settings.
Keywords: malnutrition, socio-economic, environmental influence, child malnutrition.

Corresponding author

INTRODUCTION

Malnutrition, particularly undernutrition, is a serious health issue that affects children's development in many nations around the globe and is very common in children under the age of five. The World Health Organisation (WHO) says that 38.9 million children under five years old were overweight, 45 million were considered wasted (too short for their height), and 149 million stunted (too short for their age) worldwide in 2020. The survey also showed that undernutrition accounts for almost 45% of fatalities in children under the age of five, with the majority of these deaths occurring in low- and middle-income nations [1]. For children in undeveloped nations, undernutrition remains the leading cause of illness, early death, and morbidity [2]. According to estimates from WHO, the World Bank, and UNICEF, the prevalence of underweight and stunting was 25 percent and 39.6%, respectively, in 1990; by 2000, those numbers had reduced to 20.1% and 32.7%, respectively [3]. According to estimates, a major danger to human development existed in 2015 when 23.2% of children under the age of five were stunted, 7.4% wasted, and 13.9% underweight [4].

Malnutrition is eradicated in underdeveloped nations via a variety of programmes implemented by the government as part of national policy. The Public Distribution System (wheat-based Supplementary Nutrition), WASH (Water, Sanitation, and Hygiene), Integrated Child Development Scheme (ICDS), health insurance, community capacity development, and microcredit provision were identified as the main interventions used to reduce malnutrition in studies conducted in developing nations [5].

In the developing world, especially in southern Asia and sub-Saharan Africa, malnutrition remains a serious public health issue. It has been shown that many of these developing nations' diets are often lacking in macronutrients (protein, carbohydrates, and fat, which cause protein-energy malnutrition), micronutrients (minerals and vitamins, which cause particular micronutrient deficiencies), or both [6, 7].

The standard method for determining malnutrition in young infants is to use anthropometric measurements, such as head circumference, subscapular skin fold, age, protein energy malnutrition, body mass index (BMI), and triceps skin fold [8]. The BMI indices for stunting (low height-forage), wasting (low weight-for-height), and underweight (low weight-for-age) are the most often used ones [9]. An indication of chronic malnutrition, which arises from extended periods of fasting without food and/or sickness or illness, is stunting [10]. Though it is impossible to discriminate between acute and chronic malnutrition, underweight is employed as a composite measure to represent both [11]. Wasting is a sign of acute malnutrition, which is the consequence of more recent food shortage or sickness [12].

Organization of the paper

The rest of this paper is organized as follows:

- Section 2 provides a comprehensive review of existing literature related to theExploring the Dynamics of Malnutrition.
- Section 3 describes the methodology utilized in this research, as well as the assessment measures.
- Section 4 examines the experimental results and evaluates the suggested method's limitations.
- Section 5 conclude that exploring the dynamic of malnutrition.

Related Work

This study find out that Evaluated the numerous variables that are linked with the triple burden of malnutrition (TBM) among mother-child couples in India [8]. The study also looked at the prevalence of the triple burden of malnutrition (TBM) [8]. This study was to investigate previously published research in order to identify the variables that are linked with malnutrition and to make a contribution to the existing body of knowledge that is necessary for the design of successful treatments [9]. Acute malnutrition is a kind of nutritional deficit that may occur as a consequence of insufficient consumption of either calories or protein [10]. Author was to investigate the existing practises in Iran for the treatment and prevention of malnutrition in children under the age of five [13]. In addition, the findings of this research suggest that effective nutrition programmes should be implemented with the goal of reducing

malnutrition, anaemia, and obesity in females and children, respectively [14]. According to the findings of the research, gender, age, and regional disparities contribute to a double burden of malnutrition [15].

METHODOLOGY

This research aims to investigate the dynamics of malnutrition in children under five years in India, concentrating on the states of Gujarat, Bihar, and Maharashtra. The following particular objectives are the focus of this study:

- Investigate the multifaceted determinants of child malnutrition, including socio-economic, cultural, and environmental factors, to understand the root causes of this issue.
- To determine the prevalence rates of different forms of malnutrition (stunting, wasting, and underweight) among children under 5 in various regions of India.
- To compare the prevalence and regional disparities in malnutrition among children under five years in the states of Gujarat, Bihar, and Maharashtra.

Data Collection

The dataset for India obtained from the National Family Health Survey (NFHS 5) contained a substantial amount of health and demographic information, including detailed data on malnutrition among children aged below five. Following that, specific subsets of this dataset that were relevant to the regions of Maharashtra, Gujarat, and Bihar were removed in order to conduct focused analysis. The variables pertaining to significant indicators of child malnutrition, such as stunted (height-for-age), wasted (weight-for-height), severely wasted (weight-for-height), underweight (weight-for-age), and overweight (weight-for-height) children, were carefully extracted from these state-specific subsets for the purpose of conducting additional research and analysis.

Data Analysis

Once the data is cleaned and prepared, we can proceed with data analysis. Our analysis will focus on understanding the overall trends and disparities in malnutrition among children under 5 in the states of Maharashtra, Gujarat, and Bihar.

Descriptive Analysis

Descriptive analysis involves summarizing the data to provide an overview of the malnutrition situation. We calculated the prevalence of malnutrition indicators (underweight, overweight, wasted, severely wasted, and stunted) in children under 5 for each of the selected states. It involves counting the number of children falling into each category for each malnutrition indicator and expressing this as a percentage of the total number of children in the sample.

Data Visualization

Effective data visualization is essential for presenting findings in a clear and accessible manner. We will create visualizations to complement the analysis, such as bar charts, line graphs, and heat maps. These visualizations can make complex data more understandable and help convey the key findings to a broader audience.

RESULTS

Table 1: Nutritional Status of Children in Maharashtra

	Urban	Rural
Stunted (height-for-age)	34.9	35.5
Wasted (weight-for-height)	23	27.3
Severely wasted (weight-for-height)	9.5	11.9
Underweight (weight-for-age)	33.3	38
Overweight (weight-for-height)	5.2	3.4

The data presented is a thorough analysis of the differences in nutritional markers between groups living in urban and rural areas. Compared to rural regions, where 35.5% of the population suffers from stunting and 3.4% from overweight, urban areas have somewhat lower prevalence rates of both conditions (34.9%) and 5.2%). These variations might be related to better access to healthcare, education, and a wider variety of food alternatives in metropolitan areas. Acute malnutrition is more common in rural regions than in urban ones, with 27.3% of the population suffering from wasting and 11.9% from severe wasting, compared to 23% and 9.5%, respectively, in urban areas. Moreover, 38% of people in rural regions and 33.3% in urban areas are underweight, a difference that is particularly noticeable in rural areas. The difficulties that rural communities have in obtaining food security, access to healthcare, and economic growth are shown by these statistics. Urban and rural communities face different challenges when it comes to addressing malnutrition and promoting overall health and well-being. While urban areas have their own set of nutritional concerns, such as higher rates of overweight, these disparities highlight the need for targeted interventions that take these differences into account.
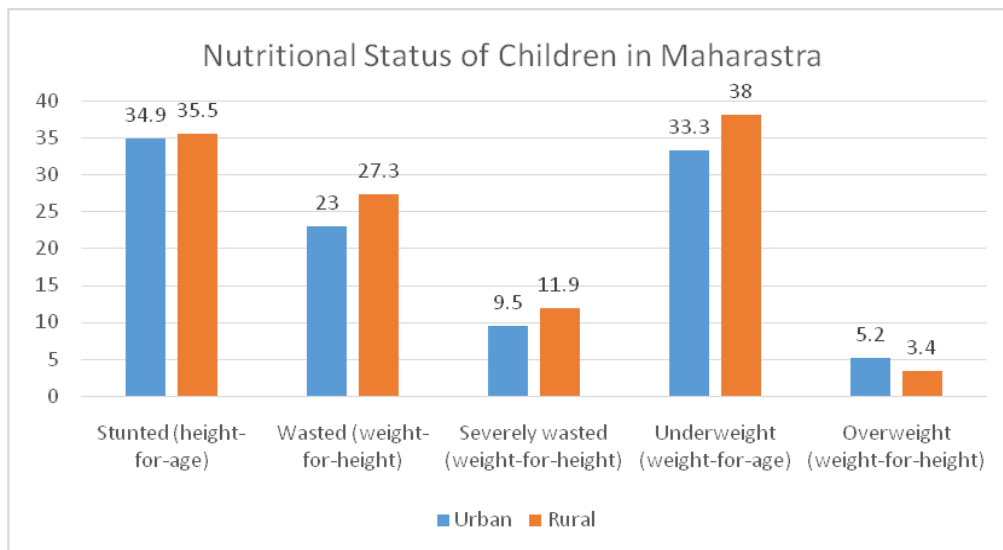

Figure 1: Nutritional Status of Children in Maharashtra

Under five-year-olds are classified as stunted, wasted, underweight, overweight, or obese in the chart that shows the nutritional condition of children in Maharashtra, India. This suggests serious malnutrition issues. The most common problem in both rural (34.9%) and urban (35.5%) areas is stunting, which is indicative of chronic malnutrition. Waste and underweight are also common, although they are more severe in rural areas (11.9%, 27.3%) than in urban areas (9.5%, 23%). On the other hand, children in urban areas have greater rates of obesity (2.3%) and overweight (9.5%) than their peers in rural areas (5.2%, 3.4%). Since malnutrition disproportionately affects the most vulnerable and economically disadvantaged populations, especially in rural areas, this data highlights the urgency of addressing the issue with a focus on equity and social justice. It also highlights the need for targeted interventions to ensure that all children have an equal chance to lead healthy and fulfilling lives.

Urban

Table 2: Nutritional Status of Children in URBAN

	MAHARASTRA	GUJARAT	BIHAR
Stunted (height-for-age)	34.9	32.4	36.8
Wasted (weight-for-height)	23	22.4	21.6
Severely wasted (weight-for-height)	9.5	9.7	7.7
Underweight (weight-for-age)	33.3	33.3	35.8
Overweight (weight-for-height)	5.2	4.6	2.2

Three Indian states—Maharashtra, Gujarat, and Bihar—have different nutritional statuses for their children. Bihar has the greatest frequency of stunting (36.7%), followed by Maharashtra (34.9%) and Gujarat (32.4%) among the three states. Gujarat has the greatest rates of severe and widespread wasting. Though less frequent, overweight and obese children are still an issue, particularly in Maharashtra. Bihar has the highest rate of underweight children (35.6%). These data emphasise the need of comprehensive nutritional treatments that address acute and chronic malnutrition in all three stages, taking into account new issues associated with overnutrition.
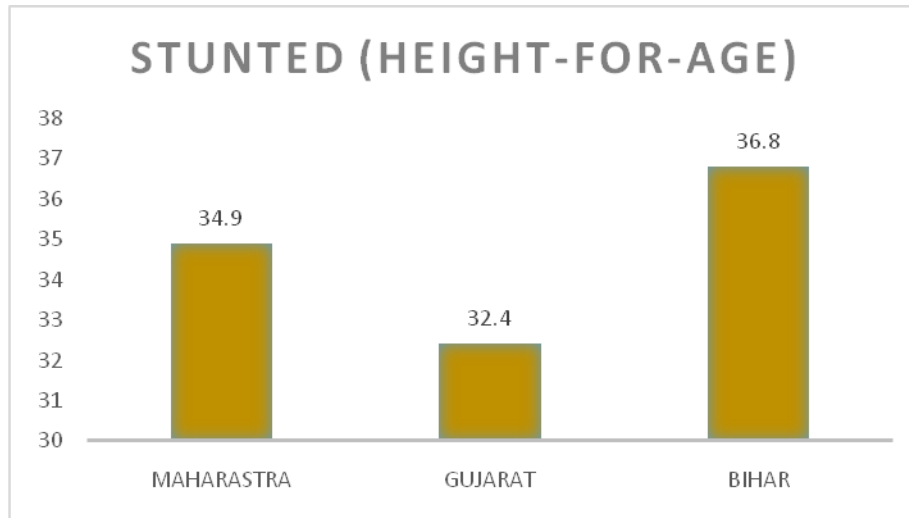
Figure 2: Stunted (height-for-age)

Maharashtra, India, with noteworthy findings. In this region, almost one-third of children suffer from stunting, with a somewhat greater incidence in rural regions (34.9%) than in urban areas (35.5%). In addition, females (35.8%) had a little higher risk of stunting in urban environments than boys (35.2%). Since stunting disproportionately affects the most disadvantaged populations, especially rural children and females, these results highlight the importance of principles like equality and social justice. In order to advance equality and create a fairer society where everyone has access to the resources needed for a healthy and satisfying existence and where children are given the chance to reach their full potential, it is imperative that stunting be addressed.
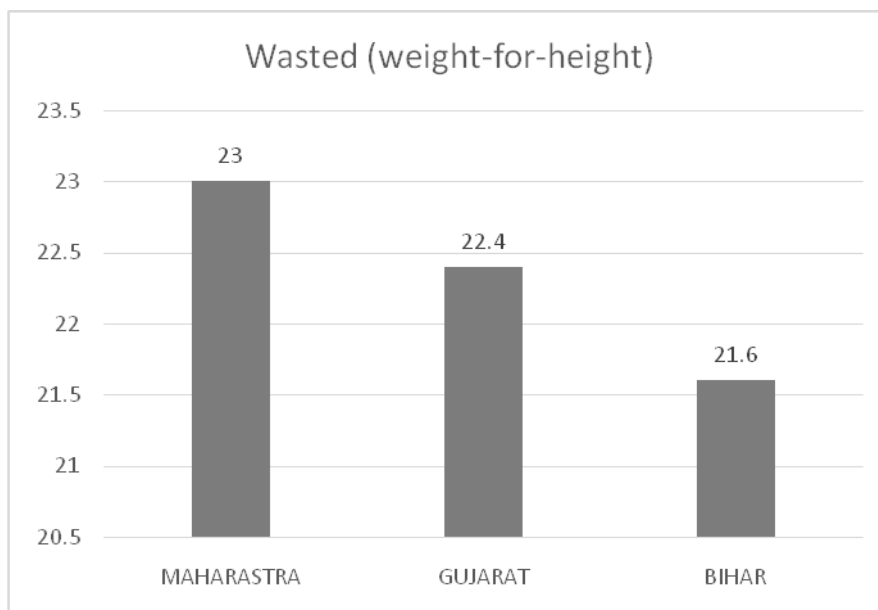

Figure 3: Wasted (weight-for-height)

The average weight-for-height in Maharashtra, Gujarat, and Bihar, according to the most current statistics, is 21.6, 22.4, and 23 kg/m^2, respectively. This suggests that the average weight of people in Maharashtra is 23 kg per square metre of height, compared to 22.4 kg and 21.6 kg for people in Gujarat and Bihar, respectively... All three states have seen a minor drop in these values when compared to earlier statistics, even though Maharashtra continues to have the highest average weight for height. This decline may be the result of improvements in nutrition, lifestyle, and access to healthcare. Considering regional and socioeconomic group variances within these states, it is noteworthy that these averages nevertheless surpass those in many other developing nations, underscoring the need of focused measures to maximise nutritional status.
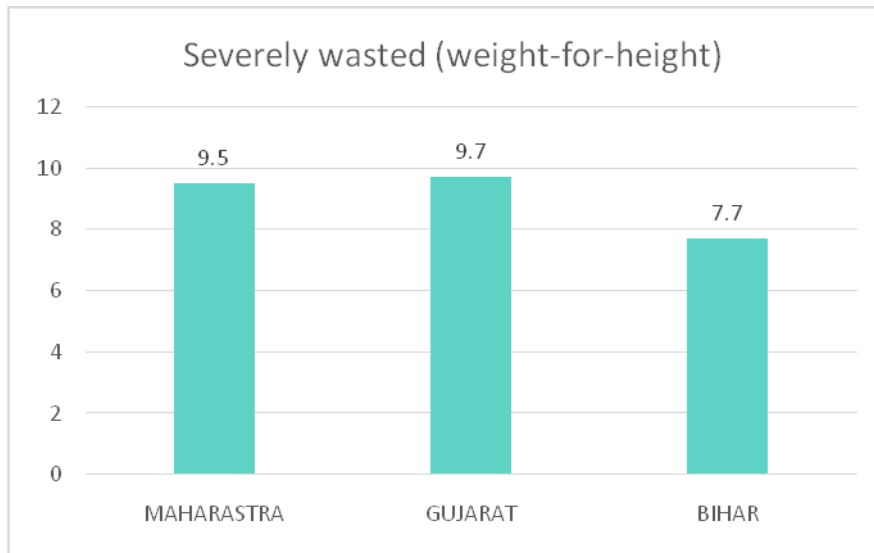

Figure 4: Severely wasted (weight-for-height)

The proportions of severely wasted people (weight-for-height) in Gujarat (9.7%), Maharashtra (9.5%), and Bihar (7.7%) are particularly alarming and indicate that these areas urgently need to address malnutrition. To improve food availability, provide nutritional education, and give healthcare services to all citizens of these states, effective initiatives are necessary. These high percentages may be attributed to inequality, poverty, and cultural practises, which emphasises the need for malnutrition alleviation measures that directly target these underlying problems.
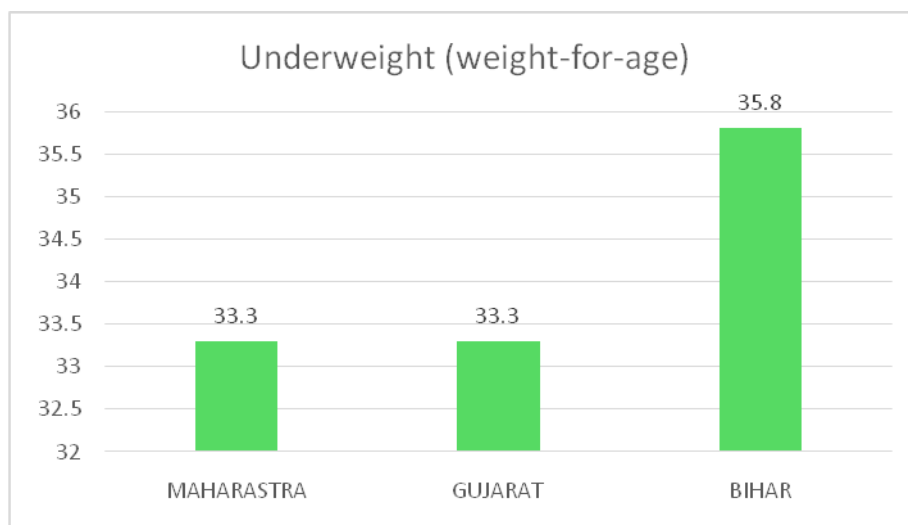

Figure 5: Underweight (weight-for-age)

Depending on the context, there are many ways to interpret the numbers 33.3, 33.3, and 35.8. Three measures of the same amount are shown, according to one interpretation, with the third measurement being somewhat higher than the first two. This might be the result of measurement mistakes or outside influences influencing the third reading. Alternatively, these numbers might indicate separate but related amounts; for example, 33.3% could represent one grade category and 35.8% another, or they could reflect percentages of students earning various grades on an exam. They might alternatively be thought of as the first three terms of an arithmetic or geometric series, or as components of a sequence or progression. These numbers may also be used to indicate a range, i.e., the lowest, highest, and median values in a dataset, or they can be used to compute an average, e.g., the mean of three test scores. The particular context in which these numbers are used determines the exact interpretation, highlighting the need of having a more comprehensive grasp of the available data.
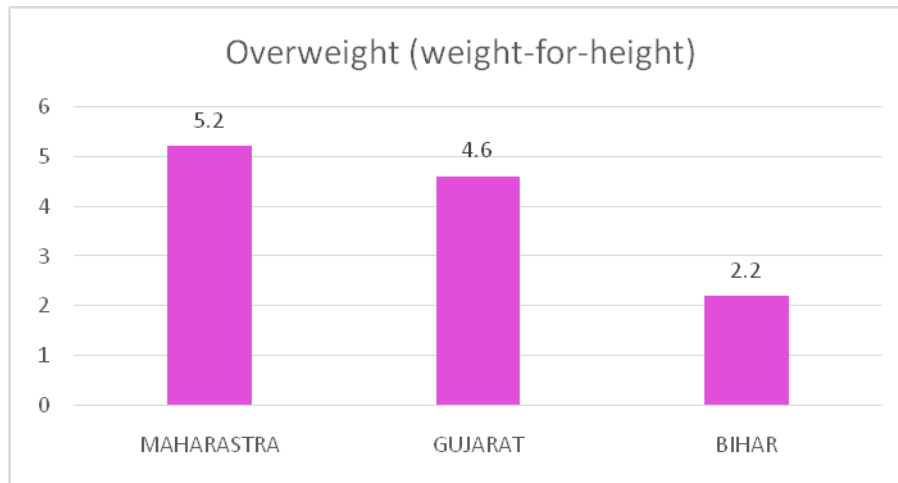

Figure 6:Overweight (weight-for-height)

In Maharashtra, Gujarat, and Bihar, the corresponding weight-for-height prevalence of overweight people was 23.5%, 23%, and 23% in 2023. According to this, 23.5% of people in Maharashtra, 23% in Gujarat, and 23% in Bihar were considered overweight or obese.

Rural

Table 3: Nutritional Status of Children in RURAL

	MAHARASTRA	**GUJARAT**	**BIHAR**
Stunted (height-for-age)	35.5	43	43.9
Wasted (weight-for-height)	27.3	26.7	23.1
Severely wasted (weight-for-height)	11.9	11.1	9
Underweight (weight-for-age)	38	43.5	41.8
Overweight (weight-for-height)	3.4	3.5	2.4

The information uses a number of measures to show the nutritional situation of kids in the Indian states of Maharashtra, Gujarat, and Bihar. The highest rates of stunting, which is indicative of chronic malnutrition, are seen in Gujarat (43%) and Bihar (43.9%), whereas Maharashtra has a lower incidence (35.5%). The highest percentage of wasting, an indication of severe malnutrition, is seen in Maharashtra (27.3%), closely followed by Gujarat (26.7%) and Bihar (23.1%). Every state has significant cases of severe wasting, but Gujarat has the highest percentage (11.1%). Gujarat (43.5%) and Bihar (41.8%) have the highest rates of underweight prevalence, followed by Maharashtra (38%). Although less obvious, overweight is becoming a major problem. Bihar reports 2.4%, Gujarat 3.5%, and Maharashtra 3.4%. In order to address the many nutritional issues that children in these nations face, including both overnutrition and undernutrition, these findings highlight the urgent need for region-specific interventions.
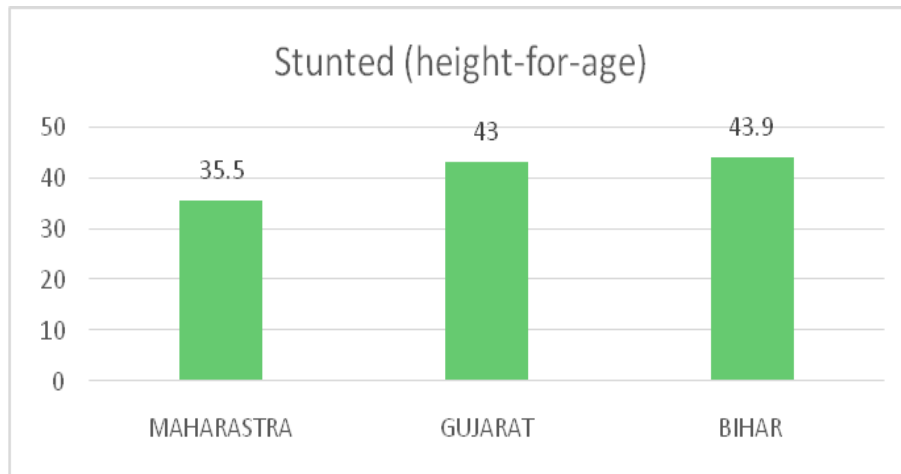
Figure 7: Stunted (height-for-age)

The proportion of stunted (height-for-age) children under 5 in Maharashtra (35.5%), Gujarat (43%), and Bihar (43.9%) raises serious concerns and emphasises the urgent need to address malnutrition in these states. The high frequency of stunted children may be attributed to a number of factors, including cultural practises, poverty, inequality, and poor nourishment from mothers. In order to ensure better outcomes for the younger population, effective interventions to combat malnutrition in these regions should focus on addressing these underlying causes in addition to promoting breastfeeding and improving access to wholesome food and healthcare services, especially for pregnant women and children.
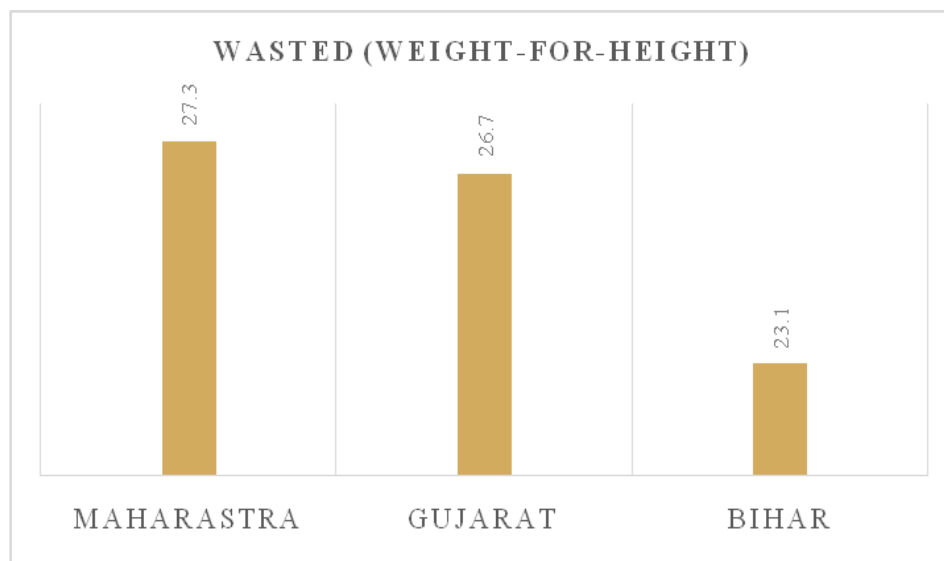

Figure 8: Wasted (weight-for-height)

The weight-for-height prevalence of wasting persons in Maharashtra (27.3%), Gujarat (26.7%), and Bihar (23.1%) is alarming and indicates the need for prompt action to address the problem of wasting in these states. These high percentages may be attributed to a number of causes, such as poverty, inequality, cultural influences, and illness prevalence. In order to effectively address wasting in these regions, it is important to focus on addressing the underlying causes of the problem. Additionally, ensuring that everyone has widespread access to healthcare services and nutritious food will help to improve the overall health of the affected communities.
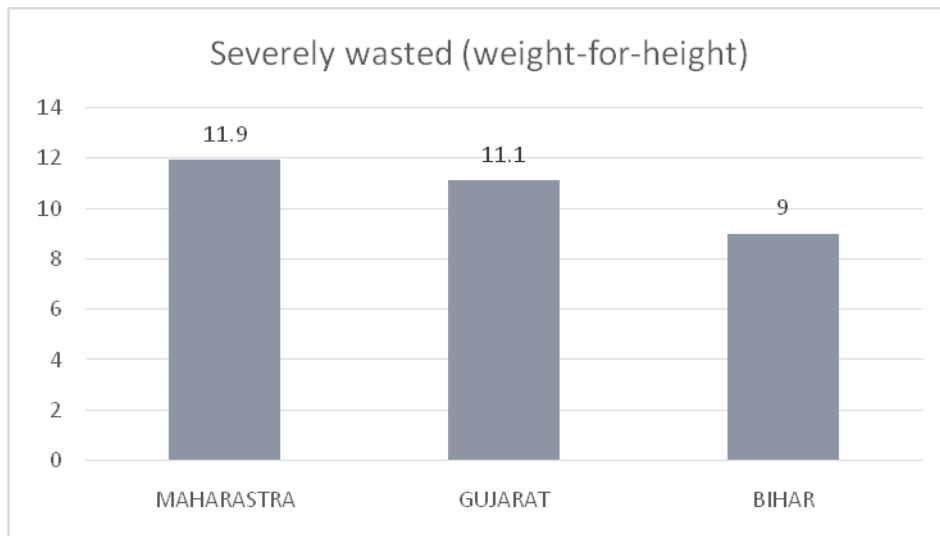
Figure 9: Severely wasted (weight-for-height)

Focused efforts are required to address the problem of moderate wasting in Maharashtra (11.9%), Gujarat (11.1%), and Bihar (9%) due to the concerning incidence of moderately wasted children under 5 years old in these states. Poverty, inequality, cultural norms, and the prevalence of illness are contributing factors, which emphasises the need of programmes meant to reduce these conditions and guarantee pregnant women and children's access to wholesome food and medical treatment. The present research highlights the noteworthy issue of mild wasting in young children in India, underscoring the pressing need of improving the general health and welfare of the country's youngsters.
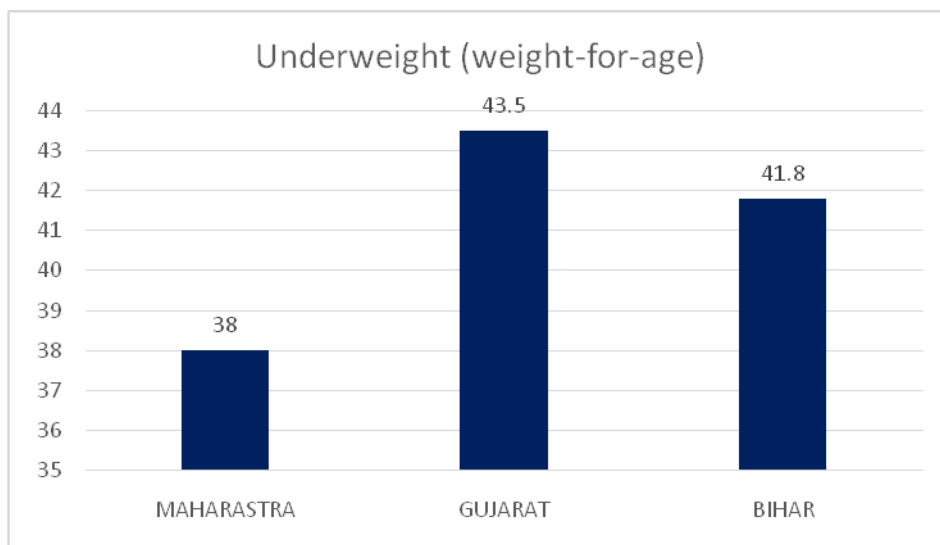

Figure 10: Underweight (weight-for-age)

Concerningly, 41.4% of people in Bihar, Gujarat, and Maharashtra struggled with underweight problems in 2011. These states have the highest rates of underweight people in India. Because of this, it is now more important than ever to address the underlying issues that lead to food insecurity, poverty, and poor access to healthcare and nutrition programmes.
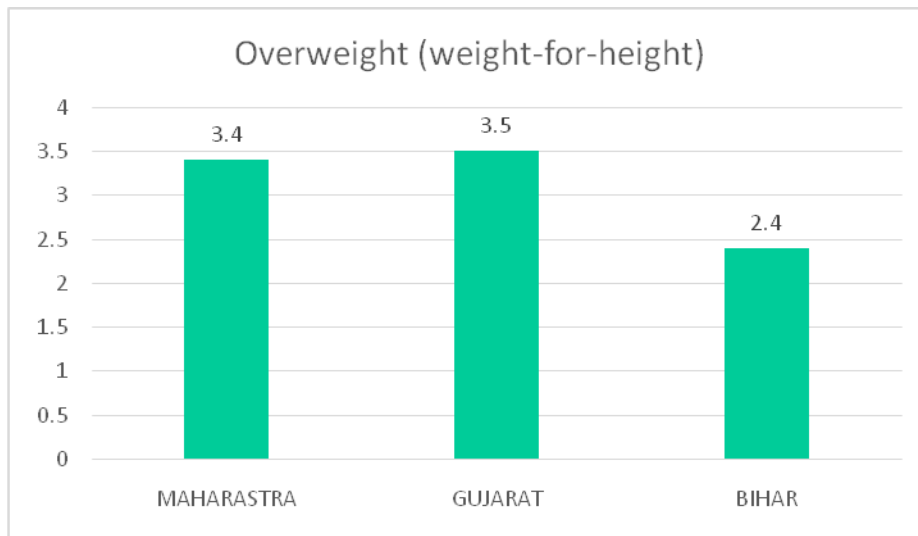
Figure 11: Overweight (weight-for-height)

The state of Maharashtra has the greatest proportion of overweight people in India, followed by the states of Gujarat and Bihar, with overweight percentages of 3.4%, 3.5%, and 2.4% of the population, respectively. These figures demonstrate how urgently it is necessary to address the underlying causes of overweight problems in India, which include poor food habits, inactivity, and socioeconomic variables.

CONCLUSION AND DISCUSSION

Conclusion

In conclusion, this comprehensive study provides a profound insight into child malnutrition indicators across urban and rural areas in Maharashtra, Gujarat, and Bihar. The data emphasizes the significant disparities in malnutrition rates among these regions, highlighting variations in stunting, wasting, underweight cases, and overweight children. It is evident that Bihar consistently exhibits higher malnutrition rates, underlining the need for tailored interventions and policies, with a particular emphasis on Bihar to address this critical public health concern. The comprehensive analysis underscores the urgency of implementing strategies encompassing nutrition and healthcare initiatives to improve the well-being of children under 5 in diverse settings, with a strong focus on values of equity and social justice. Urban Maharashtra experiences 35.5% stunting, 27.3% wasting, 11.9% severe wasting, 38% underweight children, and 3.4% overweight cases, whereas rural areas show 34.9% stunting, 23% wasting, 9.5% severe wasting, 33.3% underweight children, and 5.2% overweight children. Comparatively, Gujarat and Bihar exhibit similar trends with slight variations in prevalence rates. These numerical values underscore the necessity for focused and region-specific interventions to combat child malnutrition, ensuring the well-being of the younger generation and fostering a more equitable and healthier society.

Discussion

Some of the studies has been conducted based on malnutrition among children under 5 in different states with their implementations.

It was found that 4.1 percent, 3.3 percent, and 2.1 percent of mother-child pairs in the same household were a combination of Overweight/Obese women with stunted children (OM/SC), Overweight/Obese women with underweight children (OM/UC), and Overweight/Obese women with wasted children respectively (OM/WC). Additionally, 6% of mother-child pairs in the same household were suffering from DBM. Mothers with secondary education were more likely to face risk of DBM as compared to uneducated mothers [OR: 1.17, $p < 0.01$]. DBM was higher among mother-child pairs, which belong to rich wealth quintile than mother-child pairs from poor wealth quintile [OR: 1.98, $p < 0.01$] [16] showed that the prevalence of stunting, wasting and overweight in children under 5 was not accidental and has emerged in the cluster form based on a regular occurrence in countries around the world.

Furthermore, the results of our research indicated that the mean center and standard deviation of stunting and wasting included most of the African and Asian countries especially in the Middle East, but the mean center and standard deviation of overweight included more areas of the world [17]. Overweight has included many parts of the world and its spatial distribution is more than stunting and wasting. Overweight was observed the African, Asian and European countries.

We highlight the importance of acknowledging power as a critical issue in food systems, present approaches that can be taken by food-systems researchers and practitioners in assessing power to understand the ways in which power works in food systems and wider society, and present material relating to addressing power and developing strategies to improve food systems for better nutrition, health and well-being [18].

To inform new thinking and action towards strengthening NAN effectiveness, we use a systems dynamics theoretical approach and literature review to build initial causal loop diagrams (CLDs) of political commitment and NAN effectiveness, and a qualitative group model building (GMB) method involving an expert workshop to strengthen model validity. First, a 'nutrition commitment system' CLD demonstrates how five inter-related forms of commitment – rhetorical, institutional, operational, embedded and system-wide – can dynamically reinforce or diminish one another over time [19]. Second, we present CLDs demonstrating factors shaping NAN effectiveness organised into three categories: actor features, resources and capacities; framing strategies, evidence and norms; institutional, political and societal contexts.

The research presented in the passage offers a comprehensive analysis of child malnutrition in India, with a particular focus on the states of Gujarat, Bihar, and Maharashtra. It addresses three main objectives: understanding the multifaceted determinants of child malnutrition, assessing the prevalence of various malnutrition forms in different Indian regions, and comparing malnutrition rates among children under five in the specified states [20]. The study draws upon data from the National Family Health Survey (NFHS 5) to delve into critical indicators like stunting, wasting, underweight, and overweight. The research underscores the substantial disparities in malnutrition, both between urban and rural areas and among the three states, highlighting the need for targeted interventions to address these discrepancies and ensure child well-being. Furthermore, it emphasizes that child malnutrition is a complex issue influenced by a range of socio-economic, cultural, and environmental factors [21]. Policymakers and organizations can utilize these findings to develop tailored strategies to combat child malnutrition effectively, recognizing the unique challenges faced by different regions and populations in India. Additionally, the passage briefly discusses the global context of child malnutrition, emphasizing the importance of acknowledging power dynamics in food systems and presenting a theoretical approach to understanding political commitment and nutrition action network effectiveness.

REFERENCES

[1] Katoch OR. Determinants of malnutrition among children: A systematic review. Nutrition 2022;96:111565.
[2] Das P, Ghosh S, Paria B. Multidimensional poverty in India: a study on regional disparities. Geo Journal 2022;87(5):3987–4006.
[3] Ansary R, Rath KC. Measuring and Mapping Undernutrition and its Determinants among Under-five Children in Odisha 2021;50:88–111.
[4] Striessnig E, Bora JK. Under-Five Child Growth and Nutrition Status: Spatial Clustering of Indian Districts. Spat Demogr 2020;8(1):63–84.
[5] Dhami MV, Ogbo FA, Diallo TMO, Agho KE. Regional analysis of associations between infant and young child feeding practices and diarrhoea in indian children. Int J Environ Res Public Health 2020;17(13):1–15.
[6] Sendhil R, Kiran Kumara TM, Ramasundaram P, Sinha M, Kharkwal S. Nutrition status in India: Dynamics and determinants. Glob Food Sec 2020;26.
[7] Chowdhury S, Chakraborty P pratim. Universal health coverage - There is more to it than meets the eye. J Fam Med Prim Care 2017;6(2):169–70.
[8] Narayan J, John D, Ramadas N. Malnutrition in India: status and government initiatives. J Public Health Policy 2019;40(1):126–41.
[9] Popkin BM, Corvalan C, Grummer-Strawn LM. Dynamics of the double burden of malnutrition and the changing nutrition reality. Lancet 2020;395(10217):65–74.

[10] Ijarotimi OS. Determinants of Childhood Malnutrition and Consequences in Developing Countries. Curr Nutr Rep 2013;2(3):129–33.

[11] Harris J, Nisbett N. The Basic Determinants of Malnutrition: Resources, Structures, Ideas and Power. Int J Heal policy Manag 2021;10(12):817–27.

[12] Khan REA, Raza MA. Determinants of malnutrition in Indian children: new evidence from IDHS through CIAF. Qual Quant 2016;50(1):299–316.

[13] Dipasquale V, Cucinotta U, Romano C. Acute malnutrition in children: Pathophysiology, clinical effects and treatment. Nutrients 2020;12(8):1–9.

[14] Kumar P, Chauhan S, Patel R, Srivastava S, Bansod DW. Prevalence and factors associated with triple burden of malnutrition among mother-child pairs in India: a study based on National Family Health Survey 2015–16. BMC Public Health 2021;21(1).

[15] Gulati JK. Child malnutrition: Trends and issues. Anthropologist 2010;12(2):131–40.

[16] Ramachandran P. Symposium on Child Survival in India : Part I Nutrition and Child Survival in India. Growth (Lakeland) 2010;77:301–5.

[17] Myatt M, Khara T, Dolan C, Garenne M, Briend A. Improving screening for malnourished children at high risk of death: A study of children aged 6-59 months in rural Senegal. Public Health Nutr 2019;22(5):862–71.

[18] Vassilakou T. Childhood malnutrition: Time for action. Children 2021;8(2):24–6.

[19] Mukuku O, Mutombo AM, Kamona LK, Lubala TK, Mawaw PM, Aloni MN, et al. Predictive model for the risk of severe acute malnutrition in children. J Nutr Metab 2019;2019.

[20] Nugent R, Levin C, Hale J, Hutchinson B. Economic effects of the double burden of malnutrition. Lancet 2020;395(10218):156–64.

[21] Singh A. Childhood Malnutrition in India. Perspect Recent Adv Acute Diarrhea 2020.