Extent And Causes Of Malnutrition Among Children: An Empirical Study In North Western Himalayan Region

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Abstract
Child malnutrition still affects growth and overall wellness, becoming an extremely serious issue worldwide. This study focuses on the extent and causes of child malnutrition under five years in NWHR. The study encompasses the secondary data of three NWHRs, including Himachal Pradesh, Uttarakhand, and Jammu & Kashmir from the NFHS-4 & NFHS-5 respectively. The findings of this study highlight a worrying trend in child malnutrition in the North Western Himalayan Region from 2015-16 to 2019-20, with rural areas bearing a higher burden than urban areas. Male children consistently exhibit higher rates of stunting, wasting, underweight, and overweight compared to female children. There is a need to take urgent action to address these disparities, including comprehensive programs targeting root causes and promoting healthy growth. Addressing socio-economic disparities, implementing targeted interventions, and improving access to healthcare and nutritious food, are important steps for combating child malnutrition in the NWHR. By prioritizing the well-being of children and adopting a holistic approach, we can work towards ensuring a healthier future for generations to come.
Keywords: *Child Malnutrition, Rural-Urban disparities, Gender disparities, NWHR.*

I. Introduction:

Every individual, regardless of physical or social differences, aspires to a healthy life (Jaidka et al., 2011). Malnutrition can be defined as an excess or deficiency of essential nutrients, an unbalanced distribution of them, or difficulties with effective utilization of them. The dual impact of malnutrition is driven by both undernourishment and the health complications associated with excess weight and non-communicable diseases influenced by dietary factors. Undernutrition presents in several forms, such as wasting, stunting, underweight, and deficiencies in key micronutrients (WHO, 2019). Low height for age, or stunting, is an indicator of chronic malnutrition, which is frequently caused by inadequate food intake, and repeated illness. If a child's height for age is less than two standard deviations from the World Health Organization's Child Growth Standards median, they are considered stunted. Similarly, low weight for height, or wasting, implies acute malnutrition and provides a high risk of death. It is typically brought caused by illnesses, low-calorie intake, and inadequate nutrition. If a child's weight-for-height is less than -2 SD from the WHO median, they are considered wasted. Low weight for age, or underweight, is an outcome of acute and chronic starvation; underweight children are frequently wasted and stunted. A child is considered overweight, however, if their weight according to their height is greater than +2SD of the WHO median (WHO, 2024).

Sufficient nutrition is important for the survival and growth of human beings, with any type of malnourishment or deficiency bearing long-term significant impacts on the physical, cognitive, interpersonal, and emotional growth of children (Chopra et al., 2023). One of the main worldwide causes of both global mortality as well as morbidity is undernourishment among children (Boulom et al., 2020). Numerous factors, including the nutritional state of the mother during pregnancy, might contribute to child malnutrition. Malnutrition in children is also mostly caused by inadequate breastfeeding techniques and poor sanitation. To improve overall child well-being and encourage healthy eating habits, education is essential. Socio-economic factors such as poverty and gender inequality further exacerbate the problem by limiting access to nutritious foods and healthcare services. To effectively eliminate child malnutrition, it is essential to address these multifaceted aspects (Narayan et al., 2018).

Childhood malnutrition remains a significant global health concern, greatly affecting children's growth and overall health (Kiran & Maragatham, 2023). In 2022, approximately 148.1 million children under 5 worldwide were affected by stunting, representing 22.3% of this age group. The majority of affected children lived in Asia (52%) and Africa (43%). Additionally, an estimated 45 million children under 5 (6.8%) experienced wasting, with 13.6 million suffering from severe wasting. Over three-quarters of children with severe wasting resided in Asia, and 22% in Africa. Furthermore, globally, there were 37 million children under 5 living with overweight, a rise of nearly 4 million since 2000. The 2023 Joint Malnutrition Estimates show slow progress in reaching global nutrition goals, like reducing stunting and overweight. We urgently need to protect mothers and children from malnutrition amidst a global food crisis worsened by poverty, conflict, climate change, and COVID-19. (WHO, 2023).

Child malnutrition is a major issue in India, as reflected in its ranking of 111 out of 125 countries in the Global Hunger Index 2023, compared to 107 out of 121 countries in 2022 (Von Grebmer et al., 2023). Due to low socioeconomic status, a large portion of the Indian population faces challenges, leading to people having inadequate nutrition both in terms of quality and quantity. States such as Bihar, Madhya Pradesh, Jharkhand, and Andhra Pradesh exhibit higher rates of malnutrition, while Mizoram, Sikkim, Manipur, Kerala, Punjab, and Goa have lower rates of undernutrition. In NFHS-5, approximately 36%, 19%, and 32% of children in India were stunted, wasted, and underweight, respectively, which exceeded the global average (NFHS-5, 2019-21). To overcome child malnutrition, the Government of India adopted various schemes like Integrated Child Development Services (1975), the National Nutrition Policy (1993), the National Health Mission (2013), and POSHAN Abhiyan (2018) (Narayan et al., 2018).

The North Western Himalayan Region (NWHR) comprises one union territory and two states of the Indian Republic, namely Jammu & Kashmir (now a union territory), Himachal Pradesh, and Uttarakhand. Geographically, it spans from approximately 28°43' to 37°05' N latitude and 72°40' to 81°02' E longitude, covering 33 million hectares area, which accounts for around 10 percent of the country's total geographical area. There are significant distinctions in the climate, which varies from subtropical in the mountains to moderate in the south, and from cold and dry to highland with minimal rainfall in the north (Sharma & Thakur, 2021). In NFHS 4 (2015-16), stunted children were 26%, wasted children were 14%, underweight children were 21%, and overweight children were 2% in Himachal Pradesh, showing improvement. However, in NFHS 5 (2019-20), stunting increased to 31%, wasting to 17%, and underweight to 26%, indicating an increase in malnutrition rates. In NFHS 4 (2015-16), stunting, wasting, and underweight rates in Jammu & Kashmir were 27%, 12%, and 17% respectively. However, in NFHS 5 (2019-20), stunting, wasting, and underweight rates increased to 27%, 19%, and 21% respectively. Children's nutritional condition in Uttarakhand has shown improvement since NFHS-4 across all parameters. From NFHS-4 to NFHS-5, the proportion of stunted children decreased from 34% to 27%. Similarly, the percentage of underweight children decreased from 27% to 21%, and the proportion of wasted children decreased from 20% to 13% (NFHS-5, 2019-21).

II.   Review of Literature:
2.1   Literature on Extent of Child Malnutrition

Shadap et al. (2017) analyzed dietary habits in Himachal Pradesh and Meghalaya using NSSO data. They found that Himachal Pradesh had the highest calorie intake, while Meghalaya had the lowest, with declining protein consumption over time. Meghalaya also spent more income on food. Meghalaya has a higher rate of anemia and malnutrition in women and children than Himachal Pradesh. **Jena et al. (2019)** investigate the socioeconomic and demographic factors that predict severe acute malnutrition among children under five years of age in Odisha. They used hospital-based prospective observation research. 2.8% of children were found with severe acute malnutrition, with a higher proportion among males (54.2%) than females (45.8%). The age group of 6-12 months had the highest undernutrition at 37.4%. 96.4% of malnourished children were from lower socioeconomic backgrounds. **Raina et al. (2019)** examined childhood malnutrition in the North Indian Sub-Himalayan region, focusing on the urban and rural populations of the Kangra district in Himachal Pradesh. A cross-sectional study on children aged 1-10 years was conducted. 1.7% were found to have mental retardation. 49.5% were stunted, 10% wasted, 4.9% were both stunted and wasted, and 35-39% were underweight from out of 5300 children. Malnutrition is a contributing factor to mental retardation among children, but it's not only one cause; various other factors play a vital role. **Vasudevan & Udayashankar (2019)** examined child undernutrition under five years in the rural area of Pondicherry and conducted a cross-sectional study. By using WHO growth standards, they found that 18.3% were underweight, 31.6% were stunted, and 20% were wasted children out of 224 surveyed. Severe underweight, stunting, and wasting were found in 4.9%, 9.8%, and 4.9% of children respectively. Stunted children were more common in the 48-59 months age group compared to the higher number of wasted and moderately severely underweight children in the 11-23 months age group. **Chuc et al. (2019)** examined the children nutritional status aged under 12-36 months in the rural district of Hungyaen Province, Vietnam in 2017. The cross-sectional study was conducted including 327 children under the age of 12-36 months. A multistage sampling technique was used. This study found the presence of stunting under the 12-

36 months children at 23.5%, underweight at 7.6%, wasting at 6.7%, and overweight at 1.2%. Overall found that the percentage of stunted children under the age of 12-36 months is much higher as compared to other measures. **Rehan et al. (2020)** studied the assessment of undernutrition in children under five years in rural and urban areas of Rishikesh, Uttarakhand. The cross-sectional study was conducted in which included 400 children and employed a multistage sampling method for area selection and simple random sampling for household selection. Results showed the underweight percentage at 37.3%, stunting at 43.3%, and wasting at 24.5% among children under five. Rural areas exhibited higher rates of undernutrition compared to urban areas. The study also found that children who were not vaccinated had higher rates of stunting and wasting, highlighting the importance of vaccination in preventing malnutrition. **Mphamba et al. (2024)** analyzed the impact of opportunity inequality on child nutritional status under the age of 0-59 months. Malawi's Multiple Indicator Cluster Survey 2006, 2013-14, and 2019-20 was used among 55,723 children. The data was analyzed using the Human Opportunity Index, Shapley-value decomposition, and Dissimilarity Index. The greatest inequality was found in stunting (8.96%), then underweight (1.91%), and after that wasting (0.90%). Along with important roles for gender, money, and the mother's education, the age of the child is a prominent factor, contributing 29.15% to stunting, 12.42% to underweight, and 52.36% to wasting. **Supadmi et al. (2024)** investigate the prevalence of stunted children aged under two years with working mothers in Indonesia. The cross-sectional study was conducted with 2,073 participants. The chi-square test was employed to look at the association between both independent and dependent variables, followed by binary logistic regression in IBM SPSS statistics v21 to identify the associated factors. There was a significant relationship between stunting and urban residence, children's age, and maternal marital status.

2.2   Determinants and Risk Factors of Child Malnutrition

Kandala et al. (2011) examined the relationship between malnutrition with geographical location and other risk factors. The study used data from the 2007 DRC Demographic Health Survey and applied Bayesian hierarchical regression. They discovered that malnutrition was more prevalent across all regions of the DRC, particularly in rural areas as compared to urban areas. Children born outside hospitals faced a higher risk, and regions reliant on the mining industry exhibited higher rates of childhood malnutrition. **Kiyonki et al. (2015)** investigated the determinants of malnutrition in Somalia among children aged under five years, focusing on stunting, wasting, and low mid-upper arm circumference (MUAC). The annual cross-sectional nutritional surveys from 2007 to 2010 were conducted, using a stratified cluster sampling design based on livelihood zones. The Bayesian analysis revealed that wasting is at 21%, stunting at 31%, and low MUAC at 36%. Limitations included the absence of data on water access and sanitation, contributing to diarrhea spread, and uncontrolled factors such as intervention program timing and location affecting children's nutritional status. **Meena et al. (2016)** investigated malnutrition among children under five in Anganwadi centers in Kolar, Madhya Pradesh. Their cross-sectional study assessed socio-demographic factors and malnutrition knowledge through house-to-house surveys. They found 51% of children were malnourished according to WHO standards, and 49% based on clinical trials. Additionally, 40% of children over one year had a mid-upper arm circumference below 13.5 cm. Factors strongly associated with malnutrition included family size, maternal education and employment, personal health, and child-feeding practices. **Darsene et al. (2017)** examined undernutrition among children under five in Hawassa, Ethiopia, through a cross-sectional study in which 811 children were selected randomly. Bivariate logistic regression is used to explore the relationship between different variables and they determined the causes of malnutrition using multivariate logistic regression. 39.3% stunted, 15.8% underweight, and 6.3% wasted children were found in the study. The percentage of Underweight children was highest in the 36-47 months age group (4.6%). Maternal education, health status, and feeding frequency were strongly associated with underweight and wasting. **Sahoo M. (2019)** analyzed nutrition security and calorie intake in Nagada village, Odisha, considering the roles of Integrated Child Development Services (ICDS), and the Public Distribution System (PDS). The study used descriptive and qualitative methods, collecting data through interviews and observations. Results showed higher dependency on the PDS, with inadequate ICDS services leading to high child malnutrition rates (47%). Socio-economic factors like education and income were significantly linked to health status, while household size, caste, and land ownership showed no correlation. **Roula B. (2023)** investigates the ongoing challenges face by India about child malnutrition with economic growth. The study aims to examine the effect of parental factors on the nutritional status of children and evaluate India's progress towards SDG goal 2. This study was based on secondary data which was taken from the NFHS-4 & NFHS-5. The findings of the study indicate that mothers in professional or technical occupations have children with the lowest rates of stunting, wasting, and underweight, compared to those in other occupations. Encouraging more mothers to pursue professional or technical careers could greatly improve child nutrition in India. **(Bagewadi et al. (2023)** analyzed the determinants of child malnutrition among children aged under five years in India. They conducted a cross-sectional study in which involving 460 children and their mothers. The data is analyzed by using a multivariate logistic model. 54.13% were found to be malnourished,

and child malnutrition was higher in females rather than males. Mother's age, religion, family income, and family size were identified as significant factors that were associated with malnutrition.

2.3 Research gap: Based on a literature review, it is found that limited studies exist on malnutrition among children under five in Himachal Pradesh, Uttarakhand, and Jammu & Kashmir. While studies at the international and national level are available. Very few studies have been conducted that compare rural and urban areas child malnutrition with gender differences. Therefore, this study aims to evaluate the extent and causes of child malnutrition in NWHR.

Objectives:
➢ To study the prevalence the trend of child malnutrition in the North Western Himalayan Region.
➢ To compare rural-urban and gender disparities in child malnutrition in the NWHR.

III. Data and Methodology

The research utilizes secondary data obtained from two rounds of the National Family Health Survey (NFHS), namely NFHS 4 (conducted during 2015-16) and NFHS 5 (conducted during 2019-20). NFHS is a comprehensive, nationally representative survey conducted across all states and union territories of India under the direction of the Ministry of Health and Family Welfare, Government of India. Here we conduct the anthropometric data on the extent of child malnutrition aged under five years in NWHR (Himachal Pradesh, Uttarakhand, and Jammu & Kashmir). The State & National Report and Fact sheet data of NFHS are used for this study.

IV. Tables and Figures:

4.1 Rural-Urban Child Malnutrition Trend in NWHR

Table 4.1.1: Percentage of Stunted Children Under-five Years in NWHR

State	Stunting (Height-for-Age) (%)					
	2015-2016			2019-2020		
	Rural	Urban	Total	Rural	Urban	Total
Himachal Pradesh	26.7	21.4	26.3	31.3	27	30.8
Jammu & Kashmir	28.8	23	27.4	25.9	30.1	26.9
Uttarakhand	34	32.5	33.5	24.3	28.2	27.0

Source: Compiled by author from the fact sheet of NFHS 4 & NFHS 5.

Figure 1: Stunted Children Under age five years in NWHR - Rural vs. Urban Comparison (2015-2016 vs. 2019-2020)
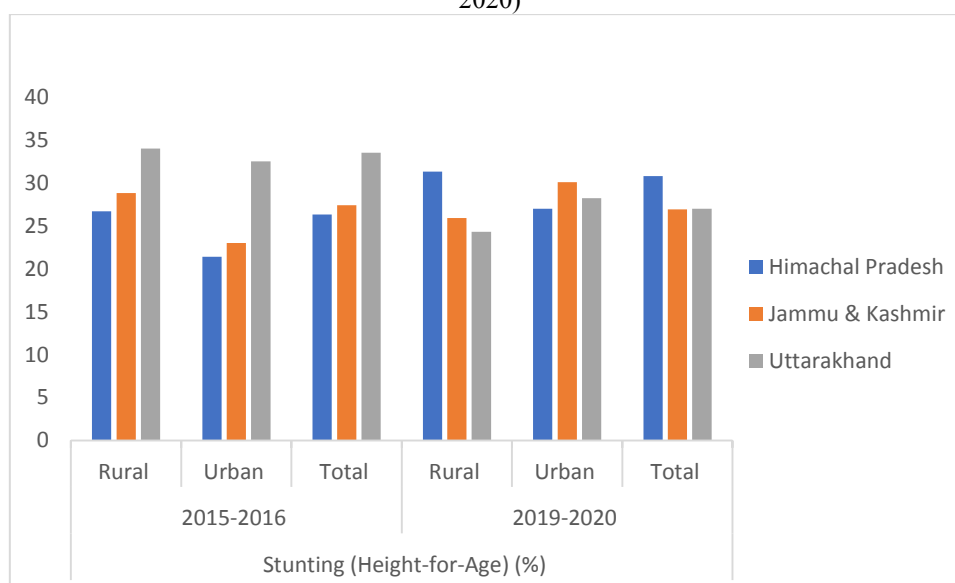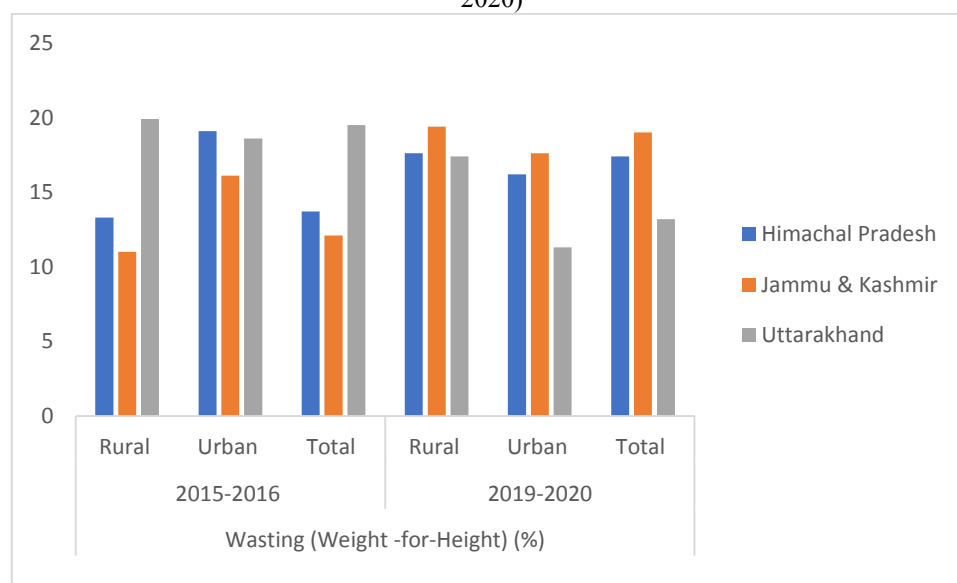

Source: NFHS 4 and NFHS 5.

Table 4.1.1 and Figure 1 represent the percentage of stunted children under five years old in the rural and urban areas of NWHR for the years 2015-16 and 2019-20. In 2015-16 Uttarakhand had the highest percentage of stunted children at 33.5% (34% in rural areas and 32.5% in urban areas). Out of these three NWHRs, Himachal Pradesh had the lower percentage of stunted children at 26.3% (26.7% in rural areas and 21.4% in urban areas). By 2019-20, the percentage of stunted children increased in Himachal Pradesh to 30.8% (31.3% in rural areas and 27% in urban areas). This rise may have resulted in children in some areas receiving insufficient nutrition and medical attention due to the limited availability of healthcare facilities. The overall percentage of stunted children is higher in rural areas as compared to urban areas.

Table 4.1.2: Percentage of Wasted Children Under-five Years in NWHR

State	Wasting (Weight for Height) (%)					
	2015-2016			2019-2020		
	Rural	Urban	Total	Rural	Urban	Total
Himachal Pradesh	13.3	19.1	13.7	17.6	16.2	17.4
Jammu & Kashmir	11	16.1	12.1	19.4	17.6	19
Uttarakhand	19.9	18.6	19.5	17.4	11.3	13.2

Source: Compiled by author from the fact sheet of NFHS 4 & NFHS 5.

Figure 2: Wasted Children Under age five years in NWHR - Rural vs. Urban Comparison (2015-2016 vs. 2019-2020)
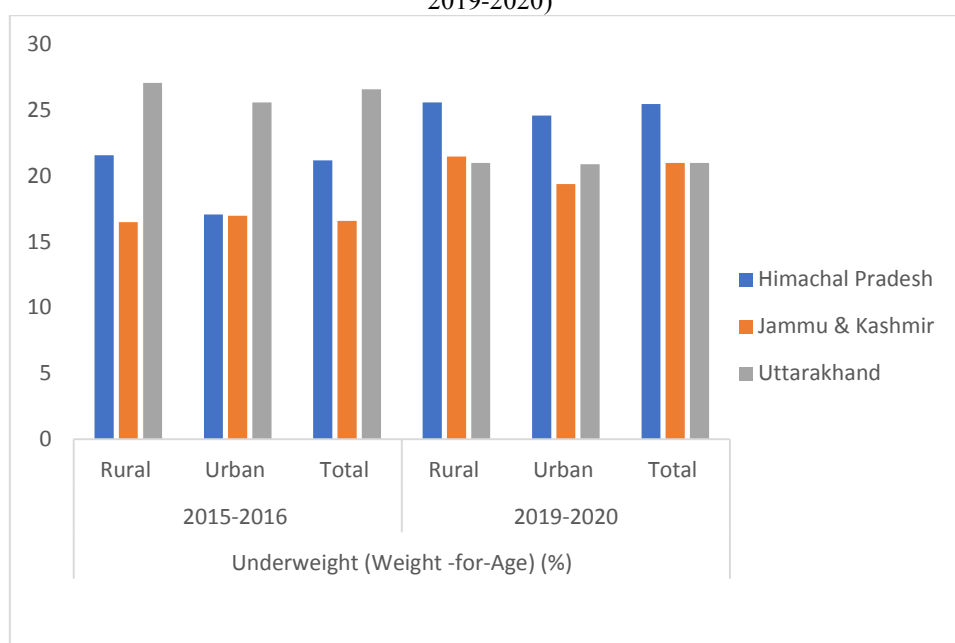

Source: NFHS 4 and NFHS 5.

Table 4.1.2 and Figure 2 show the wasted children percentage under five years old in the rural and urban areas of NWHR for the years 2015-16 and 2019-20. In 2015-16 Uttarakhand had the highest percentage of wasted children at 19.5% (19.9% in rural areas and 18.6% in urban areas). Out of these three NWHRs, Jammu & Kashmir had the lower percentage of wasted children at 12.1% (11% in rural areas and 16.1% in urban areas). By 2019-20, the percentage of wasted children increased in Jammu & Kashmir to 19% (19.4% in rural areas and 17.6% in urban areas). The overall percentage of wasted children is higher in rural areas as compared to urban areas.

Table 4.1.3: Percentage of Underweight Children Under-five Years in NWHR

State	Underweight (Weight-for-Age) (%)					
	2015-2016			2019-2020		
	Rural	Urban	Total	Rural	Urban	Total
Himachal Pradesh	21.6	17.1	21.2	25.6	24.6	25.5
Jammu & Kashmir	16.5	17	16.6	21.5	19.4	21
Uttarakhand	27.1	25.6	26.6	21.0	20.9	21.0

Source: Compiled by author from the fact sheet of NFHS 4 & NFHS 5.

Figure 3: Underweight Children Under age five years in NWHR - Rural vs. Urban Comparison (2015-2016 vs. 2019-2020)

Source: NFHS 4 and NFHS 5.

Table 4.1.3 and Figure 3 show the underweight children percentage under five years old in the rural and urban areas of NWHR for the years 2015-16 and 2019-20. In 2015-16 Uttarakhand had the highest percentage of wasted children at 26.6% (27.1% in rural areas and 25.6% in urban areas). Out of these three NWHRs, Jammu & Kashmir had the lower percentage of underweight children at 16.6% (16.5% in rural areas and 17% in urban areas). By 2019-20, the percentage of underweight children increased in Himachal Pradesh to 25.5% (25.6% in rural areas and 24.6% in urban areas). The overall percentage of underweight children is higher in rural areas as compared to urban areas.
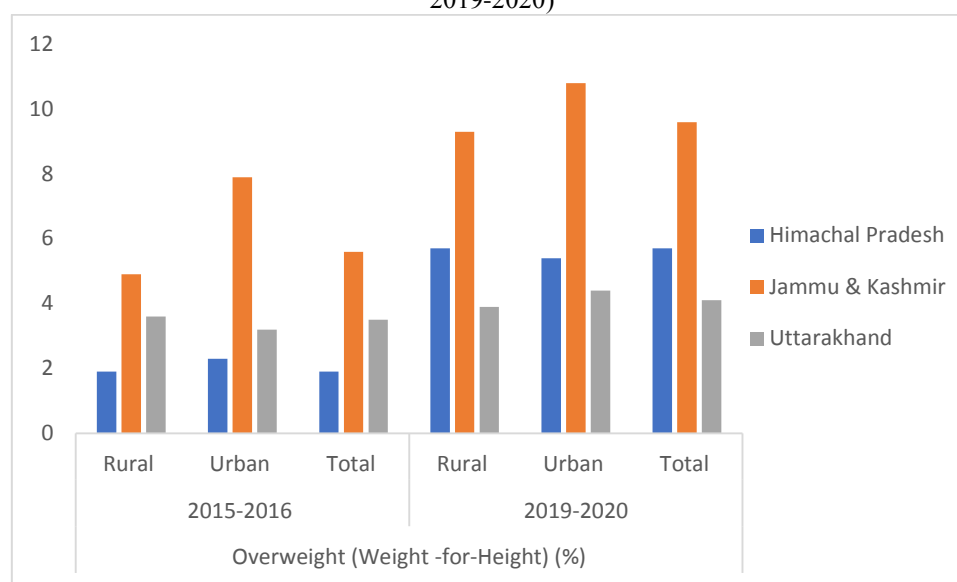
Table 4.1.4: Percentage of Overweight Children Under-five Years in NWHR

State	Overweight (Weight-for-Height) (%)					
	2015-2016			2019-2020		
	Rural	Urban	Total	Rural	Urban	Total
Himachal Pradesh	1.9	2.3	1.9	5.7	5.4	5.7

| Jammu & Kashmir | 4.9 | 7.9 | 5.6 | 9.3 | 10.8 | 9.6 |
| Uttarakhand | 3.6 | 3.2 | 3.5 | 3.9 | 4.4 | 4.1 |

Source: Compiled by author from the fact sheet of NFHS 4 & NFHS 5.

Figure 4: Overweight Children Under age five years in NWHR - Rural vs. Urban Comparison (2015-2016 vs. 2019-2020)

Source: NFHS 4 and NFHS 5.

Table 4.1.4 and Figure 4 show the overweight children percentage under five years old in the rural and urban areas of NWHR for the years 2015-16 and 2019-20. In 2015-16 Jammu & Kashmir had the highest percentage of overweight children at 5.6% (4.9% in rural areas and 7.9% in urban areas). Out of these three NWHRs, Himachal Pradesh had the lower percentage of overweight children at 1.9% (1.9% in rural areas and 2.3% in urban areas). By 2019-20, the percentage of overweight children was higher in Jammu & Kashmir to 9.6% (9.3% in rural areas and 10.8% in urban areas). The overall percentage of overweight children is higher in urban areas as compared to rural areas. The increased consumption of processed food items, a lack of physical activity, and socioeconomic differences which influence dietary habits could be the cause of the higher prevalence of overweight children in urban areas.

4.2 Gender Differences and Child Malnutrition in NWHR (2015-16 & 2019-20)

State	Nutritional Status (%)	2015-16		2019-20	
		Male	Female	Male	Female
Himachal Pradesh	Stunting	27.7	24.7	33.1	28.2
	Wasting	13.9	13.5	17.7	17.0
	Underweight	21.8	20.6	26.2	24.7
	Overweight	2.2	1.6	6.4	4.8
Jammu & Kashmir	Stunting	27.9	27.0	30.4	23.3
	Wasting	12.5	11.7	19.5	18.4
	Underweight	16.9	16.3	24.5	17.4
	Overweight	5.2	6.1	10.1	9.1
Uttarakhand	Stunting	33.7	33.2	27.3	26.8
	Wasting	20.1	18.3	13.2	13.2
	Underweight	27.0	26.2	21.8	20.1
	Overweight	3.5	3.4	4.9	3.2

Source: Compiled by author from the fact sheet of NFHS 4 & NFHS 5.

In Himachal Pradesh, between 2015-16 and 2019-20, there was an increase in stunting rates among male children from 27.7% to 33.1% and among females from 24.7% to 28.2%. Similarly, wasting rates rose from 13.9% to 17.7% for males and from 13.5% to 17.0% for females. Underweight prevalence also increased from 21.8% to 26.2% among males and from 20.6% to 24.7% among females. Overweight rates increased from 2.2% to 6.4% among males and from 1.6% to 4.8% among females.

In Jammu & Kashmir, stunting rates rose slightly from 27.9% to 30.4% among males and decreased from 27.0% to 23.3% among females. Wasting rates increased from 12.5% to 19.5% among males and from 11.7% to 18.4% among females. Underweight prevalence increased from 16.9% to 24.5% among males and from 16.3% to 17.4% among females. Overweight rates showed an increase from 5.2% to 10.1% among males and from 6.1% to 9.1% among females.

In Uttarakhand, stunting rates decreased from 33.7% to 27.3% among males and from 33.2% to 26.8% among females. Wasting rates decreased from 20.1% to 13.2% among males and remained relatively stable among females at 18.3% in 2015-16 and 13.2% in 2019-20. Underweight prevalence decreased from 27.0% to 21.8% among males and from 26.2% to 20.1% among females. Overweight rates increased from 3.5% to 4.9% among males and from 3.4% to 3.2% among females.

Overall, across the North Western Himalayan Region, male children consistently showed higher rates of stunting, underweight, wasting, and overweight compared to females in both 2015-16 and 2019-20.

V.   Conclusion and Policy Suggestions

The study in the North Western Himalayan Region shows a worrying trend in child malnutrition from 2015-16 to 2019-20. Particularly the disparity observed between rural and urban areas, with rural children experiencing a higher percentage of malnutrition. Moreover, male children consistently show a higher prevalence of stunting, wasting, being underweight, and overweight as compared to female children. To overcome these discrepancies and provide fair access to healthcare and nutrition, specific measures must be implemented urgently. To ensure a better and healthier future for the upcoming generation in the NWHR, we must prioritize comprehensive programs that target the fundamental causes of malnutrition and encourage healthy growth for all children.

To address food insecurity and child malnutrition in the region, the adoption of a multifaceted approach is important. Since more households depend on purchased food to supplement their diet, the types and amounts of food purchased for consumption, as well as their contribution to the nutritional needs of the household, must be determined. To accurately assess food security for children throughout the year, there is a need to consider the seasonal variations in food availability. The specific requirements of children and their families can be successfully met by multisectoral approaches that incorporate food security, nutrition, health, and water sanitation. Planning for agricultural programs should incorporate health and nutrition components, with a focus on child nutrition. Additionally, providing nutritional education to community members and caregivers is important for addressing malnutrition among children, and promoting healthy eating habits. By using these measures, policymakers and stakeholders can work towards improving nutrition outcomes for children, and food security in the NWHR.

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