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Correlates of Childhood Stunting in Manipur: Analysis from the 5th Round of the National Family Health Survey

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ABSTRACT

Background: Malnutrition represents one of the most severe public health challenges globally, affecting all population groups; however, young children are particularly susceptible due to their elevated nutritional requirements for optimal growth and development. Growth retardation, commonly manifested as stunting, serves as a key indicator of chronic undernutrition and has been incorporated as a core metric under the Sustainable Development Goals (Target 2.2).
Methods: This study utilizes data from the child recode file of the 7th round of the Demographic and Health Survey (DHS-7). The prevalence of stunting among children under five years of age was determined in accordance with the WHO Child Growth Standards, using STATA software for analysis. The study sample comprised 2,643 children below the age of five. Logistic regression analysis was employed to identify factors associated with childhood stunting.
Results: The analysis indicates that male children are significantly more likely to experience stunting compared to their female counterparts (OR = 1.38, $p < 0.01$). Maternal education emerged as a significant predictor of stunting, with children of mothers lacking formal education exhibiting a higher likelihood of being stunted compared to those whose mothers attained higher education levels (OR = 2.29, $p < 0.001$). Additional determinants of stunting included household wealth index, birth size of the child, age of the child, and the type of sanitation facilities available.

Keywords: Stunting, malnutrition, Manipur, children, wealth index, correlates.

INTRODUCTION

According to the World Health Organization, malnutrition refers to deficiencies, excesses, or imbalances in a person's intake of energy and/or other nutrients [1]. Malnutrition commonly affects all groups within a community, but infants and young children are the most vulnerable due to their high nutritional requirements for growth and development [2]. It is one of the gravest threats to public health, and children who are malnourished often experience slower behavioral and intellectual development, which may lead to intellectual disabilities and lower educational attainment in adulthood [3]. Physical growth and brain development primarily occur during early childhood, and inadequate nutrition during this critical period can have lifelong consequences for the child [4].

Approximately 45 percent of deaths among children under five years of age are attributed to undernutrition, and these deaths commonly occur in low- and middle-income countries [1]. India has one of the highest prevalences of malnutrition among children under the age of five. According to NFHS-5, the prevalence of stunting is 35.5 percent, wasting is 19.5 percent, and underweight is 33.8 percent.

Stunting refers to growth retardation or impairment that results from poor nutrition and repeated infections. Children are considered stunted if their height-for-age (HAZ) is more than two standard deviations (-2 SD) below the WHO Child Growth Standards median, while children whose HAZ is more than three standard deviations (-3 SD) below the median are considered severely stunted [5]. Stunting, a clear sign that children in the country are not developing well, is both a symptom of past deprivation and a predictor of future poverty [6]. It is associated with an underdeveloped brain and has long-lasting harmful consequences, including diminished mental ability and learning capacity, poor school performance, reduced earnings, and increased risk of nutrition-related chronic diseases such as diabetes, hypertension, and obesity later in life [7]. Stunting is widely regarded as one of the best indicators of child well-being and has been included as a key target under the Sustainable Development Goals (Target 2.2) of the World Health Organization [8].

Despite various national programs and interventions, the rate of decline in childhood malnutrition remains slow. There are many socio-economic and demographic factors that appear to be important contributors to a child's nutritional status. The state-level variation in India's nutritional indicators suggests that individual states must design nutrition policies that reflect their unique circumstances, rather than relying on a uniform national strategy [9]. This paper attempts to identify the determinants associated with childhood stunting in Manipur using data from NFHS-5.

METHODS

This paper uses the children recode file of the Demographic and Health Survey (DHS-7), a nationally representative cross-sectional survey in India. The data was requested from the Demographic and Health Survey website which was approved later, and the STATA data file of the children recode file was downloaded. The state-specific data for Manipur was extracted from the master data. The NFHS-5 sample was designed to provide estimates of key indicators at the national and state levels, as well as estimates for most key indicators at the district level. The survey collected a host of information including the background characteristics, such as age, sex, place of residence, mother's education, household characteristics, anthropometric measurement of mother and child, etc. A total of 8,042 ever-married women of age 15-49 years were interviewed. The present study will focus on childhood stunting. Hence, the data are screened for under-five children whose height and weight are available. Therefore, the study uses a sample of size 2,643 from a total of 3225 children. The sample size was weighted by the corresponding weighting factor of the subjects as given in the dataset.

The dependent variable is stunting and was grouped into two categories; stunted and not stunted. The z-score for height-for-age of under-five children was given in the DHS data. To get a single digit it was divided by 100. Children with measurement less than -2 Standard Deviation (SD) from the median of the reference population as recommended by the WHO was considered short for their age, i.e. stunted.

There are numerous risk factors associated with childhood stunting and this paper divides the variables into three categories: (i) Socio-economic variables which include ethnicity, place of residence, wealth index, mother's level of education, and religion,; (ii) intermediate factors such as size of the household, number of children in the household, source of drinking water, type of toilet facilities; and (iii) proximate factors which include BMI (Body Mass Index) of mothers, age of the child in months, sex of the child.

Mother's education was grouped into no education, primary education, secondary education, and higher education. Age of children in months was grouped into less than 6 months, 6-8 months, 9-11 months, 12-17 months, 18-23 months, 24-35 months, 36-47 months, and 48-59 months. Wealth index

of the household was divided into poorest, poorer, middle, rich, and richest. Size of the household was grouped into less than 5 members, 5-6 members, 7-8 members, and more than 9 members. Total child in the household was grouped into less than three children and more than 3 children based on literature. Source of drinking water and type of sanitation facilities were grouped into improved and unimproved based on the DHS guidelines.

The data were analyzed using STATA. Logistic regression analyses were done to assess the effects of the independent variables on stunting. Based on the categorization of the independent variables three models were constructed for the study. The first model analyses the effects of socioeconomic variables on stunting. The second one assesses the socio-economic and intermediate factors on stunting and the third model shows the impact of all the three categories of independent variables on stunting. The results of the logistic regression were presented by odds ratios (ORs) with 95% confidence interval (CI).

RESULT

Background characteristics

The background characteristics of children are presented in table 1. The proportion of stunted children in Manipur was 23.37 percent. The majority of the children surveyed were above 18 months of age. More than 60 percent of the children were from rural areas. 60.26 percent of the children were from scheduled caste families and 33.63 percent are from scheduled tribes.

64.72 percent of mothers have secondary education whereas only 7.73 percent of the children's mothers had no education. 16 percent of the children had mothers who have higher education. In terms of wealth index, 22.55 percent were from the poorest households and 17.83 percent were from the richest households. 67.96 percent of the mothers had less than three children in their household and 32.04 percent has three or more children. The majority of the households had access to improved drinking water and sanitation facilities. Regarding the nutritional status of mothers, only 5.74 percent of the mothers were under-weight (BMI<18.5kg/m^2), 61.05 percent had normal body mass index and 33.21 percent of the mothers were overweight (BMI≥25.0 kg/m^2). The percentage of households having less than 3 children in their family is 67.96 percent and 32.04 percent of families have more than three children.

Table 1: Background Characteristics

Variable	Category	Percent
Proportion of stunted children		23.37
Age	Less than 6 months	7.88
	6-8 months	5.20
	9-11 months	5.77
	12-17 months	7.92
	18-23 months	10.31
	24-35 months	18.93
	36-47 months	21.45
	48-59 months	22.54
Sex	Male	51.05
	Female	48.95
Place of residence	Urban	32.29
	Rural	67.71
Community	Caste	60.26
	Tribe	33.63
	Other	6.11
Mother's education	No education	7.73
	Primary	11.54
	Secondary	64.72

	Higher	16.01
Wealth Index	Poorest	22.55
	Poorer	20.98
	Middle	19.44
	Richer	19.21
	Richest	17.83
Household size	Less than 5	33.17
	5-6 members	41.08
	7-8 members	17.4
	9+ members	8.347
Number of children	Less than 3	67.96
	3 or more	32.04
Source of drinking water	Unimproved	27.29
	Improved	72.71
Type of toilet	Improved	61.20
	Unimproved	38.80
Mother's BMI	Underweight	5.739
	Normal	61.05
	Overweight	33.21
Duration of breastfeeding	Less than 12 months	23.07
	12-23 months	21.42
	24-35 months	20.27
	35+ months	35.24

Logistic regression analysis

Logistic regression was used to analyze the determinants of stunting in three models. Model 1 is used to estimate the socio-economic determinants of stunting. Model 2 shows the association between socioeconomic and intermediate factors and stunting. And Model 3 shows how all the independent variables are associated with stunting.

Table 2 shows the relationship between socioeconomic variables and stunting. There was a significant relationship between mother's education and stunting. For instance, as compared to mothers who have higher education, children whose mothers had no education, primary education, and secondary education were 2.31 times, 1.99 times and 2.06 times more like to be stunted respectively. Wealth index of the households was also found to be statistically significant. Children from the poorest wealth index are 1.75 times more likely to be stunted as compared to children from the richest wealth index. Children from poorer households and medium wealth index households are 1.75 times and 1.57 times more likely to be stunted than children from richest wealth index households respectively.

Table 2: Logistic regression showing the risk of socioeconomic variables on stunting

Variable	OR (95% CI)	p-value
Place of Residence		
Urban	Ref.	
Rural	0.99(0.72,1.37)	0.964
Ethnicity		
Schedule Caste	Ref.	
Schedule Tribe	1.19(0.95,1.48)	0.135
Others	1.16(0.67,2.02)	0.6
Mother's education		
Higher	Ref.	
No education	2.31(1.42,3.74)	0.001
Primary	1.99(1.25,3.15)	0.004
Secondary	2.06(1.39,3.07)	0.000
Wealth Index		

Richest	Ref.	
Poorest	1.75(1.15,2.66)	0.01
Poorer	1.75(1.18,2.61)	0.006
Middle	1.57(1.02,2.42)	0.042
Richer	1.2(0.81,1.79)	0.366
Source: Computed from DHS-7; Ref= Reference		

Table 3 shows the association between socioeconomic variables and intermediate variables with stunting. The intermediate variables include household size, number of children in the household, source of drinking water, and sanitation. However, only sanitation was found to be statistically significant as shown in table 3. Those households having unimproved sanitation facilities are 1.33 times more likely to have stunted children. The effects of mother's education and wealth index remain almost unchanged after the addition of intermediate factors in the regression analysis.

Table 3: Logistic regression showing the risk of socioeconomic and intermediate factors on stunting

Variables	**OR (95% CI)**	**p-value**
Place of residence		
Urban	Ref.	
Rural	0.96(0.68,1.34)	0.791
Ethnicity		
Schedule Caste	Ref.	
Schedule Tribe	1.03(0.8,1.32)	0.812
Others	1.15(0.66,2.01)	0.616
Mother's education		
Higher	Ref.	
No education	2.12(1.3,3.46)	0.003
Primary	1.84(1.14,2.98)	0.013
Secondary	2.06(1.33,3)	0.001
Wealth Index		
Richest	Ref.	
Poorest	1.92(1.21,3.07)	0.006
Poorer	1.92(1.23,2.99)	0.004
Middle	1.67(1.06,2.62)	0.027
Richest	1.29(0.86,1.94)	0.222
Household size		
Below 5	Ref.	
5-6 members	0.88(0.68,1.14)	0.326
7-8 members	1.11(0.82,1.51)	0.501
9 or above members	0.85(0.54,1.35)	0.493
Type of drinking water		
Improved	Ref.	
Unimproved	1.02(0.78,1.35)	0.863
Total children		
Below 5	Ref.	
5 or more	1.22(0.97,1.55)	0.094
Type of sanitation		
Improved	Ref.	
Unimproved	1.33(1.03,1.73)	0.031
Source: Computed from DHS-7; Ref=Reference		

Table 4 shows the association between all the independent variables and stunting. Of the proximal variables considered, the age of the child and sex of the child has significant effects on stunting. For instance, children aged 12-17 months are 2.29 times more likely to be stunted compared to those aged less than 6 months. And children of the age

group 18-23 months and 24-35 months are 2.85 and 2.31 times more likely to be stunted than children below the age of 6 months. Male children are 1.38 times more likely to be stunted than female children. By including the proximal variable, the total child in the household becomes significant. Households that have more than 3 children are 1.28 times more likely to have stunted children than the ones having fewer children. However, with regards to other socio-economic and intermediate factors included in table 4, mother's education, wealth index of the household, and type of sanitation were again found to be statistically significant after the inclusion of the proximal variables. The regression analysis also revealed that mother's BMI and duration of breastfeeding had no significant effect on childhood stunting.

Table 4: Logistic regression showing the risk of socioeconomic, intermediate and proximal variables on stunting

Variables	OR (95% CI)	p-value
Place of residence		
Urban	Ref.	
Rural	0.95(0.68,1.35)	0.79
Ethnicity		
Schedule Caste	Ref.	
Schedule Tribe	1.04(0.81,1.35)	0.757
Others	1.25(0.73,2.17)	0.416
Mother's education		
Higher	Ref	
No education	2.29(1.36,3.85)	0.002
Primary	1.91(1.16,3.15)	0.012
Secondary	2.07(1.34,3.18)	0.001
Wealth Index		
Richest	Ref.	
Poorest	1.87(1.14,3.06)	0.013
Poorer	1.86(1.17,2.95)	0.009
Middle	1.65(1.03,2.64)	0.038
Richer	1.35(0.88,2.07)	0.168
Household size		
Less than 5	Ref.	
5-6 members	0.86(0.66,1.12)	0.263
7-8 members	1.13(0.81,1.56)	0.473
9 or above	0.81(0.49,1.32)	0.395
Source of drinking water		
Improved	Ref.	
Unimproved	0.98(0.74,1.3)	0.909
Total children		
Less than 3	Ref	
3 or more	1.28(1.01,1.63)	0.044
Type of sanitation		
Improved	Ref	
Unimproved	1.38(1.06,1.8)	0.017
Age in months		
less than 6 months	Ref	
6-8 months	1.11(0.57,2.18)	0.754
9-11 months	1.14(0.64,2.06)	0.652
12-17 months	2.29(1.12,4.67)	0.023
18-23 months	2.85(1.46,5.55)	0.002
24-35 months	2.31(1.26,4.22)	0.007
36-47 months	1.66(0.9,3.07)	0.104
48-59 months	1.44(0.76,2.73)	0.266
Sex of the child		

Female	Ref	
Male	1.38(1.1,1.73)	0.006
BMI of mothers		
Normal	Ref	
Underweight	1.15(0.72,1.83)	0.551
Overweight	0.83(0.64,1.07)	0.15
Duration of breastfeeding		
Less than 12 months	Ref	
12-23 months	1.01(0.63,1.6)	0.978
24-35 months	0.8(0.55,1.17)	0.25
35 or more	0.93(0.67,1.29)	0.658
Source: Computed from DHS-7; Ref=Reference		

DISCUSSION

Our analysis indicates that children aged 12–17 months, 18–23 months, and 24–35 months; male children; those born to mothers with low educational attainment; belonging to poor households; and residing in areas with inadequate sanitation are significantly more likely to be stunted. Logistic regression results highlight maternal education as one of the most influential determinants of childhood stunting, aligning with prior studies [10, 11, 12]. Educated mothers tend to be more informed about child health, nutrition, hygiene, and appropriate feeding practices. Notably, our study finds that only higher education in mothers is associated with a lower risk of stunting; primary and secondary education do not appear to have a significant protective effect.

Consistent with existing literature, household wealth status also emerges as a key factor influencing stunting [13, 14, 20]. Children from wealthier households exhibit lower stunting rates, likely due to better access to nutritious food and healthcare services compared to children from economically disadvantaged families.

Age also plays a critical role, with children aged 18–23 months and 24–35 months exhibiting higher stunting prevalence than those under 6 months. This trend is supported by previous research indicating that the introduction of complementary feeding during the early years increases vulnerability to stunting [15].

Our findings also show that male children are more likely to be stunted than female children, which contrasts with several earlier studies that reported no significant sex-based differences in stunting prevalence [11, 13].

Environmental sanitation appears to have a substantial impact. Children living in households with improved sanitation facilities are less likely to be stunted than those in households with unimproved conditions. This result corroborates findings from studies in India and Indonesia, which emphasize that improved sanitation and hygienic practices are associated with lower rates of stunting [16, 17].

Additionally, families with a greater number of children are more likely to experience child stunting, which is consistent with previous findings [18, 19]. A higher number of children may strain household resources and limit the attention and care each child receives, thereby increasing the risk of undernutrition.

Conversely, our analysis finds that factors such as maternal body mass index (BMI), breastfeeding duration, overall household size, ethnicity, and place of residence do not exhibit a statistically significant association with childhood stunting.

LIMITATIONS

This study is subject to certain limitations. Notably, due to its reliance on cross-sectional data, it is not possible to establish a causal relationship between the variables under investigation.

CONCLUSION

This study underscores the multifactorial nature of childhood stunting, identifying several critical determinants that significantly influence child growth

outcomes. Key variables such as maternal education, household wealth status, child age and sex, sanitation facilities, and the number of children in a household have demonstrated a strong association with the likelihood of stunting. Conversely, factors such as maternal nutritional status (as measured by Body Mass Index), ethnicity, and place of residence did not exhibit a statistically significant relationship with stunting in our analysis.

Among the determinants, maternal education emerges as a particularly powerful factor. Children of mothers who have attained education beyond the secondary level are markedly less likely to experience stunting compared to those whose mothers have no formal education or only primary or secondary schooling. This finding reinforces the crucial role of women's education in improving child health and nutrition outcomes. Thus, policies aimed at promoting and expanding access to higher education for girls and women are not merely educational or social priorities but are also essential public health strategies.

Household economic status also plays a pivotal role. Children from wealthier families are significantly less likely to be stunted, indicating that economic inequalities translate directly into disparities in nutritional outcomes. To bridge this gap, it is imperative for policymakers to implement targeted, pro-poor interventions that enhance household food security, income stability, and access to quality healthcare for the most vulnerable populations.

Environmental conditions, particularly sanitation and hygiene, are also strongly linked to stunting. Poor sanitation increases children's exposure to infections, which can severely impair nutrient absorption and growth. Therefore, ensuring universal access to clean water, improved sanitation facilities, and hygiene education should be a public health priority. Communities should be actively engaged and empowered to adopt safe sanitary practices and improve environmental conditions.

Furthermore, the findings highlight the importance of raising public awareness about the causes and long-term consequences of childhood stunting, including its impact on physical health, cognitive development, and future productivity. Community-level education campaigns can play a vital role in shifting behaviors and promoting early prevention.

Importantly, the study emphasizes that efforts to combat malnutrition must be tailored to the specific contexts of different regions and communities. A uniform, one-size-fits-all strategy is unlikely to be effective. Instead, region-specific or state-specific approaches that take into account local socio-economic, cultural, and environmental contexts are needed to address the unique drivers of undernutrition.

In conclusion, reducing the prevalence of childhood stunting requires a holistic and multisectoral approach. This includes investments in female education, poverty reduction strategies, improved sanitation infrastructure, community-based nutrition programs, and targeted public health messaging. Only through coordinated, evidence-based, and context-sensitive interventions can we hope to make meaningful progress in addressing the persistent burden of childhood stunting.

Declaration by Authors

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REFERENCE

1. World Health Organization (15April 2020). Malnutrition. Available from: https://www.who.int/news room/questions-and-answers/item/malnutrition
2. World Health Organization (9 June 2021). Malnutrition. Available from https://www.who.int/news-room/fact-sheets/detail/malnutrition

3. Mishra CP. Malnutrition-free India: Dream or reality. Indian J Public Health 2017; 6:155-62.) `
4. UNICEF: The State of the World's Children 2019; Children, Food and Nutrition-Growing well in changing world.
5. World Health Organization (19 November 2015). Stunting in Nutshell. Available from: https://www.who.int/news/item/19-11-2015-stunting-in-a-nutshell
6. UNICEF: Key asks for 2020 SDG Voluntary National Reviews Zero Hunger. Available from: www.unicef.org/media/64241/file/sdg2_2paper_final.pdf
7. UNICEF: Stop stunting.[cited 2022 Sep 10] Retrieved from https://www.unicef.org/india/what-we-do/stop-stunting
8. NITI Aayog. [cited 2022 Sep 10]. Available from: https://www.niti.gov.in/combating-malnutrition-requires-granular-approach
9. The Lancet Child and Adolescent Health 2019; 855. https://doi.org/10.1016/S2352-4642(19)30295-0
10. Emamian, M., Fateh, M., Gorgani, N., & Fotouhi, A. (2014). Mother's education is the most important factor in socio-economic inequality of child stunting in Iran. *Public Health Nutrition, 17*(9), 2010-2015. doi:10.1017/S1368980013002280.
11. Singh H, Chaudhary V, Joshi HS, Upadhyay D, Singh A, Katyal R. Sociodemographic correlates of nutritional status of under-five children. Muller J Med Sci Res 2016; 7:44-9.
12. Sultana, P., Rahman, M.M. & Akter, J. Correlates of stunting among under-five children in Bangladesh: a multilevel approach. *BMC Nutr* 5, 41 (2019). https://doi.org/10.1186/s40795-019-0304-9.
13. Sumit Mazumdar (2010) Determinants Of Inequality In Child Malnutrition In India, Asian Population Studies, 6:3, 307-333, DOI: 10.1080/17441730.2010.512763
14. Darteh et al.: Correlates of stunting among children in Ghana. BMC Public Health 2014 14:504.
15. Linda S. Adair, David K. Guilkey, Age-Specific Determinants of Stunting in Filipino Children, *The Journal of Nutrition*, Volume 127, Issue 2, February 1997, Pages 314–320, https://doi.org/10.1093/jn/127.2.314
16. Rah JH, Cronin AA, Badgaiyan B, et al. Household sanitation and personal hygiene practices are associated with child stunting in rural India: a cross-sectional analysis of surveys. BMJ Open 2015;5: e005180. doi:10.1136/ bmjopen-2014-005180.
17. Rah JH, Sukotjo S, Badgaiyan N, Cronin AA, Torlesse H. Improved sanitation is associated with reduced child stunting amongst Indonesian children under 3 years of age. Matern Child Nutr. 2020; e12741. https://doi.org/10.1111/mcn.12741
18. Darteh, E.K.M., Acquah, E. & Kumi-Kyereme, A. Correlates of stunting among children in Ghana. BMC Public Health 14, 504 (2014). https://doi.org/10.1186/1471-2458-14-504
19. Mushtaq, M.U., Gull, S., Khurshid, U. *et al.* Prevalence and socio-demographic correlates of stunting and thinness among Pakistani primary school children. *BMC Public Health* 11, 790 (2011). https://doi.org/10.1186/1471-2458-11-790
20. Hong R, Banta JE, Betancourt JA. Relationship between household wealth inequality and chronic childhood under-nutrition in Bangladesh. Int J EquityHealth. 2006; 5:15. https://doi.org/10.1186/1475-9276-5-15.

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