Nutritional Status of Children in an Urban Primary School in Dhaka

Rezaul Karim, Md. Aminul Haque Bhuyan and Saha Sukanta

Institute of Nutrition and Food Science, University of Dhaka, Bangladesh

Introduction

The nutritional status of rural households in Bangladesh is well documented[1,2]. Approximately 76% of rural households are deficient in calorie intake, 53% of the households are deficient in protein intake, 87-96% of the households are deficient in vitamin A, calcium, riboflavin and vitamin C intake, 58% of the households are deficient in niacin intake and 8% and 18% of the households are deficient in iron and thiamine intake[2]. The condition of children are highly alarming. About 54% of the children aged 0-11 years are stunted, 5% of the children are wasted, 10% of the children are simultaneously stunted and wasted, 75% of the children suffer from iron deficiency anaemia[2], and one million out of the 23 million children in the country suffer from vitamin A deficiency disorders[3].

Studies on the nutritional situation of urban areas are highly limited. A study by Bangladesh Bureau of Statistics (BBS) of 1411 urban children aged 6-71 months throws some light[4]. It shows that 44% of the urban children compared to 58% of the rural children of this age group are stunted, and 7% of the urban children compared to 8% of the rural children of this age group are wasted.

In this paper an attempt is made to study the nutritional condition of urban children. Specifically, the nutritional status of selected children in a primary school in Dhaka is analysed, and the effects of some family characteristics and child specific factors on the nutritional status of the children are evaluated. It is hoped that the study would be useful in better understanding of the nutritional status and the factors affecting the nutritional status of urban school going children and be helpful in formulating policy measures for the nutritional development of urban children in the country.

Materials and Methods

Sample

The study was conducted in Nilkhet Primary School which is a government free primary school located in Nilkhet area of Dhaka. The data were collected from 193 male children of class 1-4. The selection of children was made on the basis of availability and willingness of the children to participate in the research project. However, not all data were available for the 193 children, so the sample size differed in different analysis. Actual sample

Bangladesh Journal of Nutrition vol.4, No.1, 53-61 Dec.1990 Printed in Bangladesh. Institute of Nutrition and Food Science, University of Dhaka, Bangladesh.

size in each analysis is mentioned in the analytical tables.

Data

The children were measured without shoes and with minimum clothes. Weights were taken using a Detecto scale (Brooklyn, N.Y.) and the measurements were recorded to the nearest 0.1 kg. Before starting weight measurements every day the scale was standardized using known standard weights. Heights were measured using a Microtoise (Stanley, France) and the measurements were recorded to the nearest 0.1 cm. Height measurements were also calibrated every day using standard measuring tapes made of steel. Socioeconomic data, data on the family and child characteristics and the age of the children were collected by home visits by interviewing the parents of the children. The data collection was conducted during the months of January and February 1991.

Analysis

The nutritional status of the children was assessed on the basis of weight for age and weight for height measures using the US National Center for Health Statistics (NCHS) reference data, Waterlow criterion and Gomez criterion. According to the weight for age measure children weighing 80% (approximately – 2SD or 3rd percentile) or more of the NCHS reference median weight for age were classified as nutritionally normal, children weighing 70-79.9% of the reference median weight for age were classified as moderately malnouished, and children weighing below 70% of the reference median weight for age were classified as significantly malnourished [4-6]. According to the Waterlow criterion, children measuring less than 90% of the NCHS reference median height for age were classified as stunted and children weighing less than 80% of the reference median weight for height were classified as wasted. Otherwise they were classified as normal[7]. According to the Gomez criterion children weighing 90% or more of the NCHS reference median weight for age were classified as normal, children weighing 75-89.9% of the reference median weight for age were classified as first degree (mild) malnourished, children weighing 60-74.9% of the reference median weight for age were classified as second degree (moderate) malnourished, and children weighing below 60% of the reference median weight for age were classified as third degree (severe) malnourished[8]. Where applicable the results are presented in mean ± SD. Unpaired one-tailed Student's t-test was used to compare between the means and chi-square test was used to test for independence between the variables.

Results

Height and Weight

Table 1 presents the heights and weights of the sample children by age. The sample children belonged to the age group 6-10 years.The average

Table 1. Mean height and weight of the children by age and their comparison with the reference NCHS data

Age (years)*	No of children	Weight (kg) Mean ± S.D.	Reference median weight for age, kg	% of reference weight for age	Height (cm) Mean± S.D	Reference median height for age, cm	% of reference height for age	Reference median weight for height, kg	% of reference weight for height
6	12	17.2±3.4	20.7	83.1	108.2± 9.1	116.1	93.2	18.0	95.6
7	51	18.7±2.7	22.9	81.7	117.4± 9.0	121.7	96.5	21.2	88.2
8	62	19.6±2.5	25.3	77.5	122.3± 9.1	127.0	96.3	23.2	84.5
9	54	20.6±2.4	28.1	73.3	127.7± 9.0	132.2	96.6	25.7	80.2
10	14	22.4±2.2	31.4	71.3	131.2± 7.7	137.5	95.4	27.3	82.1
All	193	19.7±2.8	25.7	76.7	122.3±10.3	126.9	96.4	23.2	84.9

* Age at the nearest birth day

child of the age group measured 77% of the reference median weight for age, 96% of the reference median height for age and 85% of the reference median weight for height. The measurements varied 71-83% of the reference median weight for age, 93-96% of the reference median height for age and 80-96% of the reference median weight for height for different ages of children in the sample.

Nutritional Status

Tables 2-4 show the nutritional status of the children by the weight for age measure, Waterlow criterion and Gomez criterion. According to the weight for age measure, 41% of the children were nutritionally normal, 39% of the children were moderately malnourished and 20% of the children were severely malnourished. According to the Waterlow criterion, 51% of the children were nutritionally normal, 15% of the children were nutritionally stunted, 33% of the children were nutritionally wasted and 2% of the children were both nutritionally stunted and wasted. According to the Gomez criterion, 13% of the children were nutritionally normal, 49% of the children suffered from first degree malnutrition, 35% of the children suffered from second degree malnutrition and 3% of the children suffered from third degree malnutrition. First degree malnutrition is a mild form of malnutrition and for practical purposes children suffering from first degree malnutrition can be considered as normal. Given this consideration, 62% of the children can be classified as normal by the Gomez criterion. Thus, on the average, 40-60% of the children can be classified as normal and 40-60% of

Table 2. Nutritional status of the children by the weight for age measure (using NCHS data)

Nutritional status *	No. of children	%
Normal	80	41.4
Moderately malnourished	75	38.9
Significantly malnourished	38	19.7
All	193	100.0

* Children weighing 80% more of the NCHS reference median weight for age were classified as nutritionally normal. children weighing 70-79.9% of the reference median weight for age are classified as moderately malnourished, and children weighing below 70% of the reference median weight for age are classified as significantly malnourished[4-6].

Table 3. Nutritional status of the children by the Waterlow criterion

Nutritional status *	No. of children	%
Normal	99	51.3
Stunted	29	15.0
Wasted	62	32.1
Both stunted and wasted	3	1.6
All	193	100.0

* Children measuring less than 90% of the NCHS reference median height for age were classified as stunted and children weighing less than 80% of the reference median weight for height were classified as wasted. Otherwise they were classified as normal[7]

Table 4. Nutritional status of the children by the Gomez criterion

Nutritional status *	No. of children	%
Normal	25	13.0
First degree malnourished	94	48.7
Second degree malnourished	68	35.2
Third degree malnourished	6	3.1
All	193	100.0

* Children weighing 90% or more of the NCHS reference median weight for age were classified as normal, Children weighing 75-89.9% of the reference median weight for age were classified as first degree (mild) malnourished, children weighing 60-74.9% of the reference median weight for age were classified as second degree (moderate) malnourished, and children weighing below 60% of the reference median weight for age were classified as third degree (severe) malnouriahed[8].

the children can be classified as suffereing from different forms of malnutrition. The variations in the proportions depend on the criterion used to identify the nutritional status of the children.

Factors Affecting Nutritional Status

Family Income

Table 5 shows the relationship between the nutritional status of the children and their family income using Waterlow criterion. The average monthly family income of the

Table 5. Nutritional status of the children by monthly family income (Waterlow criterion)

Nutritonal status	No. of children	Up to Tk 1200 %	Tk 1300 Tk 2400 %	TK 2500- Tk 3600 %	Average income, 00Tk Mean± S.D.
Normal	101	34.0	55.0	11.0	19.3±9.2
Malnourished*	92	44.1	50.5	5.4	17.3±8.2
All	193	38.9	52.8	8.3	18.3±8.9

* Stunted, wasted and both stunted and wasted together

nutritionally normal children was 1900 taka compared to 1700 taka for the malnourished children. The difference is significant at $p < 0.1$. About 11% of the nutritionally normal children came from richer (monthly income 2000 taka or more) families compared to 5% of the malnourished children, and 34% of the nutritionally normal children came from poorer (monthly income less than 1000 taka) families compared to 44% of the malnourished children. The relationship is also prominent at the mid-income level. This indicates that there exists a positive relationship between the nutritional status of the children and their family income but the relationship is not statisticully significant ($p > 0.1$).

Father's Education

Table 6 shows the relationship between the nutritional status of the children and their fathers' formal school education using Waterlow criterion. Only 2% of the nutritionally normal children had illiterate fathers compared to 10% of the malnourished children, and 22% of the nutritionally normal children had highly educated (education level class 11 and more) fathers compared to 17% of the malnourished children. This indicates that there exists a positive relationship between the nutritional status of the children and their fathers' level of formal school education, and the relationship is significant at $p<0.1$.

Mother's Education

Table 7 shows the relationship between the nutritional status of the children and their mothers' formal school education using Waterlow criterion. About 30% of the nutritionally normal children had illiterate mothers compared to 46% of the malnourished children, and 25% of the nutritionally normal children had highly educated (education level class 6 and more)

Table 6. Nutritional status of the children by father's education (Waterlow criterion)

Nutritional status	No. of children	Illiterate %	Up to class V %	Class VI–X %	Class XI and above %
Normal	101	1.9	27.7	48.6	21.8
Malnourished*	92	9.8	21.7	51.1	17.4
All	193	5.7	24.9	49.7	19.7

* Stunted, wasted and both stunted and wasted together

mothers compared to 22% of the malnourished children. This indicates that a positive relationship exists between the nutritional status of the children and their mothers' lelvel of formal school education, and the relationship is significant at $p<0.1$.

Family Size

Table 8 shows the relationship between the nutritional status of the children and their family size using Waterlow criterion. The average family size of the nutritionally normal children is 5.6 members which is lower than the average family size of the malnourished children. The difference is not however significant ($p>0.1$). About 38% of the nutritionally normal children came from small (having 1-4 members) families compared to 24% of the malnourished children, and 4% of the nutritionally normal children came from very large (having 9 or more members) families compared to 7% of the malnourished children. This is indicative of a positive relationship between the nutritional status of the children and their family size, but the relationship is not statisfically significant ($p> 0.1$).

Table 7. Nutritional status of the children by mother's education (Waterlow criterion)

Nutritional status	No. of children	Illiterate %	Class class I–V %	Class VI and more %
Normal	67	29.9	44.8	25.3
Malnourished*	46	45.7	32.6	21.7
All	113	36.3	39.8	23.9

* Stunted, wasted and both stunted and wasted together

Table 8: Nutritional status of the children by family size (Waterlow criterion)

Nutritional status	No. of children	Family size			Average family size Mean ± S.D.
		1-4 members %	5-8 members %	9 and more members %	
Normal	45	37.8	57.8	4.4.	5.6 ± 2.4
Malnourished*	68	23.5	69.1	7.4	6.0 ± 1.9
All	113	29.2	64.6	6.2	5.9 ± 2.1

* Stunted, wasted and both stunted and wasted together

Birth Order

Table 9 shows the relationship between the nutritional status of the children and their birth order using Waterlow criterion. About 56% of the nutritionally normal children were the first born of their parents compared to 36% of the malnourished children, and 44% of the nutritionally normal children were the second and subsequent born of their parents comapred to 64% of the malnourished children. This indicates that a positive relationship exists between the nutritional status of the children and their birth order, and the relationship is singificant at $p<0.025$.

Discussions

The study observed that 40-60% of the male children aged 6-10 years and studying in class 1-4 in a government free primary school in Dhaka are nutritionally normal and the remaining 40-60% of the children suffer from some degree of malnutrition. The variations in the proportions depend on the criterion used to measure the nutritional status. The proportions are within the range of proportions observed for urban children in Bangladsh. For example, BBS observed that about 50% of the urban children aged 6-71 months are normal[4]. BBS also observed that 42% of the children suffer from first degree malnutrition, 44% of the children suffer from second degree

Table 9. Nutritional status of the children by birth order (Waterlow criterion)

Nutritional status	No. of children	First born %	Second and subsequent born, %
Normal	55	56.4	43.6
Malnourished*	39	35.9	64.1
All	94	47.9	52.1

* Stunted, wasted and both stunted and wasted together

malnutrition and 6% of the children suffer from third degree malnutrition[4]. The results are consistent with our results. However, contrast exists in the proportion of stunted and wasted children. BBS observed that 44% of the children are stunted and 7% of the children are wasted compared to 15% of the children stunted and 32% of the children wasted observed in this study. Urban children are nutritionally better-off compared to rural children of the same age group. In comparison to our results, 19-31% of the rural boys aged 5-11 years are nutritionally normal as measured by the Waterlow criterion and less than 1% of the children are nutritionally normal as measured by the Gomez criterion[2].

The study observed strong indications that the nutritional status of the children are positively related to family income and negatively related to family size but the relationships are not statistically significant ($p>0.1$). Previous surveys observed significant relationship between per capita daily food and nutrient intake and family income and observed insignificant relationship between per capita daily food and nutrient intake and faimly size in rural areas[2]. Our results of insignificant relationship of the nutritional status of the children with family income supports Berg who observed that higher incomes do not necessarily lead to better nutrition[9]. The study also observed that the nutritional status of the children was postitively related to the fathers' level of formal school education, positively related to the mothers' level of formal school educaton, and negatively related to the children's birth order among the live born children of their parents ($p<0.1$). The relatonships are indicative. Previous surveys observed insignificant relationship between per capita daily food and nutrient intake and family education score in rural areas[2]. Our results of a significant relationship between the nutritional status of the children and parents' education in urban areas is a significant departure from rural findings. The findings imply that parents' education may be manipulated for improving the nutritional status of children at least in urban areas. The findings also suggest that public media like radio, television, news papers etc can play an important role in addressing the nutritional problems in urban areas. The negative relationship between the nutritional status of the children and their birth order highlights the beneficial effects of birth control and justifies the encouragement of population control programmes in Bangladesh on grounds of nutritional welfare of the children.

Summary

A study of 193 male children aged 6-10 years and studying in class 1-4 in a government free primary school located in Nilkhet, Dhaka indicates that 40-60% of the children were nutritionally normal and 40-60% of the children suffered from different degrees of malnutrition, the variations in the proportions depending

on the criterion used to measure the nutritional status of the children. About 39% of the children were moderately malnourished and 20% of the children were significantly malnourished (weight for age measure); 15% of the children were stuned, 32% of the children were wasted and 2% of the children were simultaneously stunted and wasted (Waterlow criterion); and 49% of the children suffered from first degree malnutrition, 35% of the children suffered from second degree malnutrition and 3% of the children suffered from third degree malnutrition (Gomez criterion). The results were broadly similar to the results obtained for urban pre-school children but showed a better-off position compared to the rural children of similar age groups.

The nutritional status of the children was positively related to the fathers' level of formal school education, positively related to the mothers' level of formal school education and negatively related to the children's birth order among the live born children of the parents. There are strong indications that the nutritional status of the children were positively related to family income and negatively related to family size but the relationships were not statistically significant. The significant relationship of the nutritional status of the children with their parents' level of formal school education is an important departure from the findings in rural areas. It implies that parents' eduction may be manipulated to improve the nutritional condition of children and underlines the role of public media in addressing the nutritional problems at least in the urban areas of the country.

References

1. INFS, 'Nutrition Survey of Rural Bangladesh 1975-76', Institute of Nutrition and Food Science, University of Dhaka, Dhaka, 1977.
2. INFS, 'Nutrition Survey of Rural Bangladesh 1981-82,' Institute of Nutrition and Food Science, University of Dhaka, Dhaka, 1983.
3. HKI-IPHN, 'Bangladesh Nutritional Blindness Study', Helen Keller International and Institute of Public Health Nutrition, Dhaka, 1985.
4. BBS, 'Report on the Child Nutrition Status Module Bangladesh Household Expenditure Survey 1985-86', Bangladesh Bureau of Statistics, Ministry of Planning, Government of Bangladesh, Dhaka, 1987.
5. Chong, YH and Lim RKH, 'The Prevalence of Malnutrition Amongst Malay Pre-school Children-Comparative Assessment by Anthropometric Indicators,'. Environmental Child Health, vol 21, no 1, 1975, pp 19-22.
6. Dugdale, AE and Eaton-Evans, J, 'Methods Used in Anthropometry and Suggested International Reference Sets', Human Nutrition Research Group, Department of Child Health, University of Queensland, Brisbane, 1986.
7. Waterlow, JC 'Classification and Definition of Protein-Calorie Malnutrition', British Medical Journal, vol 3, no 566, 1972.
8. Gomez F, Galvan RR, Frenk S, Munoz JC, Chavez R, Vasquez J, 'Mortality in Second and Third Degree Malnutrtition', Journal of Tropical Pediatrics, vol 2 1956 pp 77-83.
9. Berg, A, 'Increased Income and Improved Nutrtion: A Shibboleth Examined', International Development Review, vol 12, no 3, 1970, pp 3-7.