Original Research Article

A study on Income Inequality and Nutritional Status of Children in Rural Areas of Jammu and Kashmir: Evidence from Jammu District

Abstract

Children nutritional status is a powerful indicator of nutrition security and well-being of individual and reflects the nutritional and poverty situation of household. Good nutritional status of children under five years of age is very crucial for the foundation of a healthy life. This study is a small attempt to highlight the extent of malnutrition in rural areas of Jammu district on the basis of households' economic status. It empirically investigates the relationship between income inequality and nutritional status of children under age of five years of age (stunting) in the rural areas of Jammu district of Jammu and Kashmir. To determine the prevalence of undernutrition among different income groups of rural households, the study uses the data of a primary household survey. In order to measure the level of undernutrition (stunting), gender-specific anthropometric z-scores for height-for-age are calculated by using new child growth standards which are developed by the World Health Organisation (WHO). The study finds that children from households in the poorest quintile have significantly higher odds of stunting compared to those in the highest income quintile. The study revealed a negative association between income and the prevalence of stunting in the study area. It means the proportion of stunted children under five years of age decreases as the level of income increases among rural households. The study suggests that the government can help improve the nutritional status of children by taking important policy initiatives that addresses income inequality and poverty in rural areas.

Keywords: Income inequality, income quintile, nutritional status, stunting, Jammu and Kashmir.

1. Introduction

The nutritional status of children is a key indicator of their overall well-being and reflects the poverty and nutritional situation of their households. The nutrition of children under the age of five is particularly important as it lays the foundation for a healthy life. In 2020, globally, it was

estimated that 22 per cent (149.2 million) of children under five years of age were stunted (low height for age), 6.7 per cent (45.4 million) were wasted (low weight for height), and 5.7 per cent (38.9 million) were overweight or obese (WHO, 2021). Malnutrition is a major contributor to the global disease burden, with over half of deaths in children under the age of five attributed to undernutrition. This problem is particularly prevalent in low and middle-income countries, including India. According to UNICEF (2020), a healthy balanced-diet is essential for children's survival, health and development. Research shows that poverty, inequality, and nutritional status are closely linked. Children from poor households, especially in rural areas, are more likely to suffer from different forms of malnutrition, such as stunting, underweight, and wasting. Malnutrition not only affects the health and well-being of children, but it also lowers productivity, impedes economic growth, and increases healthcare expenses. This can create a vicious cycle of poverty and ill-health, perpetuating the problem further.

The prevalence of poor nutritional status in developing countries is mainly due to the low income, low production of food, low productivity of crops and livestock, unequal distribution of food, low literacy, socio culture and or environmental sanitation (Nabarro, 1984). Low socioeconomic status within households is a significant determinant of poor nutritional status in children. Children from families with low income levels are at higher risk of malnutrition due to their limited access to adequate nutrition. To improve the overall nutritional status of children under five, it is necessary to reduce poverty and make social security services and maternal medical support more readily available to low-income households (Nabeen & Akanda, 2017). Reducing poverty and increasing access to services for those in need are crucial to improving childhood health and nutritional outcomes. Kanjilal, Mazumdar, Mukherjee and Rahman (2019) found that stunting disproportionately affects children from poor socio-economic backgrounds across all Indian states, and that there is a negative correlation between Net State Domestic Product and stunting prevalence. Larrea and Kawachi, (2005) investigated the effect of economic inequality on chronic child malnutrition while considering various household and individual determinants in Ecuador. The article emphasized that child malnutrition not only affects human development and social integration in adulthood but also contributes to poverty and inequality perpetuation. Meanwhile, Hong, Banta, and Betancourt (2006) explored the relationship between household wealth inequality and chronic childhood under-nutrition in Bangladesh. They utilized multivariate logistic regressions and found that children in the poorest 20 per cent of households had more than three times the likelihood of suffering from adverse growth rate stunting compared to those from the wealthiest 20 per cent of households. The

study concluded that household wealth inequality strongly associates with childhood adverse growth rate stunting. Malnourishment resulting from insufficient nourishment and was more prevalent among poor households, while the concentration of overweight and obesity linked to economic status varies depending on the region (Alao et al, 2021).

A study conducted by Singh, Srivastava, and Upadhyay (2019) analyzed data from the National Family Health Survey (NFHS) conducted in 2015-2016 across 640 districts in India and found that the prevalence of malnutrition was higher among children from lower socio-economic groups, including those from households with lower levels of education, income, and access to basic amenities. Kumar and Paswan (2021) conducted a study on the impact of socio-economic inequality on the nutritional status of children, specifically stunting and underweight, in India's Empowered Action Group states, including Bihar, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Rajasthan, Uttarakhand, and Uttar Pradesh. The study used cross-sectional data from the National Family Health Survey conducted in 2005-2006 and 2015-2016, using height-for-age and weight-for-age as anthropometric indicators. The results showed that household wealth index was the most significant contributor to stunting, followed by mother's education and nutritional status. Jayalakshmi and Kannan (2021) explored the social, economic, and political dimensions of undernutrition among children aged 6-60 months from low socio-economic households in Kerala. The study found that children below 5 years from low socio-economic backgrounds were at a higher risk of being undernourished, which can perpetuate the cycle of poverty and undernutrition. Risk factors included acute illnesses, underweight mothers, low standard of living, and underutilization of Integrated Child Development Services and Public Distribution System. The utilization of these programs was found to improve nutritional status, highlighting the importance of ensuring that the neediest populations receive adequate and quality support.

Despite considerable progress in various sectors of the Indian economy such as agriculture, industry, and service sector over the past seventy years, poverty, malnutrition, hunger, and inequality continue to persist in the country. A significant proportion of the rural population in India lacks access to adequate food, sanitation facilities, and healthcare. The nutritional status of children under five is considered an important indicator of a household's living standard and survival. Poverty has been identified as the primary cause of malnutrition in developing countries, leading to intergenerational transfer of poor nutritional status among children and hindering social improvement and equity. Therefore, economic inequality is a crucial factor to

consider when studying malnutrition and requires appropriate analytical treatment to examine its interaction with other dimensions of malnutrition and prioritize suitable program intervention.

2. Objectives of the Study

1. To study the trends of nutritional status (underweight, stunting, and wasting) among children under-5 years of age in India and J&K.
2. To study the relationship between income inequality and nutritional status i.e. stunting in rural areas.

3. Data and Methodology

The present study has been based on primary as well as secondary sources of data. The primary data was collected by conducting a field survey of 400 rural households from the two blocks of Jammu district, namely Akhnoor and Khour. The sample was equally divided, with 200 households selected from each block. The study was carried out in 16 villages, with eight villages from each block, classified into four forward and four backward villages. From each village, 25 households were selected using systematic random sampling. There were 210 children of age under-five in the study area. In contrast, the secondary data used in this study was obtained from the National Family Health Survey reports.

The most common indices used to define a child's nutritional status are wasting, underweight, and stunting. However, this study focused solely on stunting as it provides a cumulative measure of chronic malnutrition and is not significantly affected by current dietary intake. The survey used the height or length measurements of all children aged 0-59 months to determine their nutritional status and physical growth. The World Health Organization (WHO) identifies children as growth-stunted or undernourished if their z-score (height-for-age) is two standard deviations below the international median standard. The study aimed to establish a correlation between income inequality and the nutritional status of children under age five years. To achieve this objective, the selected rural households were divided into income quintiles, with the lowest quintile representing the poorest 20 percent and the top quintile representing richest 20 per cent households in the study area. Further, to identify the extent of health inequality across income quintiles, unadjusted binary regression model is also used in this study. Economic inequality among households is an important determinant of nutrition as it is associated with various demographic and socioeconomic factors that impact children's well-being. This study highlights the importance of addressing economic inequality and its impact on children's nutrition to ensure adequate growth and development. By focusing on stunting as an indicator of

nutritional status, this study provides a comprehensive understanding of the long-term effects of chronic malnutrition on children's health.

4. Results and Discussions

The height-for-age index, also known as the stunting indicator, is an important measure of child growth and nutritional status. It compares a child's height to the expected height for their age, based on the WHO growth reference population. The -2SD and -3SD cutoffs used to define moderate stunting and severe stunting, respectively, are based on the standard deviation of the height-for-age distribution in the WHO reference population. Children whose height-for-age z-score falls below these cutoffs are considered at increased risk of poor health outcomes, including developmental delays, cognitive impairment, and increased susceptibility to infections.

Table 1 exhibiting declining trends of malnutrition among children under age five years, according to the National Family Health Survey-5 in 2019-20. The survey found that 32.1 per cent of children under five were underweight, 35.5 per cent were stunted, and 19.3 per cent were wasted. However, these percentages have decreased since the NFHS-4 in 2015-16, with the greatest decline reported in underweight children, followed by stunting (2.9 per cent) and wasting. Despite the overall decline, the NFHS-5 survey conducted in 2019-20 reported an increase in the prevalence of malnutrition (underweight, stunting, and wasting) in Jammu and Kashmir since 2015-16. In Jammu district, the prevalence of underweight (16.6 per cent), stunting (23.2 per cent), and wasting (13.7 per cent) has increased to 17.6 per cent, 27 per cent, and 18 per cent, respectively. The table provides valuable insights into the prevalence of malnutrition in Jammu, J&K, and India, allowing for a comparison of the data over time. Overall, the trend in malnutrition among children under five has been downward, but the recent increase in Jammu and Kashmir highlights the need for continued efforts to combat malnutrition in this region.

Table 1: Trends in Nutritional Status of Children under Age Five Years as per National Family Health Survey, 2019-20 & 2015-16 in J& K and India

India	Nutritional Status	NFHS-4 (2015-16)	NFHS-5 (2019-20)	Per cent Change in Relative Malnutrition
	Underweight	35.7	32.1	**-3.6**
	Stunting	38.4	35.5	**-2.9**
	Wasting	21.0	19.3	**-1.7**

Jammu and Kashmir	Underweight	16.6	21.0	**+4.4**
	Stunting	27.4	26.9	**-0.5**
	Wasting	12.2	19.0	**+6.8**
Jammu District	Underweight	16.6	17.6	**+1**
	Stunting	23.2	27.0	**+3.8**
	Wasting	13.7	18.0	**+4.3**

Sources: National Family Health Survey, 2019-2020.

Table 2 shows the prevalence of stunting among children under the age of five years in the study area, based on the W.H.O z-score values for height-for-age. In the first income quintile, 50.9 per cent of children were normal (≥-2SD and <2SD z-score), 30.2 per cent were moderately stunted (≥-3SD and <-2SD z-score), and 18.9 per cent were severely stunted (<-3 z-score). The overall percentage of stunted children in the first income quintile was 49.1 per cent. In the second income quintile, 42.9 per cent of children were moderately stunted, 4.8 per cent were severely stunted, and the overall prevalence of stunting was 47.6 per cent, which was lower than the poorest income quintile. Among the children in the richest income quintile, 94.4 per cent were normal, and 5.6 per cent were moderately stunted, and no children were severely stunted. Out of the total of 210 sampled children, 67.1 per cent were normal, 22.9 per cent were moderately stunted, and 10 per cent were severely stunted in the study area. The prevalence of stunting was highest among the sampled households in the poorest income quintile, and as income quintile increased, the rate of stunting among children decreased in the study area. The study revealed a negative association between income and the prevalence of stunting in the study area.

Table 2: Nutritional Status of Children (Height-for-age or Stunting) Under Age Five Years in the Study Area

Income Quintiles	Normal	Moderately Stunted	Severely Stunted
Poorest	27 (50.9)	16 (30.2)	10 (18.9)
Lowest	22 (52.4)	18 (42.9)	2 (4.8)
Middle	28 (62.2)	10 (22.2)	7 (15.6)
Upper-Middle	30 (88.2)	2 (5.9)	2 (5.9)
Richest	34 (94.4)	2 (5.6)	-
Study Area	141 (67.1)	48 (22.9)	21 (10.0)

Source: Primary Field Survey, 2020-2021
Notes: Figures in parentheses are column-wise percentages

Table 3 display the nutritional status of children based on z-score values in two blocks of the study area, Akhnoor and Khour. The study findings suggest that the prevalence of stunting is similar to the results found in Table 2. For instance, 60 per cent of children in Akhnoor block and 43.5 per cent of children in Khour block belonging to the first income quintile were found to be normal, while 23.3 per cent and 34.8 per cent were moderately stunted, and 16.7 per cent and 21.7 per cent were severely stunted, respectively. In Akhnoor block, 40 per cent of children in the first income quintile were stunted, whereas 56.5 per cent of children in Khour block were reported stunted, indicating a 16.5 per cent difference.

For the top income quintile, 94.4 per cent of children in Akhnoor block were normal, and 5.6 per cent were moderately stunted. Out of a total of 109 children under the age of five, 66.1 per cent were normal, 21.9 per cent were moderately stunted, and 12.8 per cent were severely stunted. The overall proportion of stunted children was reported to be 34.9 per cent in Akhnoor block. In Khour block, 88.9 per cent of children were normal, and 11.1 per cent were moderately stunted. Out of a total of 101 children under the age of five, 68.3 per cent were normal, 24.8 per cent were moderately stunted, and 6.9 per cent were severely stunted. The overall proportion of stunted children in Khour block was 31.7 per cent. The results demonstrate that Akhnoor block has a higher prevalence of stunted children than Khour block, but Khour block has a higher prevalence of stunting in the lowest income quintile of the study area.

Table 3: Nutritional status of children (height-for-age) in different quintiles of income in Akhnoor and Khour blocks of the study area

Income Quintiles	Akhnoor Block			Khour Block		
	Normal	Moderately Stunted	Severely Stunted	Normal	Moderately Stunted	Severely Stunted
Poorest	18 (60)	7 (23.3)	5 (16.7)	10 (43.5)	8 (34.8)	5 (21.7)
Lowest	10 (45.5)	7 (31.8)	5 (22.7)	12 (54.5)	10 (45.5)	-
Middle	16 (59.3)	7 (25.9)	4 (14.8)	9 (56.3)	5 (31.3)	2 (12.5)
Upper-Middle	11 (91.7)	1 (8.3)	-	22 (100)	-	*
Richest	17 (94.4)	1 (5.6)	-	16 (88.9)	2 (11.1)	-
Study Area	72 (66.1)	23 (21.1)	14 (12.8)	69 (68.3)	25 (24.8)	7 (6.9)

Source: Primary Field Survey, 2020-2021
Notes: Figures in parentheses are column-wise percentage

Data regarding the prevalence of stunting across various quintiles of income in the forward and backward villages of the study area has been shown by Table 4. The data shows that a higher percentage of children in the backward villages were found to be stunted compared to the forward villages. About 18.5 per cent of children in forward villages were moderately stunted, while 2.2 per cent were severely stunted. Meanwhile, in the backward villages, the prevalence of moderate and severe stunting was much higher, at 26.3 per cent and 16.1 per cent, respectively. Moreover, the prevalence of stunting in general was much higher in the backward villages, with 43.4 per cent of children being reported as stunted, compared to 20.7 per cent in the forward villages.

Income inequality plays an important role in the distribution of stunting, as evidenced by the fact that in the forward and backward villages about 26.1 per cent and 29.6 per cent of children were found to be moderately stunted, respectively, while 4.3 per cent and 29.6 per cent were severely stunted. Among the first income quintile, 30.4 per cent of children in the forward villages were stunted, while 56.5 per cent of children in the backward villages were reported as stunted. These findings suggest that stunting is more prevalent among lower income groups in the backward villages compared to the forward villages. In the top income quintile, all children in the forward villages were found to be normal, while 90 per cent of children in the backward villages were normal and 10 per cent were moderately stunted. Overall, the results indicate that stunting is less prevalent among children in the forward villages compared to the backward villages, and that as income increases in both areas, the prevalence of stunting among children under age five years decreases.

Table 4: Percentage Distribution of Stunting (Height-For-Age) Children across Different Quintiles of Income in the Forward and Backward Villages of the Study Area

Income Quintiles	Forward Villages			Backward Villages		
	Normal	Moderately Stunted	Severely Stunted	Normal	Moderately Stunted	Severely Stunted
Poorest	16 (69.6)	6 (26.1)	1 (4.3)	11 (40.7)	8 (29.6)	8 (29.6)
Lowest	10 (50)	9 (45)	1 (5)	13 (54.2)	9 (37.5)	2 (8.3)
Middle	14 (93.3)	1 (6.7)	-	9 (42.9)	7 (33.3)	5 (23.8)
Upper-Middle	14 (93.3)	1 (6.7)	-	17 (65.4)	5 (19.2)	4 (15.4)

Richest	19 (100)	-	-	18 (90)	2 (10)	-
Study Area	73 (79.3)	17 (18.5)	2 (2.2)	68 (57.6)	31 (26.3)	19 (16.1)

Source: Primary Field Survey, 2020-2s021

5. Association between Income Inequality and Stunting

In order to analyse the odds of having stunting (low height-for-age) across income quintile or in other word to analyze the association between health inequality and income inequality, unadjusted binary regression model is used. Compared with highest income quintile, children from households in the poorest quintile had significantly higher odds (COR=16.4; 95 % CI: 3.56-75.2) of underweight. Children from upper-middle income households had 2.26 times more odds of having suffering from stunting but it was found insignificant(COR=2.26; 95 % CI: 0.38-13.3). The findings suggest that higher income disparities are associated with a higher prevalence of stunting, indicating that as the economic status of a household increases, the odds of childhood underweight decrease.

Table 5: Crude Odds Ratio (COR) from Logistic Regression Analysis to identify the Extent of Health Inequality in the Study Area

Income Quintiles	Stunting		Crude Odds Ratio (COR) (CI 95 %)	P- Value
	Yes	No		
Poorest	26	27	16.4 (3.56-75.2)**	0.0003
Second	20	22	15.45 (3.3-72.7)**	0.001
Middle	17	28	10.3 (2.19-48.5)**	0.003
Upper-Middle	4	30	2.26 (0.38-13.3)	0.364
Highest	2	34	1 (Reference)	

6. Conclusion:

The prevalence of malnutrition among children under the age of five years in India has decreased since the National Family Health Survey-4 in 2015-16. However, the recent National Family Health Survey-5 in 2019-20 reported an increase in the prevalence of malnutrition in Jammu and Kashmir. The present study explored the relationship between income inequality and malnutrition among children under-5 years of age in rural areas of Jammu district of Jammu

and Kashmir. The prevalence of stunting was highest among the sampled households in the poorest income quintile, and as income quintile increased, the rate of stunting among children decreased in the study area. The study revealed a negative association between income and the prevalence of stunting in the study area. The findings of study also suggest that stunting is more prevalent among lower income groups in the backward villages compared to the forward villages. Moreover, stunting is less prevalent among children in the forward villages compared to the backward villages, and that as income increases in both areas, the prevalence of stunting among children under age five years decreases. An unadjusted binary regression model was used to analyze the odds of stunting across income quintiles. Children in the poorest quintile had significantly higher odds of being stunting than those in the highest quintile. Higher income disparities were associated with a higher prevalence of stunting, with odds of childhood underweight decreasing as household economic status increases.

At present in India, public health has made significant progress in recent years, many people in are still at risk of food insecurity, undernutrition, and poor health. The challenge for public health professionals and policymakers is to ensure that the benefits of economic growth and development are more widely distributed and that access to essential health and nutrition services is improved for all. By reducing inequality and improving access to basic needs, it is possible to ensure that everyone has the opportunity to lead a healthy and productive life. In conclusion, addressing income inequality and income poverty in India can play a significant role in reducing malnutrition among children. The study recommends that by investing in agriculture, social protection programmes, healthcare, water and sanitation, education, and nutrition policies and programmes, the government can help improve the nutritional status of children and reduce income inequality and poverty in rural areas.

Acknowledgement: I would like to thank the anonymous referees of this journal for valuable comments regarding title, references, language etc. that improved the quality of the paper

7. References

1. Alao R, Nur H, Fivian E, Shankar, B. & Kadiyala, S. (2021). Economic inequality in malnutrition: a global systematic review and meta-analysis. *BMJ Global Health. Retrieved from https://gh.bmj.com/content/6/12/e006906*

2. Hong, R., Banta, J. E., & Betancourt, J. A. (2006). Relationship between household wealth inequality and chronic childhood under-nutrition in Bangladesh. *International Journal for Equity in Health, 5(*15). Retrieved from https://doi.org/10.1186/1475-9276-5-15.
3. International Institute for Population Sciences (IIPS) & ICF (2017). *National Family Health Survey (NFHS-5), 2019-20: India.* Mumbai: IIPS.
4. Jayalakshmi, R. & Kannan, S. (2021). Protocol of sxplanatory study on social, economic and political dimensions of nutritional status of children aged six to sixty months from low socio-economic strata in Kerala, India. *Social Science Protocols,* 4 (2021). Retrieved from https://doi.org/10.7565/ssp.v4.5284
5. Kanjilal, B., Mazumdar, P.G., Mukherjee, M. and Rahaman, M.H. (2010) Nutritional Status of Children in India: Household Socio-Economic Condition as the Contextual Determinant. *International Journal for Equity in Health*, 9(19). Retrieved from http://dx.doi.org/10.1186/1475-9276-9-19
6. Larrea, C. & Kawachi, I. (2005). Does economic inequality affect child malnutrition? The case of Ecuador. *Social Science & Medicine* (1982). 60 (1). 165-78.
7. Mishra, P.S., & Chaurasia, H. (2020). Nutrition status and socio-economic inequality among children (0-59 Months) across different geographical regions of Uttar Pradesh, India. (ISEC Working Paper No. 507). Bangalore, India: Institute for Social and Economic Change
8. Nabarro, D. (1984). Social, Economic, Health, and Environmental Determinants of Nutritional Status. *Food and Nutrition Bulletin, 6*(1), 1-16.
9. Nabeen, A., & Akanda, M. A. (2018). Association between Economic Inequality and Under-Five Child Malnutrition: Evidence from Bangladesh Demographic and Health Survey. *Dhaka Univ. Journal of Science, 66*(1): 73-78.
10. Singh, S., Srivastava, S., & Upadhyay, A. K. (2019). Socio-economic inequality in malnutrition among children in India: an analysis of 640 districts from National Family Health Survey (2015-16). *International Journal for Equity in Health, 18*(1), 203. Retrieved from https://doi.org/10.1186/s12939-019-1093
11. UNICEF. (2020). Nutrition, for Every Child: UNICEF Nutrition Strategy 2020–2030. New York: United Nations Children's Fund. Retrieved from https://www.unicef.org/media/92031/file/UNICEF%20Nutrition%20Strategy%202020-2030.pdf.

12. United Nations Children's Fund (UNICEF), World Health Organization, The World Bank (2021). Levels and trends in child malnutrition: key findings of the 2021 edition of the joint child malnutrition estimates. Geneva: World Health Organization. Retrieved from https://apps.who.int/iris/handle/10665/341135.