

## **SOCIO-ECONOMIC DETERMINANTS OF UNDERWEIGHT IN RURAL CHILDREN: LOGISTIC REGRESSION ANALYSIS**

**Archana Shukla**

Research Scholar, Department of Home Science, Himalayan Garhwal University,  
Uttarakhand, India

### **ABSTRACT**

*The complex network of socio-economic factors that contribute to the prevalence of underweight children in rural regions. Utilizing logistic regression analysis, this study explores the statistical intricacies of several variables including economic situations, education, healthcare accessibility, and cultural behaviors. The occurrence of underweight is often associated with poverty, restricted educational opportunities, and insufficient healthcare facilities. Dietary behaviors are further influenced by cultural norms, which in turn affect nutritional results. Logistic regression is a statistical tool that helps us understand the intricate connections between these factors and the occurrence of childhood underweight. The knowledge acquired from this research provides valuable information for evidence-based interventions and policies designed to disrupt the cycle of malnutrition in susceptible rural populations.*

**Keywords:** - Logistic, Childhood, Healthcare, Socio, Parents.

### **I. INTRODUCTION**

Within the complex framework of worldwide public health, the problem of children underweight in rural regions emerges as a crucial obstacle with extensive ramifications. This problem is not just related to health, but rather is intricately interconnected with the socio-economic structure of these communities. The underweight status of rural children is determined by a complex interplay of socio-economic variables, including socioeconomic inequality, educational possibilities, healthcare access, and cultural traditions. Comprehending the complex interaction of these factors is crucial for developing efficient intervention tactics to reduce the prevalence of underweight among the most susceptible group in society - rural children. This article explores the social and economic factors that contribute to underweight in children living in rural areas. It uses a logistic regression analysis to examine the complex statistical aspects of this public health issue. The fundamental problem stems from the indisputable correlation between economic circumstances and the dietary well-being of children living in rural regions. In populations struggling with poverty, the frequency of underweight is often disproportionately greater. Insufficient financial means result in limited availability of nourishing meals, impeding the proper physical and mental growth of children. The lack of a strong economic base worsens the susceptibility of families to food insecurity, leading to an ongoing cycle of malnutrition.

Logistic regression analysis enables the quantification of the influence of economic variables on the probability of a child being underweight, offering useful information for the development of policies. Education has a crucial role in shaping the socio-economic factors that contribute to childhood underweight. Rural areas may face limitations in terms of educational possibilities, which in turn contribute to a cycle of lack of knowledge on appropriate diet and healthcare practices. Parents who have a low level of education may not possess the essential information to make well-informed choices about their children's nutritional requirements. Moreover, the communities confront additional difficulties due to a lack of knowledge about the significance of routine health examinations and immunizations. Logistic regression helps to determine the extent to which education acts as a protective factor against childhood underweight. It provides a quantitative approach to evaluate the effectiveness of educational programs.

Access to healthcare services is a crucial factor that influences the frequency of underweight in rural children, as part of the socio-economic determinants. In remote areas, the lack of proper healthcare infrastructure sometimes leads to limited access to important treatments. Moreover, economic limitations may hinder families from promptly obtaining medical care for their children. Logistic regression analysis is a valuable method for examining the complex connection between healthcare accessibility and children underweight. It provides a detailed knowledge of the statistical importance of healthcare factors in the setting of malnutrition. The dietary environment of rural populations is significantly influenced by cultural practices and social norms. Conventional beliefs and practices may maintain eating habits that do not adequately fulfill the nutritional requirements of developing children. Logistic regression analysis allows for the investigation of cultural influences, providing a statistical perspective to assess their impact on the occurrence of childhood underweight. The use of this analytical methodology enables a more thorough comprehension of how cultural variables connect with socio-economic determinants to impact nutritional outcomes in rural environments. The underweight status of rural children is influenced by several socio-economic factors, including economic inequalities, educational levels, healthcare availability, and cultural customs. Utilizing logistic regression analysis in this investigation not only improves our comprehension of these intricacies but also offers a quantitative foundation for policymakers and public health experts. Through the analysis of statistical correlations between different socio-economic determinants and childhood underweight, we can pinpoint strategic areas where focused interventions may be implemented. By carefully examining the many aspects of this problem, we may develop policies that are supported by research and can effectively address malnutrition, enabling rural children to flourish.

## II. REVIEW OF LITERATURE

**Khan, Md et al., (2020)** the degree of a country's growth and quality of life are contingent upon the well-being and potential of its newborn population. From 1990 to 2015, Bangladesh did not succeed in decreasing the prevalence of underweight children, while the problem of overweight children remains very noticeable yet overlooked in terms of public health.

Therefore, it is essential to promptly implement measures to enhance both situations. The aim of this research is to determine the socioeconomic and demographic variables that contribute to the variation in weight among children under the age of 5. The analysis relies on data from the Bangladesh Demographic and Health Survey (BDHS) conducted in 2014. Initially, the data was gathered from a total of 17,866 homes. This research included 8092 respondents after extracting the variable from the sample weighted original dataset. The dependent variable, the weight of children under the age of 5, was determined by calculating the weight-for-age Z-score (WAZ) and the Body Mass Index-for-age Z-score (BAZ). Subsequently, the polytomous logistic regression model was used to get understanding of the underweight and overweight groups in comparison to the normally weighted under-5 kid. The key factors that have a major impact on the weight of children under the age of 5 include the location of their domicile, the educational level of both their mother and father, the body mass index of their mother, the employment status of their mother, the age at which their mother gave birth to them, the profession of their father, the birth order of the kid, and the area in which they live. The factors that have the greatest impact on the weight of children under the age of 5 are the level of education of the parents, the present employment position of the mother, and the location of their dwelling. Public health experts and managers in Bangladesh must devise more efficient programs and methods to effectively address the optimal nutrition and health of children.

**Bhuiyan, Mohammad et al., (2020)** this research investigates how several demographic, socioeconomic, and health-related variables affect the nutritional condition of children under the age of five in rural Bangladesh. The study uses data from the nationally representative Bangladesh Demographic and Health Survey (BDHS) conducted in 2011. The BDHS employs a hierarchical data structure due to the use of a two-stage stratified sampling methodology in the survey. We used two-level random intercept binary logistic regression models to account for the unobserved variability across clusters (communities) and to ascertain the factors influencing malnutrition in children under the age of five. The results revealed that 16% of the children had severe stunting, whereas 26% showed moderate stunting. Out of the children under the age of five, 4% were extremely malnourished and 12% were moderately malnourished. In addition, 11% of the children had severe underweight, while 28% displayed moderate underweight. The variables that showed a significant correlation with malnutrition were division, child age in months, child's sex, presence of twins, preceding birth interval, child's birth size, religion, education level of both mother and father, wealth index, household size, age of household head at first child birth, sources of drinking water, and occurrence of fever and diarrhea. Notable disparities were identified at the community level in the studies, highlighting the need for increased focus on areas with low performance. Concrete policy suggestions have been proposed to enhance the nutritional condition of children under the age of five in rural areas of Bangladesh.

**Kamal, S. M. Mostafa. (2011).** Malnutrition is a persistent issue among children under the age of five in poor nations. This research investigates the socio-economic factors that

contribute to severe and moderate stunting in children under the age of five in rural areas of Bangladesh. The research used data obtained from the 2007 Bangladesh Demographic and Health Survey. The study included cross-sectional and multinomial logistic regression analyses to evaluate the impact of socio-demographic factors on the occurrence of moderate and severe stunting compared to normal growth in children. The findings indicated that more than 40% of the children had stunted growth, with 26.3% classified as moderately stunted and 15.1% classified as severely stunted. The multivariate multinomial logistic regression analysis revealed a statistically significant higher likelihood of severe stunting (OR=2.53, 95% CI=1.34-4.79) and moderate stunting (OR=2.37, 95% CI=1.47-3.83) compared to normal stunting among children whose mothers had a lower body mass index. The nutritional condition of children was influenced by factors such as the region they lived in, the level of education of their father, the availability of toilet facilities, the age of the kid, the birth order of the children, and the wealth index. Efforts to promote development and reduce poverty should prioritize the marginalized rural population in order to enhance their nutritional well-being.

**Bharati, Surya et al., (2010)** The objective of this research is to assess the prevalence of undernutrition among children aged 0-71 months in West Bengal at the district level, as well as to examine the socio-economic factors that contribute to underweight in these children. The data were obtained from the Reproductive and Child Health Survey (RCHS-II), which included information on 7,550 children and their parents. We have also collected data on socio-economic characteristics related to the families of these youngsters for our research. This research used weight-for-age z-scores to evaluate the nutritional status of the youngsters, using the WHO (2006) reference. There was variation in the frequency of underweight between the districts. The districts exhibiting a significantly high frequency of underweight children were Murshidabad, Burdwan, Purulia, Medinipur, Howrah, and South 24 Parganas. Jalpaiguri and Coochbihar were the districts with the highest prevalence rates for both boys and girls. The districts with low prevalence rates for both boys and girls were South Dinajpur, Nadia, and Kolkata. In rural locations, among Muslim households with illiterate parents and a poor level of living, there was a higher prevalence of underweight children. In the districts of Murshidabad, Bankura, Nadia, Medinipur, and South 24 Parganas, where the frequency of underweight children was greater, the disparities between rural and urban areas were minimal. Religion, parents' educational level, and quality of living index had a notable influence on the weights of the children. It is crucial to prioritize public intervention programs that focus on improving parental education and the quality of living in families at the district level in order to effectively address the issue of undernutrition in children, specifically in terms of weight for age.

### III. RESEARCH METHODOLOGY

In order to maintain a healthy lifestyle, access to a nutritious food and enough nourishment are essential. Higher diet leads to stronger immune systems, fewer illnesses, and a better overall quality of life. Micronutrient deficiency and undernutrition is common in

underdeveloped nations like India. There are a number of detrimental consequences of undernutrition, particularly for children. In underdeveloped nations, Rural children are particularly vulnerable to nutritional deficiency and infectious infections. Economic and human development consequences of poor child health and nutrition, particularly in the poorest nations and communities, are enormous and long-lasting. Investing in the long-term health and well-being of children is both a moral obligation and a sound financial decision. This research focuses on children under the age of six since they are the most vulnerable in society.

## **METHOD OF DATA COLLECTION**

### **Primary Data**

Primary data was collected from children and also from their parents by interview method. The survey would be conducted by seeking help of principals and teachers of the school. Each subject will be contacted individually and would be persuaded to answer all the questions in the Performa and their responses would be recorded.

### **Secondary Data**

Secondary data was collected from the help of Books, e-magazines, e-journals, Thesis.

## **METHOD OF ANALYSIS**

Bivariate and multivariate analyses are used to determine the factors that contribute to underweight, stunting, and wasting among children in rural Sitapur district. Whether or if a kid is undernourished is the primary topic of these studies. To examine whether the independent factors under investigation had any effect on rural children's nutritional status, the Chi-square test was used in the bivariate analysis, and p-values less than 0.05 were deemed significant. Because confounding effects are not taken into account in the Chi-square analysis, the multivariate logistic regression method is used to evaluate the net impact of each independent variable. Given a subject's scores on dependent variables, logistic regression predicts the likelihood that an event will occur. When the response distribution on the dependent variable is predicted to be nonlinear with one or more of the independent factors, the logistic regression technique is very beneficial.

## **IV. DATA ANALYSIS AND INTERPRETATION**

The next stage is to analyze and evaluate the data that has been gathered. Data summaries and statistical tests are part of the analysis process. this chapter is all about assessing of hypothesis and analysis of objective to relationship between socio-economic factors and nutritional Status among Children (6-14) in rural area of district sitapur in Uttar Pradesh.

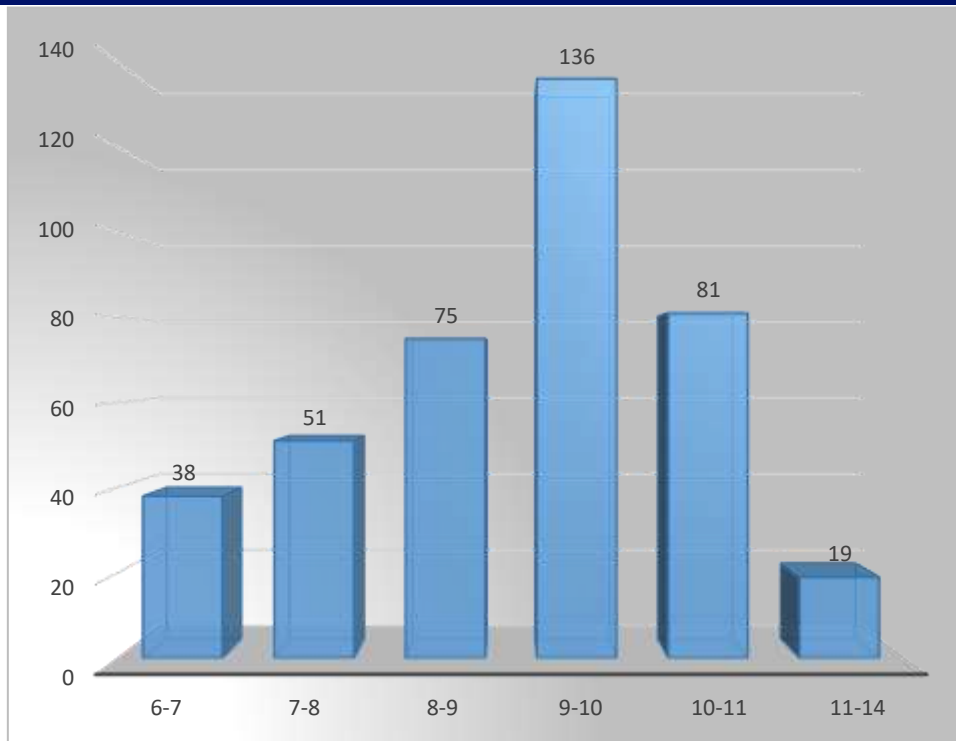
## **DISTRIBUTION OF RURAL CHILDREN ACCORDING TO SOCIO-DEMOGRAPHIC FACTORS**

In the present study, rural children (6-14 years) were classified according to their age, gender, father's education, mother's education, father's occupation; mother's working status, type of family, number of siblings and social class. Age-Group of Children

A total of 400 rural children (6-14 years) were grouped into different categories according to their age. Following table represents the distribution of Children according to their age groups.

**Table 1 Distribution of Children According to Age-Groups**

Age-Groups (Years)	Frequency	Proportion (%)
6-7	38	9.5
7-8	51	12.8
8-9	75	18
9-10	136	34.0
10-11	81	20.2
11-14	19	4.8
TOTAL	400	100



**Figure 1 Distribution of Children According to Age-Groups**

Above table shows that out of 400 rural children, the maximum percentage (34.0 %) of children were in the age group of 9-10 years, followed by 20.2% and 18.8% in the age group of 10-11 and 8-9 years. On the other hand, minimum percentage of children 10%, were found in the age groups 11-14, years respectively.

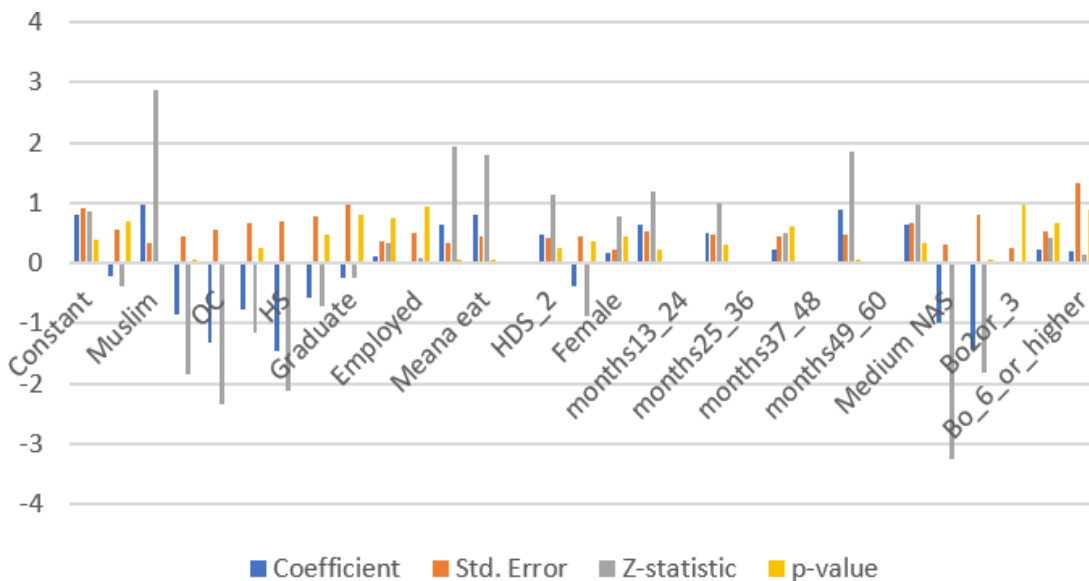
**Table 2. Summary results of Logistic regression analysis of Underweight among Rural children by Socio-economic characteristics**

Variables	Coefficient	Std. Error	Z-statistic	p-value	
Constant	0.792691	0.926457	0.8556	0.39221	
Christian	-0.208356	0.548461	-0.3799	0.70403	
Muslim	0.983407	0.343239	2.8651	0.00417	***
OBC	-0.844891	0.458711	-1.8419	0.06549	*
OC	-1.32865	0.570668	-2.3282	0.01990	**
Primary	-0.775757	0.675971	-1.1476	0.25113	
HS	-1.46577	0.695159	-2.1085	0.03498	**

HSS	-0.568919	0.787735	-0.7222	0.47016	
Graduate	-0.236769	0.983919	-0.2406	0.80984	
Agricultural labor	0.115771	0.352303	0.3286	0.74245	
Employed	0.0444871	0.515441	0.0863	0.93122	
Mean age of marriage years 18_25	0.644677	0.334597	1.9267	0.05401	*
Mean age of Marriage years_25	0.800717	0.44532	1.7981	0.07217	*
HDS_2	0.483211	0.422108	1.1448	0.25231	
HDS_3	-0.392917	0.444951	-0.8831	0.37721	
Female	0.185164	0.237335	0.7802	0.43528	
Again Months 7 to 8 years	0.646549	0.540598	1.1960	0.23170	
Again Months 8-9 years	0.489317	0.483888	1.0112	0.31191	
Again Months 9-10 years	0.23082	0.457419	0.5046	0.61383	
Again Months 10-11 years	0.899518	0.483265	1.8613	0.06270	*
Again months 11-14 years	-0.641072	0.664515	0.9647	0.33468	
Medium NAS	-0.98519	0.304249	-3.2381	0.00120	***
High NAS	-1.4378	0.797572	-1.8027	0.07143	*
Bo 2 or 3	0.0107143	0.250867	0.0427	0.96593	



Bo 4 or 5	0.225673	0.53317	0.4233	0.67210	
Bo 6 or higher	0.206324	1.32035	0.1563	0.87582	



**Figure 2. Summary results of Logistic regression analysis of Underweight among Rural children by Socio-economic characteristics**

Level of significance: \*\*\* $p < 0.001$ ; \*\* $p < 0.01$ ; \* $p < 0.05$  Reference category: Hindu, SC/ST, Illiterate, Housewife, Mean age <18years, HDS-1, Male, Age in 6-7 years, Low NAS, birth order. McFadden  $R^2 = 0.164378$  Likelihood ratio test:  $\chi^2_{25} = 89.5647$  (p-value=0.0000)

To identify the determinants of Stunting multivariate analysis was performed and summary results clearly presented in table 4.36. It reveals that religion, community, nutritional awareness score of mothers are the significant predictors of the stunting among rural children in rural areas of Sitapur district in Sitapur. Stunting is associated with a number of long-term factors including chronic insufficient protein and energy intake, frequent infection, sustained in appropriate feeding practices and poverty. The overall significance of the logistic regression model has been provided by the likelihood ratio test, which is highly significant.  $\chi^2_{25} = 75.0015$  (p-value=0.0000).

## V. CONCLUSION

The socio-economic factors that contribute to childhood underweight in rural settings are complex and interrelated. This research has used logistic regression analysis to highlight the substantial influence of economic inequalities, educational constraints, healthcare accessibility, and cultural behaviors on the incidence of underweight in children. These findings serve as a basis for evidence-based treatments and policies that may effectively

tackle the underlying factors contributing to malnutrition in rural areas. By comprehending the statistical correlations among different variables, we may strive to disrupt the pattern of underweight among susceptible communities and promote more favorable outcomes for children living in rural areas.

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