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SOCIO-DEMOGRAPHIC FACTORS ASSOCIATED WITH STUNTING AMONG THE UNDER-FIVE CHILDREN IN INDIA: AN ANALYSIS OF NATIONAL FAMILY HEALTH SURVEY-V DATA

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ABSTRACT

Background: Malnutrition remains a critical public health issue in India, particularly affecting children under five, with stunting being a significant indicator of chronic undernutrition. The aim is to assess the relationship between various socio-demographic factors and the prevalence of stunting in children under five years of age in India, utilizing data from the National Family Health Survey-V.

Materials and Methods: The study utilized secondary data from the NFHS-5, which surveyed 6,36,699 households across 28 states and 8 union territories in India. The data was collected using Computer Assisted Personal Interviewing (CAPI). Statistical analysis was performed using SPSS version 22.0. The Pearson's Chi-square test was employed to assess the association between various socio-demographic factors and the prevalence of stunting, with a p-value of < 0.05 considered statistically significant.

Results: A total of 73,594 children were included in the analysis. Stunting was more prevalent in rural areas (37.3%) compared to urban areas (30.0%) and was inversely related to household wealth (44.5% in the poorest households versus 24.5% in the richest). The study also found a significant inverse relationship with maternal education and age at first birth; stunting was highest among children of mothers with no education (44.7%) and those who had their first child under 18 years of age (41.2%).

Conclusion: The study confirms that stunting in India is a multifactorial problem influenced by a combination of socio-economic and maternal characteristics. The strong associations with household wealth, residence, maternal education, and age at first birth highlight critical areas for intervention.

Keywords: Stunting, Undernutrition, National Family Health Survey (NFHS-5), Socio-demographic factors.

INTRODUCTION

Malnutrition is widely recognized as a major health problem in developing countries. Growing children in particular are most vulnerable to its consequences.[1] Malnutrition manifests itself in many different ways: as poor child growth and development,[2] According to recent estimates by UNICEF, malnutrition is the root cause of virtually half of all deaths occurring globally among children under 5.[3] Although all cause under-5 death rate in India had decreased from 2336 per 100 000 in 1990 to 801 per 100 000 in 2017, the proportion of under-5 deaths attributable to malnutrition changed only modestly from 70·4% (67·0–74·0) in 1990 to 68·2% (65·8–70·7) in 2017.[4]

The prevalence of child stunting was 39·3% in India in 2017. This prevalence was inversely correlated with the Sociodemographic index (SDI) of the states and varied 2·3 times between the states.[5]

Stunting is an indicator of past growth failure. It is associated with a number of long-term factors including chronic insufficient nutrient intake, frequent infection, sustained inappropriate feeding

practices and poverty. Stunting often results in delayed psycho-social and cognitive development and poor school performance. This in turn affects economic productivity at national level.[6]

Stunting, a result of chronic malnutrition, leads to short- and long-term negative consequences if not addressed at a young age.[7]

A growing body of literature confirms that household factors such as family wealth, sanitation and household size are among the underlying causes of malnutrition.[8] Decades of policy and programmatic efforts have been made in India to tackle the continuing challenge of malnutrition.[9] The different states in India are at varying levels of development, leading to a heterogeneous distribution of health risks and their effects.[10]

The present study used NFHS 5 data to analyze the key factors that influence stunting in India which will help to design future studies and will facilitate in policy decision-making and to assist in more specific targeting of actions to overcome child undernutrition.

Aim and objectives:

To assess the relationship between various socio-demographic factors and the prevalence of stunting in children under five years of age in India, utilizing data from the National Family Health Survey-V (NFHS-5).

MATERIALS AND METHODS

This cross-sectional study utilized secondary data from the National Family Health Survey-5 (NFHS-5), a nationally representative survey conducted under the Demographic and Health Surveys (DHS) Program. The DHS Program's data is widely used for public health research. Due permission was obtained for the extraction of the required data. The study population comprised 232,920 children under five years of age.

Data Source: This study is a secondary data analysis using data from the National Family Health Survey-V (NFHS-5). NFHS-5 is a large-scale, multi-round survey conducted in India that provides data on health, family welfare, and other indicators. The NFHS-5 data was collected in two phases: Phase I was from June 17, 2019, to January 30, 2020, and Phase II was from January 2, 2020, to April 30, 2021.

Study Population: The NFHS-5 surveyed 6,36,699 households across 28 states and 8 union territories in India. For this specific analysis on stunting, the study population were a subset of the total survey participants consisting of 73,594 children up to 5 years of age belonging to 2,32,920 household were included in the final analysis.[11]

Definition of Stunting,[12]

Stunting, an indicator of chronic undernutrition, was defined as having a height-for-age measurement more than two standard deviations below the WHO growth reference (Height-for-Age Z-score < -2). Stunting is linked to long-term negative consequences, such as poor cognitive development and reduced economic productivity.

This standardized methodology, utilizing the WHO's Child Growth Standards with large-scale national panel data, is consistent with approaches used in other multi-country analyses of undernutrition in the developing world.[13]

Sampling Method: A uniform sample design, representative at the national, state/union territory, and district levels, was used for the NFHS-5. The sampling was a two-stage process.

- **First Stage:** Rural areas were stratified into sub-strata based on village population and the percentage of scheduled castes and scheduled tribes (SC/ST). Primary Sampling Units (PSUs), which were villages in rural areas and Census Enumeration Blocks (CEBs) in urban areas, were selected.
- **Second Stage:** From a newly created list of households, 22 households per cluster were selected using an equal probability systematic selection method.

A total of 30,456 PSUs from 707 districts were selected, with fieldwork completed in 30,198 PSUs.

Data Collection: Data for the NFHS-5 was collected by 1,061 field teams using Computer-Assisted Personal Interviewing (CAPI) on mini-laptops. The field teams consisted of a field supervisor, three female interviewers, one male interviewer, two health investigators, and a driver. The data was collected in 18 local languages.

NFHS-5 fieldwork for India was conducted in two phases—covering 11 states and 3 UTs — by 17 Field Agencies and gathered information from 6,36,699 households, 7,24,115 women, and 1,01,839 men.[11]

Data Extraction: The variables selected for analysis were based on the sociodemographic determinants of stunting in children, which have been identified as key factors influencing chronic undernutrition such as place of residence, religion, occupation, education of parents, number of living children, age at 1st birth of child, interval of birth of Child after marriage, socioeconomic status etc. Data for these variables were recoded as required for the analysis

Statistical Analysis: The collected data was analyzed using the SPSS statistical package version 22.0. The Pearson's Chi-square test was used to assess the association between various socio-demographic factors and the prevalence of stunting. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Demographic profile of population: The survey included households predominantly located in rural areas 79.7% while 20.3% in the urban areas. Majority families (73.4%) belonged to Hindu religion, 14.4% Muslim, 8.1% Christian, 1.8% Sikh, 1.0% Buddhist/Neo-Buddhist and remaining 1.3% other religions. According to ethnicity majority (79.5%) of families belong to any caste, 15.4% tribes, 5.1% did

not mention any caste/tribe. Majority (45.4%) of households have 2 to 5 members followed by 38.1% households with 6 to 8 members and 15.8% with 9 or more family members.

84.8% families were headed by males, 15.2% by females. The age of HOF in 50% of the households were below 45 years, in 14% households the age was 65 years an above. (Figure-1) The association of stunting with age and sex of HOF was found to be statistically significant [Tabel-1A]

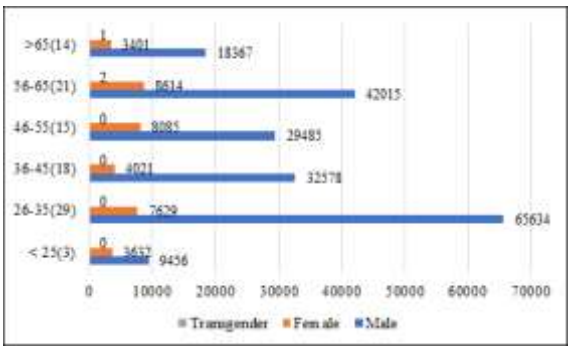

Figure 1: Age and Sex wise distribution of HOF (N=232920)

In 50.2% the relationship of respondents to the HOF were as head himself, wife or husband, in 46.6% it was son/daughter/daughter-in-law and in remaining 3.2% the respondents were grandchildren, brother/sister/ relative etc.

Out of total, 51.5% of the respondents have education at secondary level, 13.6% at higher, 12.9% of primary education and 22.0% have no education. The distribution of respondents according to their occupation: 75.2% were not working, agricultural 13.6%, 4.2% skilled and unskilled manual, 2.1% Professional / technical / managerial, 2.0% Services / household and domestic, 1.5% sales, 0.3% clerical, 1.1% others.

In majority (43.2%) of the households there was one child in the age group of under 5 children, 37.9% with 2 children, 11.0% with 3 children, in 3.2% of households there were more than 4 children and in 4.8% there were no under 5 children available at the time of survey.

Husband/partner's profile (N=35581, 15.3% of total): According to educational status of husbands, the majority (55.5%) were educated up to secondary level, 15.6% up to higher, 13.0% up to primary level, 15.5% have no education and 0.4% did not know their educational status.

Age distribution of husband/partner were 61.9% in the age group of 25 to 34 years followed by 19.0% in the age group of 35-39 years, 9.7% among 40 to 49 years and 1.0% of aged 50 years and above (both inclusive).

According to occupation, majority (55.8%) were skilled and unskilled manual, 9.3% were professional/technical/managerial/clerical, 11.3% in own shops and sales, 9.2% in services/household/domestic, 12.7% working as cultivator/farmer, 0.6% not working, while 1.2% no response.

Women profile: Out of total 2,32,920 respondents, 16,578 (7.1%) of women were currently pregnant during the survey period.

According to number of births in last five years, majority (54.3%) of women gave birth to one child followed by 38.4% with two children, 6.8% with three children and 0.4% of women have given birth to four children.

Marriage to First Birth Interval [Figure 3]

The time interval between marriage and the first birth shows a clear pattern. The highest percentage of women had their first child between 12 and 24 months of marriage (40.9%). A significant proportion (20.3%) had their first child within 12 months, and 19.4% had their first child between 24 and 36 months of marriage. This data provides context for the age at first birth, showing that a majority of women begin their families relatively soon after marriage.

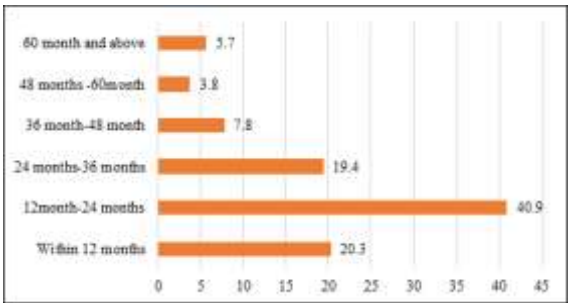

Figure 2: Marriage to first birth interval(in percentage)

Maternal and Individual Characteristics: Individual factors, particularly those related to the mother, are strongly correlated with child stunting. A woman's educational attainment showed a significant inverse relationship with stunting prevalence; children of mothers with higher levels of education had lower rates of stunting compared to those with no education (24.0% vs. 44.7%). This is likely because educated mothers have greater awareness of health and nutrition practices.

Children profile: Of the total 2,32,920 children, 51.8% were males and 48.2% females. Out of total, 10.3% were in the age group of 0-5 months, 9.7% in 6-11 months, 19.5% in 12-23 months and 60.4% in age group of 24 to 59 months.

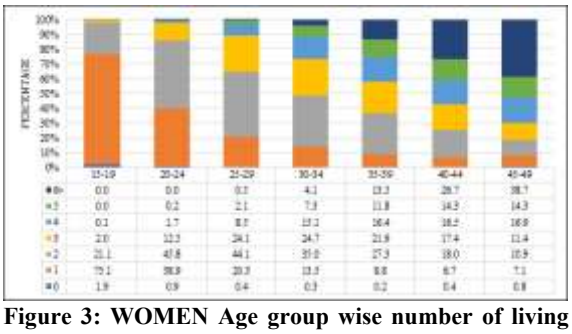

Figure 3: WOMEN Age group wise number of living children (IN PERCENT) INCLUDING THE current pregnancy(grouped)

The [Figure 3] illustrates a clear pattern: as women's age increases, the number of living children they have also increases. Younger women (15-24) predominantly have one or two children, while older women (40-49) are more likely to have four or more children.

Table 1: A Socio-demographic factors associated with Stunting.

Variable		Stunting [73594 (35.8)]	Pearson Chi square with p-value	
Age of HOF	< 25 (3)	4757 (41.2)	769.573	0.000
	26-35 (29)	25157 (38.6)		
	36-45 (18)	11627 (36.0)		
	46-55 (15)	11299 (34.3)		
	56-65 (21)	14560 (32.7)		
	>65 (14)	6194 (32.3)		
Sex of HOF	Male	61858 (35.5)	65.945	0.000
	Female	11736 (37.5)		
Number of Household members	2	32811 (35.0)	66.736	0.000
	3	28917 (36.5)		
	4	11866 (36.4)		
Religion	Hindu	54290 (36.0)	394.228	0.000
	Muslim	10513 (35.8)		
	Christian	6221 (36.5)		
	Other	2570 (30.7)		
Educational attainment (V149)	No education	20047 (44.7)	4418.927	0.000
	Incomplete primary	11100 (41.7)		
	Incomplete secondary	34614 (33.7)		
	Complete secondary	1144 (31.0)		
	Higher	6689 (24.0)		

Table 1B: Socio-demographic factors associated with Stunting

Variable		Stunting [73594 (35.8)]	Pearson Chi square with p-value	
Wealth index (V190)	Poorest	22311 (44.5)	4459.221	0.000
	Poorer	17675 (39.1)		
	Middle	14101 (34.8)		
	Richer	11175 (31.2)		
	Richest	8332 (24.5)		
Type of residence (V025)	Urban	12364 (30.0)	809.513	0.000
	Rural	61230 (37.3)		
Respondents age (V013)	15-19	1638 (34.6)	338.06	0.000
	20-24	21354 (36.5)		
	25-29	29094 (35.6)		
	30-34	14069 (34.8)		
	35-39	5633 (36.1)		
	40-44	1415 (38.5)		
	45-49	391 (40.6)		
Age of Respondent at 1st Birth (V212)	<18	17150 (41.2)	1412.972	0.000
	18-23	41708 (36.4)		
	24-29	12761 (30.1)		
	30-34	1673 (27.8)		
	≥35	302 (26.9)		

[Table 1A & 1B] also shows a significant inverse relationship between a mother's age at her first birth and the prevalence of stunting in her child. Stunting is most prevalent (41.2%) among children whose mothers were under 18 years old at the time of their first birth. This rate decreases steadily as the mother's age at first birth increases, dropping to 26.9% for mothers who had their first child at or after age 35.

This finding suggests that delaying the first pregnancy to an older age is associated with a lower risk of stunting for the child. This is likely due to the mother being more physically mature, better educated, and having greater access to resources, which are all factors that contribute to better nutrition and care for the child.

DISCUSSION

The present study, which utilized data from the National Family Health Survey-V (NFHS-5), aimed to assess the socio-demographic factors associated with stunting in India. The findings reveal a significant and complex relationship between a child's nutritional status and their household's socio-economic and demographic characteristics. These results are largely consistent with a growing body of evidence highlighting the multifactorial nature of stunting.[7,8]

One of the key findings is the significant association between stunting and several household characteristics. The age and sex of the Head of Family (HOF) were found to be statistically significant factors, as was the number of household members. A similar study in Uganda found that most households had five or more members, with a small proportion being female-headed, which aligns with the demographic profile observed in this NFHS-5 data.[12] The study's findings also indicate a significant association between stunting and a household's wealth index, with lower prevalence in

wealthier households. This is a well-established trend in nutrition research, as family wealth directly impacts access to nutritious food, sanitation, and healthcare.[8]

Furthermore, the study highlights a strong correlation between stunting and individual characteristics, such as the educational attainment of the respondent, their age, and their age at first birth. The data shows that the prevalence of stunting was lower among individuals with higher levels of education.[5] This is likely due to a greater awareness of health and nutrition practices. The association with the type of residence (urban or rural) also indicates that geographical location and its corresponding socio-economic infrastructure play a crucial role in determining nutritional outcomes.[5,10]

The results of this study underscore the need for targeted policy decisions and interventions. By identifying specific socio-demographic determinants of stunting, such as low educational attainment and household poverty, policymakers can develop more effective programs to combat child undernutrition in India.[9] The findings provide a robust basis for future research and programmatic efforts aimed at addressing the root causes of malnutrition and improving the overall health of children in India.

There is no one-size-fits-all solution for addressing stunting. Rather, a multisectoral approach is required, which includes improvements in household conditions, maternal factors, and health and nutrition interventions such as antenatal care, skilled birth attendance, and immunization. Successful programmatic efforts are further enabled by a supportive political and societal environment, which can drive positive change in preventing stunting among children.[14]

Stunting is a cyclical process because women who were themselves stunted in childhood tend to have stunted offspring, creating an intergenerational cycle of poverty and reduced human capital that is difficult to break.[15]

These findings are consistent with existing literature, such as a similar study in Uganda that also found a correlation between household characteristics and stunting. This research provides valuable insights for policy-making by identifying key socio-demographic determinants of stunting. The results can assist in designing future studies and implementing targeted interventions to effectively combat child undernutrition in India.

CONCLUSION

The study confirms that stunting in India is a multifactorial problem influenced by a combination of socio-economic and maternal characteristics. The strong associations with household wealth, residence, maternal education, and age at first birth highlight critical areas for intervention. Strengthening policies aimed at improving girls' education, delaying age at first pregnancy, enhancing household living conditions, and ensuring equitable access to nutrition and health services are critical to reducing stunting.

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