NUTRITIONAL STATUS OF SCHOOL CHILDREN IN RURAL SCENARIO

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This study investigates the nutritional status of school children on randomly selected Seven hundred thirty six children with their age range between 6 to 13 years taking Mid Day Meal (MDM) in govt. schools. This study is cross-sectional, consists the anthropometric measurements of body i.e., the height, weight and calculated BMI. To assess the nutritional status of children, the comparison has been drawn on the measurements between the collected data on children's body and the given ICMR (Indian Council of Medical Research) standard value. The study reveals the poor nutritional status of school children receiving mid day meal per day in rural scenario.

Key words – Mid Day Meal, Anthropometric Measurements

INTRODUCTION

Children of School going are a major segment of the community. Their health and nutritional status will indicate the changing trend of the nutritional profile of the region. Nutrition plays a key role for health and development of a child. Good nutrition protects the infants, the children and the mother, strengthens the immune system and reduces the risk of non communicable diseases related to foods. It is a basic requirement for good health and a living organism is a product of nutrition (Begum, 1997). Over 1/5th of our population comprises of children aged 6-13 years i.e. the group covering primary and secondary education (Raghava, 2005). The age of 5 to 15 years is a period of transition between childhood and adulthood which occupies a crucial position in the life of human beings. This period is characterized by an exceptionally rapid rate of growth. This age is considered as a dynamic period of growth and development because children undergo physical, mental, emotional and social changes. This age group lay the foundation for good health and sound mind in children which persists with them through their lifetime (Suvarna and Itagi, 2009). According to the estimates in developing countries (1996-2005), approximately 146 million children are underweight. Of these, 57 million children live in India (UNICEF, 1997). In addition it is claimed that the actual statistical information regarding nutritional assessment of growing age children is not properly estimated due to non-availability of good research by any organized initiation.

Child Nutrition

One of the greatest problems for rural India is poor nutrition among children. The country is still struggling with this problem. Undernutrition, the condition resulting from faulty nutrition, weakens the immune system and causes significant growth and cognitive delay. Developing countries like India, accounts for about 40% of undernourished children in the World (James, 1998). National Nutrition Monitoring Bureau (NNMB, 2000) indicates that about 70% of these children are undernourished and there is about 30% deficit in energy consumption and over 75% of the children have dietary micronutrient deficit of about 50%. The prevalence of underweight children in India is highest in the world. Child malnutrition has risen in recent years in India (Chaterjee, 2007). Child

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malnutrition in school going children is responsible for 22% of the country's burden of diseases (Deonis, 2009). Famous economist, Jean Dreze told that low height according to the age of the particular children is the sign of malnutrition. In West Bengal, it is a great misery to say that rate of low height children is 69%, that is maximum in our country (Ananda Bazar Patrika, 27th June, 2012).

MID DAY MEAL SCHEME (MDMS)

The renowned midday meal project is a famous school meal scheme in India. The main objective of the scheme is to provide free of cost day lunch to students during working school days. Some other important aims of this scheme are including protecting students from study-room hunger, improved socialization, increasing enrollment as well as attendance, social empowerment, addressing malnutrition etc. As per Mid-day Meal Scheme (MDMS) in India, all the children studying in primary and upper primary classes in Government school will get free lunch during working days. As per Government, this scheme is the world's largest school feeding programme. While there is evidence that school feeding in India does indeed improve the immediate nutritional intake of children (Afridi, 2010). And it also helps avert severe undernutrition among many of the children, particularly of the socially and economically underprivileged communities (Dreze and Goel, 2003).

The Cooked mid-day meal (CMDM) scheme was introduced in all Government and Government-assisted primary schools in the form of a country-wide "Day of action on mid-day meals" according to the guidelines given by the Union Ministry of HRD, Department of Elementary Education and Literacy with prescribed supply of meal of content calories and Proteins. The details contents are given below in the following tables.

Table 1 - Prescribed per head Nutritional Content for Mid-Day Meal

Item	Primary	Upper Primary
Calories	450	700
Proteins (Gms)	12	20
Per head price	Rs. 3.59 per meal	Rs. 5.38 per meal

(source :http://mdm.nic.in/ and compiled by the author)

The above nutritional content is ensured through a package consisting of the following ingredients per child per day per school –

Table 2 - Prescribed Ingredients of School Meal for children

Item	Primary	Upper Primary
Rice/ Wheat	100gms	150gms
Pulses	20gms	30gms
Vegetables	50gms	75gms
Oil	5gms	7.5gms
Micro-nutrients	Adequate quantities of micro nutrients like Iron, Folic Acid, Vitamin-A etc.	

(source :http://mdm.nic.in/ and compiled by the author)

The concept of nutritional support to education is not new in India and it dates back to 1925 when Madras Corporation started a school lunch program. In 1995, such a scheme was launched at

the national level in order to provide nutritional support to students in primary schools in the goal to give boost to universalization of elementary education and to impact the nutrition of students in primary classes. The Mid Day Meal Scheme (MDMS) has been revised in 2004 and as per the Supreme Court directive it envisages provision of cooked, nutritious Mid Day Meal to all govt. primary and secondary school children.

Objectives

The objective is to determine the pattern of nutritional status of children attending mid day meal scheme in government primary and upper primary schools in age 6-13 years. The principal aim of the nutritional assessment of school children is to map out the magnitude and geographical distribution of nutrition as a public health problem and to suggest appropriate corrective measures to overcome malnutrition of the children.

MATERIALS AND METHODS

Here the materials comprise school going children belonging 6-13 age groups from class I standard to class VIII standard in the two adjoining blocks of Ramnagar, Purba Medinipur district, West Bengal, India. In this cross sectional study, 736 school going children divided equally among Class I to class VIII standard have been taken as sample and were examined through anthropometric devices. In this rural set up, only general, scheduled caste, Muslim OBC and Hindu OBC community are available and the study has covered these sections of the children.

Anthropometric Measurements: Anthropometric indices are combination of measurements related to body size and composition. Anthropometry is the most useful tool for assessing the nutritional status of children. To do the anthropometric measurement, four variables need to be collected: age, weight, height and gender. Height and weight of each child was measured by means of a measuring tape and weighing scale respectively. Here, also BMI for age as a measure of Body Mass Index has been calculated. It is calculated dividing the weight in kilograms (kg), by the height squared (2) in meters (m). Low BMI indicates the low weight of the children. In this study, nutritional state indicators used are Body Mass Indices (BMI) for age, weight for age, height for age. After collecting the concerned data, the comparison from the standard measurement of ICMR (Indian Council of Medical Research), 1990 has been drawn to show the difference between the two. Below mentioned table shows the standard ICMR height and weight per age and per sex.

ICMR Standard Height / Weight Chart

Table 3 - Height and weight of boys at 6-13 ages

AGE	WEIGHT (kg)	HEIGHT (cm)
6 years	20.7	116.1
7 years	22.9	121.7
8 years	25.3	127.0
9 years	28.1	132.2
10 years	31.4 137.5	
11 years	32.2	140.0
12 years	37.0	147.0
13 years	40.9	153.0

Table 4 - Height and weight of girls at 6-13 ages

AGE	WEIGHT (kg)	HEIGHT (cm)
6years	19.5	114.6
7 years	21.8	120.6
8 years	24.8	126.4
9 years	28.5	132.2
10 years	32.5	138.3
11 years	33.7	142.0
12 years	38.7	148.0
13 years	44.0	150.0

Source: Nutrient Requirements and Recommended Dietary Allowances for Indians, I.C.M.R., 1990).

The study employed varied tools and techniques in the process of collecting data. With Different techniques of data collection, like observation, interview, pre structured questionnaire etc. are used singly or in combination depending on the subject concerned of this study. Study design is mainly a qualitative data collection method that provides information about nutrition. The collected data is being analysed and interpreted statistically through percentage and table.

FINDINGS

Both descriptive and inferential statistics is being employed in analyzing the data gathered for this study. Height and weight of every age group are the most common body (or anthropometric) measurements used to measure nutritional status in emergencies. The present study shows the basic parameters of height, weight and Body Mass Index (BMI) of each child as compared to the reference standards laid down by Indian Council of Medical Research (ICMR), 1990. Here, for detail analysis, single and bivariate table has been made on the basis of physical measurements according to age and sex wise.

Age And Sex Wise Children's Height, Weight And BMI

In the present study, out of total 736 students, boys and girls ratio are same. In every age group, the boys and girls are taken equally and the number is 46. The variables of weight, height and BMI around their age and sex wise are being summarised in the following single table. These variables are being categorised as taller, under and low of height, weight and calculated BMI as compared to ICMR standard, respectively. In comparison to ICMR standard the deficit in the weight for age measure corresponds to the biological state of being underweight and simultaneously the surplus value of height as taller for age and deficit in the calculated BMI measure as low. Because, the field data results that the height of child is taller than the ICMR standard, weight is under than the standard and therefore calculated BMI is low than the standard in every age group irrespective of sex and table data are being exhibited in percentage.

Table 5 - Distribution of Children's Height, Weight and BMI chart of Deficit and Surplus from ICMR According to Age and Sex

AGE	SEX	HEIGHT (%) (Taller than ICMR)	WEIGHT (%) (Under than ICMR)	BMI (%) (Low than ICMR)
6	BOYS	71.74	60.87	54.35
	GIRLS	58.69	78.26	63.05
7	BOYS	84.78	54.35	76.09
	GIRLS	86.95	69.56	93.48
8	BOYS	47.83	73.91	91.30
	GIRLS	65.22	69.56	78.26
9	BOYS	52.17	86.96	91.30
	GIRLS	50.00	91.30	95.65
10	BOYS	71.74	91.30	93.47
	GIRLS	69.56	97.82	51.69
11	BOYS	69.57	82.61	89.13
	GIRLS	65.22	73.91	93.48
12	BOYS	93.48	95.65	93.48
	GIRLS	91.31	100	97.82
13	BOYS	84.78	86.96	91.31
	GIRLS	82.61	93.48	95.65

(**S**ource : Field data and compiled by the author**)**

This table shows the percentage of children taller in height, under in weight and low in BMI in every age group in comparison to ICMR standard height, weight and BMI. The overall prevalence of taller height of both boys and girls in the present study is praiseworthy, exceptional and remarkable. But the prevalence of underweight and low BMI is most common and normal picture as in most developing countries. Here it is striking to note that the heights of the girls in most cases are taller than the boys.

Mean Differences of Nutritional Status of Age and Sex Wise From ICMR Standard (According to Height, Weight and BMI)

The numbers of boys and girls in each single years and their mean height, weight and BMI is given in these two tables. The mean height, weight and BMI of children were found to be comparable to the ICMR pooled data and the differences from the standard data are being picturised.

Table 6 - Comparison of Mean Height, Weight and BMI of School boys with ICMR Standard on the basis of age BOYS

AGE	HEIGHT			WEIGHT			BMI		
	Mean	ICMR Standard	Difference	Mean	ICMR Standard	Difference	Mean	ICMR Standard	Difference
6	1.22	1.161	0.059(+)	17.93	20.7	**2.77 (-)**	11.87	15.33	**3.46 (-)**
7	1.24	1.217	0.023(+)	18.94	22.9	**3.96 (-)**	11.95	15.68	**3.73 (-)**
8	1.35	1.27	**0.08 (+)**	21.25	25.3	**4.05 (-)**	10.61	15.71	**5.1 (-)**
9	1.38	1.322	0.058(+)	22	28.1	**6.1 (-)**	12.32	16.15	**3.83 (-)**
10	1.41	1.375	0.035(+)	23.10	31.4	**8.3 (-)**	12.79	16.70	**3.91 (-)**
11	1.49	1.40	**0.09 (+)**	23.89	32.2	**8.31 (-)**	13.10	16.43	**3.33 (-)**
12	2.13	1.47	**0.66 (+)**	24	37	**13 (-)**	14	17.13	**3.13 (-)**
13	2.74	1.53	**1.21 (+)**	24.83	40.9	**16.07 (-)**	15.13	17.48	**2.35 (-)**

(**Source : Field data and compiled by the author**)

(+ indicates taller/over than ICMR standard, - indicates shorter/under than ICMR standard, Mentioned in highlighted areas)

Table 7 - Comparison of Mean Height, Weight and BMI of School Girls with ICMR Standard on the basis of age GIRLS

AGE	HEIGHT			WEIGHT			BMI		
	Mean	ICMR Standard	Difference	Mean	ICMR Standard	Difference	Mean	ICMR Standard	Difference
6	1.213	1.146	**0.067 (+)**	18.43	19.5	**1.07 (-)**	11.83	14.84	3.01 (-)
7	1.29	1.206	**0.084 (+)**	18.06	21.8	**3.74 (-)**	10.83	14.93	**4.1 (-)**
8	1.33	1.264	**0.066 (+)**	20.81	24.8	**3.99 (-)**	11.79	15.6	**3.81 (-)**
9	1.43	1.322	**0.108 (+)**	23	28.5	**5.5 (-)**	11.35	16.38	**5.03 (-)**
10	1.51	1.385	**0.125 (+)**	23.69	32.5	**8.81 (-)**	12.10	17.11	**5.01 (-)**
11	1.62	1.42	**0.2 (+)**	24.11	33.7	**9.59 (-)**	12.89	16.68	**3.79 (-)**
12	1.73	1.48	**0.25 (+)**	25	38.7	**13.7 (-)**	13.10	17.67	**4.57 (-)**
13	2.14	1.50	**0.64 (+)**	26.39	44	**17.61(-)**	14.12	18.33	**4.21 (-)**

(**Source : Field data and compiled by the author**)

(+ indicates taller/over than ICMR standard, - indicates shorter/under than ICMR standard, Mentioned in highlighted areas)

Results show that boys were heavier than girls and girls are found taller than the boys in each age. The mean weight of the children was much lower in comparison to ICMR specifications. The mean weight of the girls is much less than the National standard as comparison to boys. In the age group of 6 to 13, the height of the girls is distinctly taller as compared to the boys in this age group. The mean height of the girls in the age is higher than boys. This study reported that of children were found to be severely underweight. In BMI status, the result is like the weight status of the children, i.e., the low status. Due to the severe deficit in weight status, the calculated BMI is seen also excessively low in comparison to ICMR standard. Underweight is used as a composite indicator to reflect acute undernutrition.

Community Wise Children's Nutritional Status

In order to make the study more comprehensive and holistic, the body measurements of the cross-section of the community have been covered in the study. Out of 736 children, 184 school children are taken from each category, i.e., General, Scheduled Caste, Hindu and Muslim community. Out of 184 students, boys and girls ratio is 92. From each category of the height, weight and BMI has been picturised on the basis of sex division in the following bivariate table. In these three tables, highlighted areas are striking in this sense that the study reports the underweight, taller height and low BMI of the children in the rural scenario.

Table - 8: Distribution of Children's Weight Compared to ICMR for each Sex and for Each Community Weight

CATEGORY	BOYS in %			Total	GIRLS in %			Total	Grand Total
	under	over	Proper		under	over	proper		
GEN	71 *77.18*	12 *13.04*	9 *9.78*	92	77 *83.69*	13 *14.13*	2 *2.18*	92	184
SC	73 *79.35*	13 *14.13*	6 *6.52*	92	76 *82.61*	14 *15.21*	2 *2.18*	92	184
OBC (Hindu)	69 *75*	13 *14.13*	10 *10.87*	92	69 *75*	16 *17.39*	7 *7.61*	92	184
OBC (Muslim)	78 *84.78*	13 *14.13*	01 *1.09*	92	88 *95.65*	0	4 *4.35*	92	184
TOTAL	291 *79.08*	51 *13.86*	26 *7.06*	368	310 *84.24*	43 *11.68*	15 *4.08*	368	736

(Source : Field data and compiled by the author)

In the weight chart, Muslim boys i.e., 84.78% are underweight, after that Scheduled caste category boys i.e., 79.35%, after general community i.e., 77.18% and lastly other backward Hindu classes i.e., 75% are belonging to underweight category.

Here, in girls section, Muslim girls are severely underweight i.e., 95.65%, then 83.69% of general community girls, 82.61% of SC girls and 75% of other backward Hindu girls are belonging in underweight.

Table 9 - Distribution of children's Height compared to ICMR for each sex and for each community Height

CATEGORY	BOYS in %			Total	GIRLS in %			Total	Grand Total
	Shorter	Taller	Proper		Shorter	Taller	Proper		
GEN	9 *9.78*	62 *67.39*	21 *22.83*	92	17 *18.48*	63 *68.48*	12 *13.04*	92	184
SC	10 *10.87*	74 *80.43*	8 *8.7*	92	13 *14.13*	71 *77.17*	8 *8.7*	92	184
OBC (Hindu)	20 *21.74*	64 *69.57*	8 *8.69*	92	13 *14.13*	62 *67.39*	17 *18.48*	92	184
OBC (Muslim)	19 *20.65*	65 *70.65*	8 *8.7*	92	26 *28.26*	66 *71.44*	0	92	184
TOTAL	58 *15.76*	265 *72.01*	45 *12.23*	368	69 *18.75*	262 *71.20*	37 *10.05*	368	736

(Source : Field data and compiled by the author)

In the height chart, the result is also here praiseworthy. Around 70% boys and girls irrespective of caste are taller as compared to ICMR standard.

Table - 10: Distribution of children's BMI Compared to ICMR for each Sex and for each Community BMI

CATEGORY	BOYS in %			Total	GIRLS in %			Total	Grand Total
	Low	High	Proper		**Low**	**High**	**proper**		
GEN	74 *80.44*	12 *13.04*	6 *6.52*	92	81 *88.04*	9 *9.78*	2 *2.18*	92	184
SC	75 *81.52*	10 *10.87*	7 *7.61*	92	77 *83.69*	11 *11.96*	4 *4.35*	92	184
OBC (Hindu)	81 *88.04*	9 *9.78*	2 *2.18*	92	83 *90.22*	8 *8.69*	1 *1.09*	92	184
OBC (Muslim)	83 *90.22*	4 *4.35*	5 *5.43*	92	89 *96.44*	3 *3.26*	0	92	184
TOTAL	313 *85.05*	35 *9.51*	20 *5.44*	368	330 *89.68*	31 *8.42*	7 *1.90*	368	736

(Source : Field data and compiled by the author)

In calculating BMI, the results are same as weight chart due severe deficit at weight as compared to ICMR standard.

In the BMI chart, Muslim boys i.e., 90.22% are seen as maximum low, after the other backward

Hindu community boys i.e., 88.04%, next the Scheduled caste category i.e., 81.52% and then general community i.e., 80.44% are belonging to low category. Here, in girls section, Muslim girls are severely in low BMI i.e., 96.44%, next 90.22% of other backward Hindu girls, just after 88.04% of general community girls and lastly 83.69% of SC girls are belonging in low BMI.

The pattern of gain in height was more among girls but boys had gained more weight in comparison to girls. The study shows that the mean height of both boys and girls are higher than ICMR standard. Statistically, mean height is higher and mean weight and calculated BMI are seen as under and low respectively than ICMR standard value in the present study. So, they are not suffered in chronic malnutrition. In another side, the mean weight of both boys and girls are much lower than ICMR standard. So, it is being claimed that side by side the child are suffered from acute malnutrition and it can be claimed that their malnutrition can be overcome through conscious and humanitarian efforts.

CONCLUSION

The nutritional status of school children under study was found to be low. Statistically the mean weight and calculated BMI of the children are lower than ICMR standard. The results clearly indicate that the prevalence of severe underweight is much higher among school going children. It is well documented that dietary insufficiencies are mainly reflected through the high prevalence of underweight. The findings of present study indicate that malnutrition of children was mainly due to recent causes. Therefore, this malnutrition must be overcome through immediate calculative steps. The prevalence of under nutrition in this study is in the category of not so high. Underweight is used as a composite indicator to reflect both acute under nutrition and lower height is an indicator of chronic or long-term nutritional deficiency and/or disease or illness. Here, average height of boys and girls are higher in comparison to ICMR standard. Thereby, the children in the present study experienced instant and prolonged nutritional stress. The prevalence of underweight is higher in girls than in boys. Side by side, it is well documented that boys are more likely to suffer from long term nutritional deficiency than girls in respect of measuring height. In another aspect, girls are more likely to suffer acute malnutrition than boys in respect of measuring weight. Deficiency in height indicates long term nutrition which needs to overcome through planned, concerted, long term and well balanced efforts. This study reports that height is really praiseworthy where long term nutritional deficiency is not documented. Here, deficiency in weight among school going children shows instant and acute nutritional deficit which may be overcome through some instant efforts. The prevalence of acute malnutrition among children is a sensitive and objective crisis indicator and is associated with an increased emergency risk of morbidity and mortality. Strong evidence indicates that a child with severe acute malnutrition has a greatly increased risk of dying, and in some instances this extends to the moderately malnutrition as well. Severe and acute malnutrition increases the incidence, duration and severity of infectious disease.

Supplementary feeding programmes initiated by the Government of India like Mid-Day Meal Scheme are indeed a good attempt to combat malnutrition among school-age children but more needs to be done. Good housing with sanitary living conditions and good environment are a must for growing children to attain their full growth potential. Such environment will minimize the chances of contracting diarrhoea and other related infectious diseases in children. It is highly desirable that all children between 6-13 years of age be provided deworming in every 6 months. In addition there is extra need to focus the attention of policy-makers on the nutritional status of children as one of the main indicators of development and as a precondition for the socioeconomic advancement of societies in the long term. Addressing acute malnutrition, supporting and protecting nutrition

in emergencies need appropriate policy development, coordination, monitoring, evaluation and capacity development. These functions should go hand in hand with well balanced programming, and are necessary for a longer term and have more sustained impact on nutrition.

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