

An Investigation into Factors Affecting Child Undernutrition in Madhya Pradesh

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ABSTRACT Undernutrition has been a major problem in developing countries like India. In this context, this study tries to explore the determinants of child undernutrition in Madhya Pradesh, a socio-economically and demographically backward state of India. Both bivariate and multivariate analyses have been carried out by using National Family Health Survey III data, 2005-06. This study uses four indicators of nutritional status; three of which are anthropometric in nature and the other is Iron Deficiency Anemia. Logistic regression models revealed that education of the mother, poverty, social group membership, birth order, nutritional status of mother etc are important factors of child undernutrition. As the findings of this paper revealed that children belonging to the socially and economically lagging groups are at a higher risk of malnourishment even after controlling other selected socio-economic factors, holistic programmes need to be undertaken to improve their nutritional status taking their food habits and health behaviour into account.

INTRODUCTION

The nutritional status of any population is a vital determining factor in its biosocial development and physical and mental well-being. Malnutrition has been one of the world's most serious developmental problems. As per the report of Bellagio Study group (2003), Malnutrition (mild to severe) is associated with about 60 percent of all childhood deaths globally (Claeson et al. 2003). Poor nutrition during childhood causes severe cognitive and physical damage. It is a violation of a child's human right. Approximately, 27 percent children under age five in developing countries are still malnourished (WHO 1999). This average figure does not tell about the variations across regions and groups. It has been observed that the rate of poorly nourished children is exceptionally high among few regions and groups.

Alma Ata Declaration (1978) envisaged "Health for All" goal till 2000. But the year 2000 has passed; still the state of health is not in a good shape. A large number of women and children are suffering from severe malnutrition, especially in developing countries like India. According to National Family Health Survey III 2005-06, 45, 23 and 40 percent of children below three years suffer from stunting, wasting and under weight respectively (corresponding figure

for NFHS II, 1998-99 were 51, 20 and 43 percent respectively). A comparison between NFHS II and III shows that there has been a minor reduction in proportion of child malnutrition. Stunting is an indicator of chronic deficiency, wasting is an indicator of acute undernutrition and under weight is a composite measure of both chronic and acute undernutrition (Gillespie and McNeil 1992; Arnold et al. 2003). Several nutrition programs like Integrated Child Development Scheme (ICDS) and Minimum Needs Program have been launched for the downtrodden sections of population in general and vulnerable sections of the population in particular but these programmes have not been successful in making any significant impact to raise the level of nutrition to the optimum level (Bagchi 1994; Sacher and Gill 1993). This failure is reflected by the high rates of undernutrition in India, particularly in the mid-Indian Tribal belt as recorded by NFHS III (Das 2008). What are the factors affecting child undernutrition? It is well-known that child undernutrition is affected by multiple factors like socio-cultural, economic and demographic. Studies found that mother's education, standard of living, ethnicity etc. are important factors of child nutrition (Mishra et al. 1999; Griffith et al. 2002; Brennan et al. 2003; Krishna Mohan 2004; Griffith 2004; Das 2005). A study by Nutrition Foundation of India had recogni-

zed that nutrition intervention would be effect from the education of both parents, especially mothers, was ensured upto middle or high school (Gopalan et al. 1998). A report based on the National Family Health Survey (1998-99) in India has concluded that the prevalence of malnutrition can be reduced by improving educational level of mothers. In this context, the present study tries to explore the determinants of child under-nutrition in Madhya Pradesh which is one of the high-child undernutrition states of India.

Study Area

Madhya Pradesh is one of the socio-economically and demographically backward states in India, where 40 percent of the population of the female population is illiterate (Census 2011), poverty rate is 32.4 percent as estimated by National Sample Survey 2004-05 and infant mortality rate is 70 (IIPS and ORC Macro 2007). Besides, the proportion of the Scheduled Caste (SC) and Scheduled Tribe population (ST) are substantially high (15.2 and 20.3 percent, respectively as per 2001 Census). As far as nutritional status is concerned, 50, 35 and 60 percent of children below 5 years are stunted, wasted and underweight respectively; which are much higher than the national average of 48.0, 19.8 and 42.5 percent, respectively (IIPS and ORC Macro 2007). Even the child undernutrition rates in Madhya Pradesh are substantially higher compared to most of the constituent states of India. So there is a need to investigate the underlying factors of child undernutrition in the state which this study proposes to do so.

MATERIAL AND METHODS

Data for this study are drawn from National Family Health Survey (NFHS) III which is the third in a series of Demographic Health Surveys carried out in India during 2005-06. The survey coordinated by the International Institute for Population Sciences (IIPS), Mumbai under the aegis of the Government of India. The survey collected information from nationally representative sample of 109,041 households and 124,385 women of age 15-49 years. It covers 99 percent of India's population living in all 29 states (IIPS and Macro International 2007). In the NFHS, data on fertility histories, mortality, family planning, and important aspects of nutri-

tion, health and health care were obtained. An advantage of the NFHS data set is that individual records of background characteristics are available thus permitting a detailed analysis. So the relevance of the NFHS data for the present study lies in the fact that it gives data on a variety of nutritional indicators of children below five years and also the determinant variables such as caste/tribe, religion, education and wealth index etc. which gives an opportunity to examine the determinants of nutritional status.

This study uses four indicators of nutritional status; three of which are anthropometric in nature and other one is anemia. The anthropometric measures of child malnutrition are based on weight for age, height for age, weight for height. These three indices of child malnutrition are expressed in terms of standard deviation units (z-scores) from the median in the international reference population recommended by World Health Organization (Dibley et al. 1987a, 1987b). A study conducted by Nutritional Foundation of India in 1991 concluded that the WHO standard is generally applicable to Indian children (Agarwal et al. 1991). Children who are below minus two standard deviations (-2 SD) from the median of the reference population in terms of weight for age, height for age, weight for height are considered as underweight, stunted and wasted respectively. The categories of severely underweight, severely stunted and severely wasted are on the basis of below minus three standard deviations (-3 SD) from the median of the international reference population. Besides these indicators anemia is also considered as an important indicator of the nutritional status of a population. Anemia is generally measured on the basis of hemoglobin level (g/dl) in blood. Children are classified as having mild anemia (hemoglobin level of 100.0-109.99 g/l), moderate anemia (hemoglobin level 70.0-99.99 g/l), and severe anemia (hemoglobin level of less than 70.0 g/l).

For this study, both bivariate and multivariate analyses have been carried out. Bivariate analysis in terms of cross tabulation and multivariate analysis in terms of logistic regression have been used. Nutritional status of children is studied by using four sets of logistic regression models for four dichotomous dependent variables (underweight, stunting, wasting and anemia). Predictor variables included in the analysis are: birth order, sex of the child, educational level of mother, caste, religion, place of residence, ex-

posure to mass media, work status of the mother, wealth index of the household, Body Mass Index (BMI) and hemoglobin level of the mother. Wealth Index has been used as a proxy for economic condition of the household.

RESULTS AND DISCUSSION

To find out the gross effect of selected background characteristics on nutritional status of children, bi-variate analysis have been done and presented in Table 1. It is evident from Table 1 that, about half of the children under five years of age are stunted (50.1 percent) and two-fifth of children are under-weight (60.2 percent) where as about one-third (35.6 percent) of children are wasted in Madhya Pradesh. Undernutrition of children increases with the increase of birth order. It is observed that more females are under-nourished compared to males. A negative relationship between maternal education and child undernutrition has been observed. Religion and caste differentials too have also found in child undernutrition. More proportion of children belonging to scheduled tribe are undernourished compared to other groups.

As far as under weight and wasting are concerned, the percentage of undernourished children are higher in rural areas than urban areas. This may be due to the fact that availability, accessibility and affordability of health care services in rural areas are not in par with urban areas. From the bi-variate analysis, it seems that media exposure has positive effect on nutritional status of children. Media is likely to have effect on practices of child care as it enables women to learn the proper way of utilizing existing resources for the optimal use for children. With respect to the work status of mother, children of non-working mothers are less likely to be under nourished compared to working mothers. Substantial differences in undernutrition have been found by the wealth index of the household. It is observed that higher the living standard of the household, lower the proportion of undernourished children. Differentials in nutritional status of children have also been varied by maternal nutrition; children of under nourished mothers are more likely to be wasted and under-weight than those of nourished women.

As far as anemia is concerned, about three-fourth (74 percent) of the children are anemic in Madhya Pradesh. Among which 3, 44 and 27

percent of children are severely, moderately and mildly anemic respectively. In case of anemia, differentials have also been observed across socio-economic characteristics like wealth index of the household, education and work status of mother, place of residence, sex of the child, caste. Level of anemia is found to be negatively related with wealth index of the household and educational level of the mother. Anemia is found to be substantially higher among scheduled tribe children compared to other categories. Maternal nutritional status as measured in terms of Body Mass Index (BMI) and anemia have been found to be important factor of child nutrition status. It is observed that, substantial proportion of children are under nourished whose mothers are also under nourished.

Determinants of Nutritional Status of Children: Results from the Logistic Regression Models

As the bi-variate analysis only shows the gross differentials, logistic regression analysis have been used to find the net effect of individual predictor on the dependant variables. The results of logistic regression models are given in Table 2. With respect to birth order of the child, it is clear that it has a positive relationship with height for age(stunting) as well as weight for age (under-weight), that is, children with 5+ birth orders is 1.5 times more likely to be stunted and 1.4 times underweight compared to the children who took birth at 1-2 birth order. It is generally believed that parents give less attention to older children when they give birth to a new child who needs much attention and care.

Children of women with higher education are less likely to be undernourished (which is true for all the indicators of nutrition with the exception of wasting). Higher educated women owing to their exposure to the outside world are more aware of personal hygiene and issues on preventive, promotive and curative health care than uneducated or less educated women. Education also enables women to make independent decisions and to have greater access to household resources that are important for nutritional status. Controlling the effect of other variables, the probability of being anemic is higher (1.6 times) among ST children compared to the children belonging to the others categories. In case of underweight, both ST and SC children adver-

Table 1: Percentage of children under age five years classified as undernourished and anemic by selected background characteristics, Madhya Pradesh, 2005-06

<i>Background characteristics</i>	<i>Anthropometric measures</i>			<i>Anemia</i>			
	<i>Stunting</i>	<i>Wasting</i>	<i>Under-weight</i>	<i>Severe</i>	<i>Moderate</i>	<i>Mild</i>	<i>Any anemia</i>
<i>Birth Order</i>							
1-2	46.5	33.9	55.5	2.9	43.8	25.1	71.8
3-4	47.7	37.8	61.4	3.2	43.3	29.6	76.1
5+	62.4	36.9	70.2	5.0	43.8	27.5	76.3
<i>Sex of the Child</i>							
Male	49.4	37.6	59.9	3.5	44.7	24.2	72.4
Female	50.7	33.7	60.6	3.4	42.5	29.8	75.8
<i>Educational Level of Mother</i>							
Illiterate	56.0	36.3	65.8	3.6	46.1	27.5	77.2
Primary	46.4	40.0	61.0	3.0	44.5	26.7	74.3
Secondary	40.2	33.5	49.6	3.1	37.5	26.9	67.5
Higher	34.3	17.6	33.7	3.1	37.5	20.8	61.5
<i>Caste</i>							
Scheduled caste	55.8	34.7	63.7	5.1	43.3	27.5	75.8
Scheduled tribe	57.2	41.2	71.5	3.7	54.1	25.5	83.3
Other backward class	47.3	34.3	57.4	2.6	39.2	28.0	69.8
Others	39.8	31.9	46.9	3.2	40.2	25.7	69.2
<i>Religion</i>							
Hindu	50.6	35.6	60.5	3.7	43.3	26.7	73.7
Others	44.8	36.2	58.1	0.8	46.8	29.4	77.0
<i>Place of Residence</i>							
Urban	44.4	32.5	52.0	4.2	37.4	27.2	68.8
Rural	51.8	36.6	62.8	3.2	45.5	26.9	75.7
<i>Exposure to Mass Media</i>							
Not exposed	55.9	35.3	64.3	3.4	46.7	27.7	77.8
Exposed	45.7	35.9	57.1	3.4	41.3	26.4	71.1
<i>Work Status of Mother</i>							
Not working	45.9	34.2	55.3	3.6	41.6	27.5	72.7
Agricultural and HH related	52.8	35.6	64.1	3.5	43.9	28.6	76.0
Non-agricultural	55.0	39.5	65.5	2.8	48.1	22.8	73.8
<i>Wealth Index</i>							
Poorest	55.7	39.1	68.3	2.9	48.0	27.7	78.6
Poorer	50.7	38.3	61.3	3.5	44.2	28.5	76.2
Middle	49.6	31.6	57.7	4.4	40.4	25.1	69.9
Richer	43.8	30.6	50.0	4.1	40.7	26.8	71.7
Richest	30.0	25.1	36.6	3.3	30.8	22.1	56.3
<i>BMI of Mother</i>							
<18.5	53.5	42.5	68.4	4.0	44.5	28.0	76.4
18.5-24.9	48.1	31.3	55.5	3.1	43.5	26.6	73.2
=>25	30.2	17.5	23.8		29.7	20.3	50.0
<i>Anemia of Mother</i>							
Severe	69.0	41.4	73.3	10.7	53.6	28.6	92.9
Moderate	55.8	33.8	68.3	7.5	53.9	22.3	83.7
Mild	50.2	36.7	61.2	2.4	49.0	25.9	77.3
Normal	46.8	35.0	55.1	2.6	32.7	30.3	65.6
Total	50.1	35.6	60.2	3.4	43.6	27.0	74.0

Note: @: Reference category, ***Significant at 1% level; ** Significant at 5% level, * Significant at 10% level

Source: Computed from NFHS III data file

sely placed (odds ratios are 1.5 and 1.66 for SC and ST children are respectively). Again the risk of being stunted is substantially higher among SC children compared to the others children. A closer examination of odds ratios would reveal that ST children are at highest risk of being undernourished followed by SCs. Even an analysis

of NFHS-II, 1998-99 data for Madhya Pradesh shows similar findings for stunting and underweight (Das 2008). It shows that children belonging to socially backward groups are at higher risk of undernutrition compared to advanced section of the society. As these groups have little exposure to outside world probably they stick to their

Table 2: Odds ratio showing the variations in nutritional status of children under age five in Madhya Pradesh

<i>Background characteristics</i>	<i>Stunting</i>	<i>Wasting</i>	<i>Under-weight</i>	<i>Any anemia</i>
<i>Birth Order</i>				
1-2®				
3-4	0.903	1.117	1.078	1.094
5+	1.509***	1.042	1.440***	0.984
<i>Sex of the Child</i>				
Male®				
Female	1.038	0.846**	1.010	1.149
<i>Educational Level of Mother</i>				
Illiterate®				
Primary	0.805**	1.267**	1.000	1.027
Secondary	0.767**	1.089	0.817*	0.984
Higher	0.932	0.527**	0.661	1.365
<i>Caste</i>				
Others®				
Scheduled caste	1.455***	0.958	1.517***	1.250
Scheduled tribe	1.280*	1.167	1.660***	1.629***
Other backward class	1.058	0.938	1.151	0.892
<i>Religion</i>				
Hindu®				
Others	0.975	1.226	1.402**	1.753***
<i>Place of Residence</i>				
Urban®				
Rural	0.889	0.909	0.969	0.987
<i>Exposure to Mass Media</i>				
Not exposed®				
Exposed	0.857*	1.263**	1.127	0.903
<i>Work Status of Mother</i>				
Not working®				
Agricultural and household related	1.044	0.911	1.038	0.895
Non-agricultural	1.146	1.121	1.154	0.807*
<i>Wealth Index</i>				
Poorest®				
Poorer	0.945	0.909	0.794**	0.985
Middle	1.040	0.637***	0.772*	0.742*
Richer	0.891	0.586***	0.602***	0.799
Richest	0.526***	0.579**	0.511***	0.444***
<i>BMI of Mother</i>				
<18.5®				
18.5-24.9	0.818**	0.639***	0.597***	0.913
=>25	0.702	0.383***	0.276***	0.518**
<i>Anemia of Mother</i>				
Anemic®				
Normal	0.918	1.048	0.828**	0.547***
Constant	1.281	0.792	1.862***	0.4203***
-2 Log Likelihood	3867.680	3658.606	3664.028	3008.656
Nagelkerke R Square	0.059	0.047	0.096	0.078
Number of cases	2557	2557	2557	2462

Note: ®: Reference category, ***Significant at 1% level; ** Significant at 5% level, * Significant at 10% level

Source: Computed from NFHS III data file.

traditional beliefs related to child care, feeding practices, food preparation methods etc. which have important implications for child nutrition. Besides STs tend to live in inaccessible remote areas and hence there is an issue of availability and accessibility.

After controlling the effect of other variables, differentials in child undernutrition by place of

residence and mother's work status were not in evidence. Absence of statistical significant effect of place of residence indicate that differentials in undernutrition rates between rural and urban areas are confounded by the socioeconomic factors and rural and urban place does not have effect per se. Wealth index as a measure of economic condition of the household shows signi-

ificantly negative relationship with nutritional status of children. The probability of being stunted and wasted is substantially lower for children of richest wealth quintile than the children of poorest households. This is probably due to the fact that standard of living of the household affect food supplies, use of health services, availability of improved water services and sanitation facilities which are important determinants of child nutritional status (UNICEF 1990). As expected maternal nutrition as measured by Body Mass Index is strongly negatively associated with child nutrition. This shows intergenerational link of nutritional status. The presence of intergenerational link between maternal and child nutrition means under nourished mother will have under weight baby. Maternal nutrition influences fetal growth and birth weight.

CONCLUSION

From the foregoing analysis, it is evident that undernutrition of children shows a gloomy picture in Madhya Pradesh. Data show that 50 percent of children under-five years of age are stunted, 60 percent are under-weight and 36 percent are wasted in Madhya Pradesh which is much higher than national figures. This analysis found that socially, economically and educationally weaker sections of this state are deprived as far as child nutrition is concerned. As tribal children are found to be at higher risk of under nourishment even after controlling the other selected socio-economic factors, food habits and health behaviour of different tribal communities need a special attention. Studies also indicated towards the unhygienic personal habits and adverse cultural practices relating to child rearing, breast-feeding and weaning among tribal communities of Madhya Pradesh; Gond tribes (Rao et al. 2005), Bhil tribes (Taneja and Vaidya 2001), and Kol tribes (Tiwari et al. 2007). Besides health care facilities in tribal areas need to be improved as 'the most important problem in public health among the tribes concerns the shortage of medical personnel and qualified nurses in the face of continued belief in the old system and a steadily rising faith in the new' (Hasnan 1991:188). Besides the existing universal education programme should be strengthened particularly in the backward regions and among the socioeconomic groups which are educationally lagging. Poverty in terms of wealth index

is found to be an important factor of child undernutrition. So there is a need to implement well thought poverty reduction measures along with providing mass education regarding health and nutrition with a special focus on socially and economically deprived sections of the society. Besides combined food and iron supplementation programmes would help in improving nutritional status of the children belonging to the socioeconomically disadvantaged sections of the society. Needless to say, for making a significant dent in child nutrition, holistic programmes need to be designed for different sections of the population taking their socio-economic and cultural specificities into account. In this endeavour, co-operation is necessary among the Government, Non-Governmental Organizations, the medical personnel and the local people.

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