



Impact of Socio-Economic Factors on the Immunization and Nutritional Status of Under-Five Children in India

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Abstract

Background: The nutritional and immunization status of children under five are crucial factors in shaping the future health of India. This study aims to examine the immunization and nutritional status of children under five in India, with a focus on understanding the key challenges and areas for improvement.

Method: The study utilizes data from the National Family Health Survey (NFHS), 2019–2021, focusing on a sample size of 636,699 households across India. The nutritional status of children is assessed using standard anthropometric indicators such as weight-for-age (WAZ) and height-for-age (HAZ). Immunization coverage is evaluated by examining polio, DPT, BCG, and measles vaccinations.

Result: The findings underscore the need for targeted policies, infrastructure investments, and societal reforms to address issues like gender inequality and promote inclusive economic growth. India must focus on improving child health and nutrition, taking into account the disparities between regions and socio-economic groups. The data suggests that while some progress has been made, significant gaps remain in achieving full immunization coverage and improving nutritional outcomes for children under five.

Conclusion: The study finds that children under five in India still face major issues with undernutrition and incomplete immunization. Despite some progress, many children lack proper nutrition, mainly due to socio-economic and regional inequalities. While education and wealth improve child health, India needs to strengthen efforts in boosting immunization and addressing nutrition gaps. Focused policies and investments are needed to improve children's health, which is vital for India's future socio-economic growth.

I. Background

Malnutrition silently undermines India's economy and human development, as children are the foundation of the future generation. Ensuring proper nutrition for children is vital for the nation's growth. Indicators like child weight and height reflect India's human capital and population health. Organizations like UNICEF work in India to strengthen community health systems, improve disease surveillance, and enhance supply chains, helping children receive necessary protection. Vaccination plays a key role in improving child health, reducing diseases like polio and measles, and enhancing the overall well-being of children.

In India, vaccinated children not only gain protection from diseases but also experience improved nutrition, leading to better educational outcomes and long-term economic benefits for their communities. Vaccines are one of the most effective tools for advancing national welfare. The 2021 Global Hunger Index ranked India 101st out of 116 countries, with a score of 27.5, based on indicators like child mortality, undernourishment, wasting, and stunting.

India has implemented policies such as the National Immunization Programme (NIP) and Integrated Child Development Services (ICDS) to address malnutrition and improve immunization rates. Child development is influenced by various factors, including socioeconomic conditions, cultural practices, and living standards, which vary across the country. To meet the "Hunger-reduction target" under SDG 2, it is estimated that US\$39–50 billion will be needed annually until 2030. Investing in nutrition is crucial for India's socio-economic future, as it can generate significant economic gains while reducing child mortality and improving health outcomes across the nation.



Research Questions

- What percentage of under-five children in India are suffering from undernutrition?
- What is the status of immunization among under-five children in India?
- What are the key factors influencing the immunization and nutritional status of children in India?
- How does the socioeconomic background of mothers in India affect their children's immunization and nutritional status?

II. Method

Study Area and Population

This study uses data from the India's National Family Health Survey (NFHS-5) 2019–2021, which provides valuable information on various demographic and socio-economic factors affecting children aged 0–59 months and women of different age groups. The NFHS-5 data offers insights into key health indicators such as child nutrition, immunization, and maternal health, helping to analyze the current status and challenges related to child development in India. This dataset is essential for understanding the socio-economic disparities and regional variations that impact children's health outcomes across the country.

Data Collection Procedures

The fieldwork of NFHS-5 in India is conducted in two different phases. Phase one ended on 30 January 2020 as it started from 17 June 2019 and phase two, ended on 30 April 2021 as it started from 2 January 2020, divided the work between the 17 Field Agencies and collected information from total of 636,699 households, 724,115 women and 101,839 men. Fact sheets are also available separately for each state/UT and district of India. The respondents help to give information on the demographic and socio-economic factors of men and women.

Measurement of Nutritional and Immunization Status

Malnutrition in Child examined using the standard indicators of anthropometric weight-for-age (WAZ) and height-for-age (HAZ), which are used as a child malnutrition proxy. Underweight is defined as low weight for age, while stunting is low height for age. Among these variables of child immunization, DPT, measles, polio and BCG vaccinations are mainly considered.

Outcome Variable

The dependent variables of this study are child immunization and nutritional variable status. The status of immunization of measles, DPT, BCG, and polio are measured under the binary values of 1 for yes and 0 for No, where yes implies the positive variable and indicates that the vaccines have been taken whereas no indicates the negative variable and indicates that the vaccines have not taken.

Independent Variable

The study's independent variable is its six socioeconomic and demographic factors. These are the mother's educational attainment, residential pattern, mother's occupation, religion, wealth index, and number of children. The variables are selected based on the previous studies and NFHS-5 of 2019–2021.

Statistical Analysis

The distribution of frequency helps to identify the prevalence of nutritional and immunization status. The regression of multiple binary logistic models is used to find several factors which are associated with children's immunization and nutritional status. $p < 0.05$ values which mainly considered under the statistically significant analysis. These statistical analyses were performed by using SPSS.

III. Result

Table 1: Under-Five Children's Nutritional Status Frequency Distribution of India by Demographic and Socio-Economic Factors

Socio-economic and Demographic Variables	India		
	Gender		
	Women	Men	Total
Education			
Secondary education	70	72	
Occupation			
Working	32.6	76.8	
Wealth Index			



Poor			4.36
Non-poor			1.43
Mortality Rate			
Under-5/ Mortality rates			42

Source: SPSS

The data reveals notable differences in secondary education attainment between genders and countries. In India, secondary education completion rates are relatively balanced between women (70%) and men (72%). This indicates a commendable effort towards gender parity in

education at the secondary level. However, despite the near parity, the rates could still be improved to ensure that a larger portion of the population receives at least a secondary education, which is crucial for personal and economic development.

Table 2: Regression Statistics of Morality vs Wealth

<i>Regression Statistics</i>	
Multiple R	0.658566461
R Square	0.433709783
Adjusted R Square	0.150564675
Standard Error	7.193383666
Observations	4

Source: MS Excel

The relatively low workforce participation of women in India, at 32.6% compared to 76.8% for men, underscores the significant gender gap in employment. This disparity highlights persistent socio-cultural and structural barriers faced by Indian women when entering and remaining in the workforce. Factors contributing to this gap include workplace discrimination, traditional gender roles, limited job opportunities, and lack of access to childcare.

To address these challenges, comprehensive policies are needed to support women's employment. These could include measures such as combating workplace discrimination, offering flexible working hours, providing maternity benefits, and promoting initiatives that encourage gender equality in the workforce.

Additionally, the statistical analysis shows that the Wealth Index (p-value 0.341) does not have a significant linear relationship with the mortality rate in the sample, as the p-value exceeds the conventional significance level of 0.05. This suggests that, within this specific dataset, wealth alone may not directly influence child mortality, pointing to the need for a broader understanding of the factors affecting health outcomes in India.

Table 3: Regression Statistics of Morality vs Occupation

<i>Regression Statistics</i>	
Multiple R	0.247241
R Square	0.061128
Adjusted R Square	-0.40831
Standard Error	9.262257
Observations	4

Source: MS Excel

In India, the workforce participation rate for women is significantly lower at 32.6%, compared to 76.8% for men. This substantial gender gap underscores the socio-cultural and structural barriers that women encounter when trying to enter and remain in the labor market. India's lower rate indicates less effective cultural factors and labor policies that support women's employment. To enhance female workforce participation in India, efforts must focus on improving job opportunities for women. This can be achieved by providing vocational training and ensuring safe, supportive work environments that encourage women to engage in the workforce. Additionally, the statistical analysis shows that neither the Occupation variable (p-value 0.753) nor the intercept (p-value 0.080) are statistically significant at the conventional level of 0.05. This suggests that, within this limited dataset, occupation does not have a significant impact on the



mortality rate, highlighting the need for a more comprehensive analysis of the factors influencing health outcomes in India

Table 4: Regression Statistics of Morality vs Education

Regression Statistics	
Multiple R	0.906951
R Square	0.822561
Adjusted R Square	0.733841
Standard Error	4.026599
Observations	4

Source: MS Excel

In India, only 1.43% of the population is classified as non-poor, while 4.36% is categorized as poor. This imbalance raises concerns about the data collection and presentation processes, as the low percentage of the non-poor category prompts questions regarding the criteria for classification and the distribution of the socio-economic population.

Accurate wealth index data is crucial for designing effective poverty alleviation programs and economic policies. Clear classification helps identify target groups in need of economic assistance, enabling more efficient resource allocation.

In terms of education's impact on mortality rates, the analysis reveals that the Education variable (p-value 0.093) and intercept (p-value 0.437) are not statistically significant at the 0.05 level. While education shows some influence on mortality rates, it is not strong enough to be deemed significant in this sample.

Regarding child health, India has an under-five mortality rate of 41 for boys and 42 for girls, indicating gender disparity. High mortality rates are linked to inadequate healthcare services, malnutrition, poor maternal health, and limited access to sanitation and clean water. To reduce these rates, India needs a comprehensive healthcare strategy that prioritizes child and maternal health, improves healthcare infrastructure, and ensures access to essential services for all segments of the population.

The analysis also highlights a strong positive correlation (0.907) between education and mortality rates, suggesting that higher education levels may be associated with higher mortality rates due to confounding factors not accounted for in the data. Additionally, there is a positive correlation (0.613) between education and the wealth index, indicating that higher education levels are typically

linked to better economic status. Conversely, a moderate negative correlation (-0.359) exists between education and occupation, suggesting that higher education may delay entry into the workforce.

Moreover, the positive correlation (0.513) between occupation and the wealth index suggests that employment significantly contributes to economic well-being, while a weak negative correlation (-0.247) indicates that higher employment rates are slightly associated with lower mortality rates. Interestingly, a moderate positive correlation (0.659) between the wealth index and mortality rate suggests that wealthier populations may face unique health risks or reporting biases.

IV. Discussion and Analysis

The results indicate that parents' education, particularly the mother's level of education, positively influences a child's immunization and health status. In India, the completion rates for secondary education are relatively balanced, with women at 70% and men at 72%, reflecting progress toward gender parity in education. However, these figures also highlight that a significant portion of the population still does not complete secondary education (DHS Program, 2022). This gap identifies potential areas for policy intervention, such as improving access to education in rural regions, providing scholarships and financial incentives to reduce dropout rates, and enhancing the overall quality of education to help retain students.

Workforce participation data reveals significant gender disparities in India. Only 32.6% of women are engaged in the workforce compared to 76.8% of men. This stark difference underscores the socio-cultural and structural barriers women face, including traditional gender roles, a lack of childcare facilities, limited job opportunities, and workplace discrimination. Addressing these issues requires comprehensive policies that support women's employment, such as flexible working hours, enhanced maternity benefits, and initiatives to combat workplace discrimination (DHS Program, 2020). Additionally, shifting societal attitudes to recognize and value women's economic contributions is crucial.

The wealth index data in India presents some inconsistencies, with 4.36% of the population classified as poor and only 1.43% as non-poor. This imbalance may suggest issues with data presentation or collection (Bangladesh.uz, 2024). The low percentage of the non-poor category raises questions about the criteria for classification and the socio-economic distribution of the population. Accurate



wealth index data is essential for designing effective poverty alleviation programs and economic policies, enabling better identification of target groups in need of assistance and more effective resource allocation.

The under-five mortality rate serves as a critical indicator of healthcare quality and overall socio-economic conditions. In India, reducing these rates necessitates comprehensive healthcare strategies focusing on child and maternal health, ensuring access to essential services, and improving healthcare infrastructure (ncbi.nlm.nih.gov, 2024). Addressing these challenges is vital for enhancing child health outcomes and overall socio-economic well-being.

V. Conclusion

The study highlights the critical role that demographic and socioeconomic factors play in influencing children's immunization and nutritional status in India. Despite some progress, India continues to face significant challenges in these areas, with immunization and nutritional outcomes lagging behind those in neighboring countries. India must intensify its focus on child nutrition policies and programs. Additionally, reducing unemployment among mothers and improving the wealth index can significantly contribute to better nutritional status for children under five. The Indian government is urged to strengthen existing health policies and create new initiatives that specifically target improvements in children's immunization and nutritional status. This may involve expanding access to healthcare services, enhancing community awareness programs, and implementing targeted interventions that address the unique challenges faced by families in various socioeconomic strata. By prioritizing these areas, India can work towards ensuring healthier futures for its children, which is essential for the nation's overall development and progress.

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