

Nutritional status among children aged 24-59 months in rural Bangladesh: An assessment measured by BMI index

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Citation

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Abstract

This study employs statistical methods to identify the factors associated with nutritional status among children aged 24-59 months in rural Bangladesh. Bangladesh Demographic Health Survey data 2004 (N=652) were used for this study. Child's nutritional status was defined in terms of Body Mass Index (BMI/wt in kg/ht in m²). Descriptive and multivariate logistic regression methods were employed in analyzing the data. It was observed that that girl children's were more under weighted than the boys. This study elucidates that although maximum numbers of children (both boys and girls) aged 24-59 months have healthy weight a large portion of them were under weighted. Bivariate analysis shows that mothers who gave last birth in their middle age group (20-30 years) have more healthy boys (61.7%) and girls (56.1%) children as compared the mothers who gave their first birth during adolescence (<20 years) and women with higher age group (≥30 years). Multivariate logistic regression analysis shows that women who worked for cash were two-and-a-half times more probability of having healthy weighted child than among the mothers who did not work for cash. It was also found that proportion of under weighted children was significantly greater among those who had not taken vitamin A supplementation. The other main contributing factors likely to affect nutritional status of children aged 24-59 months were respondent's education, husband's education and occupation, household assets index and mothers' age at last birth,

INTRODUCTION

Today's children are tomorrow's world or tomorrow's father" this slogan is riding a massive wave of concern throughout the world. But children, all over the world are deprived of many facilities. Hunger and malnutrition make them worst sufferers and these pose potential threats to mankind as a whole or to the civilization itself. The children of Bangladesh are particularly more victimized than those in other part of the world₁. Although there has been a steady decline in the infant mortality rate in Bangladesh (87 per thousand live births in 1993-1994 to 65 per thousand in 2004) but overall health condition and nutritional status of children is not so well₂.

The nutritional status of under-five children is of particular concern, since the early years of life are crucial for future growth and development. Globally, nutritional status is considered the best indicator of the well being of young children and a parameter for monitoring progress towards the Millennium Development Goals (MDGs), especially MDG1₃. In developing countries, an estimated 50.6 million children aged less than five years are malnourished₄. Low birth weight (<2,500g) is an especially important indicator:

both as a marker of overall health of the mother and as a predictor of ill health for newborns. Poor nutrition severely hinders personal, social and national development₅. Bangladesh has the highest prevalence of childhood underweight among all countries in the world, except North Korea, and only seven countries have a higher prevalence of child stunting. Rates of low birth weight among Bangladeshi children are among the highest in the world with 20-40% of babies weighting less than 2,500g at birth. It has been though that improved nutrition for mothers during pregnancy would reduce this rate₆. The percentage of children aged 6-59 months with stunting decreased from 64.2% in 1992 to 48.3% in 2000 and 42.4% in 2005, under weight decreased from 68.3% in 1992 to 51.0% in 2000 and 47.8% in 2005, and wasting decreased from 16.7% in 1992 to 12.0% in 2000 and remained at 12.7% in 2005₇.

From the above discussion, we observe that nutritional status among children under age five is not so well. Yet more work is needed to identify the more influential factors which can improve the nutritional status among children in rural Bangladesh. This paper documents the extent of under nutrition among rural Bangladeshi children aged 24-59

months and explores a number of socioeconomic factors thought to explain its genesis and distribution. For the purposes of analysis, we employ BMI as a simple and reliable measure of nutritional status. It is expected that the findings will lead to consider alternative program strategies for the reduction of poor nutritional status of the children of aged 24-59 months.

MATERIALS AND METHODS

This study utilizes the data extracted from 2004 Bangladesh Demographic and Health Survey (BDHS), which were conducted under the authority of the National Institute of Population Research and Training of the Ministry of Health and Family Welfare in Bangladesh. This study considered only the case for rural children aged 24-59 months (N=652). Bivariate analysis was performed to determine the differentials of nutritional status among children aged 24-59 months by explanatory variables. Pearson’s Chi-square test of independence was performed to test the existence of significant association between categories of nutritional status and selected risk factors. Considering the fact that among multivariate techniques the Cox’s linear logistic regression model is algebraically simple, computationally straightforward and efficient with acceptable degree of precision for a binary dependent variable, this study applied Cox’s linear logistic regression model for multivariate analysis.

This study considered CDC and the American Academy of Pediatrics (AAP) for the classification of nutritional status among children aged 24-59 months. CDC and the American Academy of Pediatrics (AAP) recommended the use of BMI to screen for over weight in children beginning at 2 years old. BMI is a number calculated from a child weight and height. After BMI is calculated for children, the BMI number is plotted on the CDC BMI-for-age growth charts (for either girls or boys) to obtain a percentile ranking. The percentile indicates the relative position of the child’s BMI number among children of the same sex and age. According to the growth chart children were considered underweight if the percentile fall below the 5th percentile, healthy weight 5th percentile to less than the 85th percentile, over weight 85th to less than the 95th percentile and at risk of overweight if the percentile were equal to or greater than the 95th percentile

RESULTS

WEIGHT STATUS OF THE CHILDREN

Table 1 shows percentage distribution of weight status of

children under-5 years old (i.e., children of 24-59 months old). The table elucidates that girl children’s were more under weighted than the boys (44.5% as against 36.1%). It is also observed that 62.5% boy’s children (24 -59 months years old) have healthy weight, 36.1% were under weighted and 1.1% have over weight and only 0.3% children were at risk of over weight. Correspondingly for female children we see that 54.3% girls (24 -59 months old) have healthy weight, 44.5% have under weight and 0.6% children are at risk of over weight and only 0.6% were over weighted.

Figure 1

Table 1: Percentage distribution of weight status of 24-59 months children

Child health status	Male child	Female child
	Percentage (%)	Percentage (%)
Under weight	36.1	44.5
Healthy weight	62.5	54.3
At risk of overweight	0.3	0.6
Overweight	1.1	0.6
Total	100.0	100.0

DIFFERENTIALS OF UNDER-FIVE (AGED 24-59 MONTHS) RURAL CHILDREN’S NUTRITIONAL STATUS

The percentages of boys and girls having healthy weight status decrease when their age increases. 63.4% boys and 57.4% girls have healthy weight whose age is within 24-35 months, which is the highest percentage as compared to other age groups child. About 60.0% and 52.1% boys and girls children have healthy weight status who received vitamin “A” dose. Mothers who gave last birth in their middle age group (20-30 years) have more healthy boys (61.7%) and girls (56.1%) children as compared to adolescence mothers (<20years) and mothers aged ≥30 years. The table 2 also unveils that the percentage of healthy weighted boys and girls is highest (70.6% and 58.8% respectively) among over weighted mothers as compared to under weighted, normal weighted and obese mothers also the percentage of healthy boys is highest (68.4%) among higher educated mothers followed by 63.5% of secondary educated, 58.0% of primary educated and 58.0% of illiterate mothers. on the other hand, our present study represent that, higher educated mothers have 54.4% healthy girls children followed by 41.5% of primary educated, 47.6% of illiterate and 53.3% for secondary educated mothers.

The fathers who were illiterate have 62.8% healthy male children and fathers with primary education have 55.5%, with secondary education have 58.8% and with higher education have 60.8% healthy male children. On the other

hand, the percentage of healthy female children is highest (53.1%) among primary educated and secondary educated mothers and lowest (45.8%) among higher educated mothers. Father's occupation has a great impact on child health and nutritional status. 66.7% boys and 55.3% girls have healthy weight whose fathers are non-manual workers (doctors, service man, business man etc.). 65.3% boy and 53.7% girl children's of non-Muslim mothers were healthy weighted followed by 59.1% boys and 51.6% girls of Muslim mothers. Household asset is an indication of family status. The mothers whose households have upper class assets have 75.0% healthy male children and the mothers whose households have middle class assets have 76.0% healthy female children. The mothers whose households have upper quality houses have 100.0% healthy male children and 53.0% healthy female children.

Figure 2

Table 2: Percentage distribution of under-five (aged 24-59 months) rural children's weight status according to some selected background characteristics

Background characteristics	Boys		Girls	
	Healthy	Unhealthy	Healthy	Unhealthy
Child age in months				
24-35	63.4	36.6	57.4	42.6
36-47	60.4	39.6	47.2	52.8
48-59	35.7	64.3	40.7	59.3
Vitamin "A" supplementation				
Yes	60.0	40.4	52.1	47.9
No	45.2	40.0	50.6	49.4
Mothers age at last birth				
<20 Years	61.1	38.3	50.0	43.9
20-30 Years	61.7	38.9	56.1	50.0
30+ Years	50.8	49.2	51.6	48.4
Mothers BMI in group				
Under weight (<18.5kg/m ²)	60.2	39.8	51.1	48.9
Normal (18.50-24.99kg/m ²)	59.9	40.1	52.1	47.9
Over weight (25-29.99 kg/m ²)	70.6	29.4	58.8	41.2
Obese (≥30 kg/m ²)	33.3	66.7	0.0	0.0
Mothers education				
No education	58.0	42.0	47.6	52.4
Primary	58.0	42.0	41.5	42.5
Secondary	63.5	36.5	53.3	46.7
Higher	68.4	31.6	54.4	58.6
Fathers education				
No education	62.8	37.2	51.9	48.1
Primary	55.5	44.5	53.1	46.9
Secondary	58.8	41.2	53.1	46.9
Higher	60.8	39.2	45.8	54.2
Fathers occupation				
Manual	56.7	33.3	50.3	44.7
Not manual	66.8	43.2	55.0	50.0
Others	33.3	66.7	71.4	28.6
Religion				
Muslim	59.1	40.9	51.6	48.4
Non-Muslim	65.3	34.7	53.7	46.3
Household asset index				
Lower	54.1	45.9	52.4	47.6
Middle	57.1	42.9	76.0	24.0
Upper	75.0	25.0	37.5	62.5
Household quality index				
Lower	58.8	41.2	50.5	49.5
Middle	60.3	39.7	50.5	46.5
Upper	100.0	0.0	53.0	50.0

DETERMINANTS OF NUTRITIONAL STATUS OF UNDER-FIVE (AGED 24-59 MONTHS) RURAL CHILDREN

Table 3 shows that, considering male child as reference category, female child having 1.134 times higher probability of having healthy weight status than that of male child. It is also found that children who have received vitamin "A" supplementation were 1.655 times more likely to be healthy weighted as compared to the children who have not received vitamin "A" supplements. Table 3 elucidates that as the education level of mother rises the chance of having healthy weighted children also raises. The relative odds ratio corresponding to primary, secondary and higher educated rural mothers are 1.573, 1.942 and 1.983 which indicates that, primary and secondary and higher educated mothers

having 1.573, 1.942 and 1.983 times higher probability of having healthy weighted children as compared to the mothers with no education. The results indicate that, middle aged mothers (20-30 years) were 1.058 times more likely to have healthy weighted children as compared to the mothers below aged 20 years.

Gradually healthy mothers can give healthy child_s. But our present study shows that, the normal weighted mothers have 0.972 times less probability of having healthy weighted child as compared to the under weighted mothers. Father's educational qualification also influences child health and nutritional status. Considering no education as reference category, the relative odds ratio corresponding to primary, secondary and higher educated fathers are 0.546, 1.198 and 2.540 respectively. This indicates that, higher and secondary educated fathers were 1.198 times and 2.540 times more likely and primary educated fathers were 0.546 times less likely to have healthy weighted child as compared to illiterate fathers. Fathers who were non-manual worker have 1.241 times higher and the fathers who are related with other works or not have 0.759 times lower probability of having healthy weighted child. It is also found that women who worked for cash the probability of having healthy weighted child is almost 2.312 times more than among the mothers who did not work for cash. Household assets largely influence child and mothers health status. Table 3 unveils that middle class and upper class asset holder respondents having 1.062 times and 1.964 times higher probability of having healthy weighted child as compared to the lower class asset holder mothers.

Figure 3

Table 3: Logistic regression estimates of the effects of some selected background characteristics on the child weight under-five years period preceding the purvey of rural Bangladesh

Background Characteristics	Coefficient β	Standard error of the estimates	Exp (β)
Sex			
Male \otimes	-	-	1.000
Female	0.126	0.344	1.134
Child micronutrient intake (vit. A)			
No \otimes	-	-	1.000
Yes	0.408	0.500	1.665***
Mothers education			
No education \otimes	-	-	1.000
Primary	0.687	0.454	1.573
Secondary	0.663	0.509	1.942**
Higher	0.557	1.389	1.983***
Mothers age at last birth			
<20 years \otimes	-	-	1.000
20-30 years	0.539	0.381	1.058*
30+ years	-0.593	0.607	0.553
Mothers weight status			
Under weight \otimes	-	-	1.000
Normal	-0.029	0.356	0.972
Over weight	0.688	1.122	1.503
Fathers education			
No education \otimes	-	-	1.000
Primary	-0.605	0.460	0.546
Secondary	0.181	0.514	1.198*
Higher	0.932	0.970	2.540***
Fathers occupation			
Manual \otimes	-	-	1.000
Non-manual	0.216	0.501	1.241**
Others	-0.276	0.387	0.759
Women's employment status			
Work not for cash \otimes	--	--	1.000
Work for cash	0.032	0.236	2.312***
Household asset index			
Lower \otimes	-	-	1.000
Middle	0.060	0.382	1.062***
Upper	0.675	0.659	1.964**
Constant	0.529	0.708	1.697

Note: \otimes = Reference category. Here ***, ** and * indicates $p < 0.001$, $p < 0.01$ and $p < 0.05$

DISCUSSIONS

Nutritional status of children under age five has an all pervasive impact on the physical well-being and socioeconomic condition of a nation_s. In our study nutritional status among children's aged 24-59 months was defined in terms of Body Mass Index (BMI/wt in kg/ht in m²). The study found that girl children's were more under weighted than the boys. It is also observed that although maximum numbers of children (both boys and girls) aged 24-59 months have healthy weight a large portion of them were under weighted.

Both bivariate and multivariate analyses indicated that the educational level of wife was positively related to the better nutritional status of children. This is likely to be attributed because educated mothers are more conscious about their children's health; they tend to look after their children in a better way. Islam et al. (1994) found from a case-control study on 250 children, aged <36 months, in Bangladesh that

maternal education was significantly associated with severe malnutrition. This study finding also suggests that mother's education played a significant role in reducing prevalence of underweight. Under weighted children was highest among children of illiterate mothers. Smith and Haddad (2000) drawn on the experience of 63 developing countries over the 25-years period to identify the determinants of child malnutrition for each developing region. Six factors were explored; one of the important factors was women's education. They depicted that improvements in female secondary school enrollment rates were estimated to be responsible for 43 percent of the total 15.5 percent reduction in the child underweight rate of developing countries during the period 1970-95.

Father's education and occupation emerged as important factors that were significantly associated with underweight status among 24-59 months aged children¹⁰. Analysis showed that children, whose fathers had higher level of education and non-manual work status (Serviceman, business man etc.), were lower in proportion of weight deficiency than those with illiterate fathers. Usually father is the main earner and decision maker of a family and so their higher level of education plays an important role to ensure better nutritional status of children.

Intake of Vitamin A also has positive effect on better nutritional status of children aged 24-59 months. Vitamin A supports growth especially skeletal growth¹¹. Our study revealed that the proportion of under weighted children was significantly greater among those who had not taken vitamin A supplementation. The household assets index is an indicator of child and maternal nutritional status. This study elucidates that children with upper class assets have 1.964 times higher probability of becoming healthy weight status than among the children living with lower quality of household assets index. A study found from a case-control study on 977 children aged 0-59, in Bangladesh that mothers poorest household assets are more than three times as likely to suffer from acutely malnourished from the wealthiest households assets index¹².

The observation that mothers who worked for cash having more healthy weighted child is most likely to be attributed due to the fact that women's employment increases household income, with consequent benefit to household nutrition. Employment may increase women's status and power, and may bolster a woman's preference to spend her earnings on their child health and nutrition. Though

employed, women without control over their income and decision-making authority within the household are deprived of economic and social power and the ability to take actions that will benefit their children's well-being

Our study also found that children among the middle aged mothers were more healthy weighted than among the children of adolescence and higher aged mothers due to the fact that adolescence and higher aged mothers have no proper knowledge about child health rearing and bearing of their child including feeding.

These results confirm the importance of programs to improve child nutritional status, especially in light of the high levels of under weight status among rural children aged 24-59 months in Bangladesh. These results suggest that much more attention needs to be placed on reducing household poverty, increasing rural nutritional resources. This study depicted strong negative relationship between parent's education and prevalence of under weight status, there is no alternative but to create scope and opportunities for education. Involvement of the community, NGOs and use of media of mass communication with coverage of necessary health care information may prove to be useful in improving nutritional status. Health and nutrition education should also be an integral part of the education process. It was found that women's employment for cash is an important determinant of her child's nutritional status. Therefore; strategies must be developed to increase women's productivity per unit of time both in paid work and in domestic production so that women can increase their incomes without scarifying additional time, their children's welfare, or their own health and nutritional status. Vitamin A supply and other childcare programs should be launched to improve the nutritional status of children under age 24-59 months. Government may wish to design well thought child care program to ensure easy access to health information and health education to parents.

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References

1. Anoshua Chaudhuri (2008): Impact of sibling rivalry on

the nutritional Status of children: Evidence from Matlab, Bangladesh. Available at SSRN:

<http://ssrn.com/abstract=1158815>

2. Alnda M. Bosch, Frans J et al., (2008): "Association between age at menarche and early age at -life nutritional status in rural Bangladesh" *J.biosoc.Sci*, 40, 223–237, Cambridge University Press doi: 10.1017/S0021932007002490 first published online 24 Oct 2007
3. Semba RD, de Pee S, Sun K, Sari M, Akhter N, Bloem MW (2008): "Effect of parental formal education on risk of child stunting in Indonesia and Bangladesh: a cross-sectional study" *Lancet*; 371(9609):322-8.
4. Best CM, Sun K, de Pee S, Bloem MW, Stallkamp G, Semba RD (2007): "Parental tobacco use is associated with increased risk of child malnutrition in Bangladesh". *Nutrition*. 2007 Oct; 23(10):731-8.
5. Shafique S, Akhter N, Stallkamp G, Pee SD, Panagides D, Bloem MW (2007): "Trends of under- and overweight among rural and urban poor women indicate the double burden of malnutrition in Bangladesh". *Int J Epidemiol*.
6. Faruque, A. S. G et al., (2008): "Nutrition: Basis for Healthy Children and Mothers in Bangladesh" *ICCDR, B Health, Population and Nutrition* 00; 26(0):0000 ISSN

1606-0997

7. Bangladesh Bureau of Statistics (BBS) and UNICEF (2005): *Child Nutrition Survey*, Dhaka, Bangladesh
8. Alessandro Tarozzi (2008): "Growth reference charts and the nutritional status of Indian children". Volume 6, Issue 3, Pages 455-468, *Symposiums on the Economics of Obesity*
9. Berger SG, de Pee S, Bloem MW, Halati S, Semba RD (2007): "Malnutrition and morbidity are higher in children who are missed by periodic vitamin A capsule distribution for child survival in Rural Indonesia". *J Nutr*; 137(5):1328-1333.
10. Sharma, Barkha and Mitra, Mitashree, and Chakrabarty, Suman, and Bharati (2006): "Premananda. Nutritional status of preschool children of Raj Gond - a tribal population in Madhya Pradesh" *India. Malaysian Journal of Nutrition*, 12 (2). pp. 147-155. ISSN 1394-035X.
11. Darnton-Hill I, Webb P, Harvey PW, Hunt JM, Dalmiya N, Chopra M, Ball MJ, Bloem MW, de Benoist B (2005). "Micronutrient deficiencies and gender: social and economic costs" *Am J Clin Nutr*.81(5):1198S-205S.
12. Hong Rathavuth (2006): "Relationship between household wealth inequality and chronic childhood under-nutrition in Bangladesh". *International journal for equity in health*;5(1):15.

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