

Dietary Intake Patterns of Children (7-9 Years) From Mawana, Uttar Pradesh

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Abstract

This study was conducted to assess the dietary intake of children (7-9 years), belonging to lower middle socio-economic strata of Mawana, Uttar Pradesh. Total of one hundred subjects (56 boys and 46 girls) participated in the study. In terms of religion 46% were Muslims and 54% were Hindus (39% General category and 25% schedule castes). Dietary intake patterns revealed a cereal pulse based diet with low consumption of milk, eggs, meat, green leafy vegetables and fruits. Mean intake of all nutrients except protein was found to be lower than RDAs. Sixty two percent of the subjects were consuming adequate amount of proteins while 38% were consuming marginally adequate amount of proteins. In terms of iron and Vitamin A, 96% and 85% subjects respectively, had inadequate intakes. Forty nine subjects had inadequate intake of calcium. There were no significant differences in mean intake of nutrients between boys and girls which implies that there was no gender discrimination in terms of giving food in families of subjects. Total dietary NAR score of four nutrients (protein, calcium, iron and vitamin A) was poor in 52% of the subjects. Total dietary NAR was found to be significantly associated with total income of the family, category of child (general/ scheduled caste), and number of siblings (<2/2 or more). Children belonging to poorer families, being from schedule caste families and having two or more siblings were at a disadvantage.

Key words- Dietary intake, children, NAR, Nutrient intake

1. INTRODUCTION

Inadequate food habits along with the traditional socio-cultural practices may lead to a high proportion of under nutrition in children that also interferes with their body growth and development (Rao et al, 2006). Therefore the dietary intake is considered as one of the most important determinants of nutritional status (Grover and Singh, 2006). The health of children is dependent upon a diet that provides sufficient calories and other nutrients for their optimal physical and social development. Inadequate intakes will lead to growth retardation, poor academic performance, micronutrient deficiencies and psycho-social difficulties (Amirthveni and Barikor, 2002).

The primary school age period is nutritionally significant because this is the prime time to build up body stores of nutrients in preparation for rapid growth of adolescence. Malnutrition in childhood can have repercussions in terms of growth retardation, reduced work capacity and poor social and mental development. Many studies have been done on especially vulnerable phases of life like infancy, preschool age, adolescence, pregnancy, lactation etc. However, it is important to have studies in other age groups also especially among children growing up in low or lower middle income groups.

2. METHODOLOGY

The study was conducted in a private primary school catering to low middle income group families in Mawana, Uttar Pradesh. Subjects were students of class 2nd, 3rd and 4th. In these classes there were three sections. One section from each class was selected randomly. A total number of 100 children, in age group of 7-9 years, belonging to lower middle socio economic strata were selected. A pre coded, pretested and semi structured schedule was administered to the subjects and their parents to collect the information. Information about their socio economic profile, meal patterns, and dietary likes or dislikes were also collected. Data about dietary intake patterns of subjects was collected by 'Food frequency questionnaire'. This data was analyzed to find out dietary patterns of subjects. Information about diet was also collected by "24 hours' dietary recall". This data was used to calculate calorie, protein, iron, calcium and vitamin A intake of subjects. The mean of these values were compared with RDAs. Data of protein, iron, vitamin A and calcium intake of each subject was used to calculate Nutrient Adequacy Ratio (NAR) of their diet. Total NAR values were also calculated. Influence of various factors on Total NAR was studied by regression analysis.

3. RESULTS AND DISCUSSIONS

The study was conducted on 100 school children in the age group of 7-9 years. They were studying in a private primary school catering to children from lower middle socio economic group residing in Mawana, Western Uttar Pradesh. Mawana is a small town near Meerut, where not only Hindus (General category) but also a large population of Muslims and scheduled castes live.

Socio Demographic Profile of subjects: The subjects (100 in number) were studying in class one to three. There were 56 boys and 44 girls who were part of this study. Further, 64% were Hindus (39% General and 25% scheduled caste) and 36% were Muslims. With respect to father's education of the subjects, majority (60%) had studied up to middle class, only 17% had studied up-to senior secondary level while 23 % had studied at college level. Three children were there whose fathers were no more. With respect to father's occupation, 26% were labourers/semiskilled workers/artisans, 7% were farmers, 42% managed their own business (like shopkeepers, small scale traders, vendors etc.) and 25% were in service (working as clerks, peons etc.).

Education levels of mothers were lower in comparison to that of fathers and most of them were homemakers. In terms of total monthly family income, most (69%) reported it between Rs 5000 to Rs. 10,000, 23% above Rs 10,000 and 8% below Rs 5000. In terms of number of siblings of subjects, 57% had 0 or 1 sibling while 43% subjects had more than one sibling. This indicates that the norm of two child family is still not being followed.

Dietary Intake of the Subjects: Data on usual consumption pattern of various food groups was collected by Food Frequency Questionnaire. The data (Table 1) was collected from mothers of subjects and also inputs were taken from subjects regarding their likes and dislikes.

Table 1: Data on Food Frequency

Food Group	Daily (%)	2-3 times/week (%)	Once a week (%)	Once in 15 days or more (%)	Not taken (%)
Whole Cereals	100	0	0	0	0
Refined Cereals	26	10	8	56	0
Whole Pulses	0	6	76	18	0
De husked Pulses	22	65	8	3	2
Green Leafy Vegetables	5	8	28	59	0
Root Vegetables	100	0	0	0	0
Other Vegetables	35	45	6	14	0
Fruits	2	5	40	43	10
Milk/ Milk Products	100	0	0	0	0
Eggs/Meat/Chicken	0	0	16	30	54
Fats and Oils	100	0	0	0	0
Sugar	100	0	0	0	0

Primary Cereals consumed everyday by subjects were wheat/ and rice. *Bajra* and maize flour was also used but not frequently. There is need to encourage consumption of millets like bajra as they are rich in micronutrients. Refined flour was consumed in terms of bread, biscuits or maggi noodles. Only 26% consumed them daily while a large number (56%) had it once in 15 days. Consumption of whole pulses was low as in about 76% families these were prepared once a week only. Consumption of de- husked pulses was better as 22% consumed them daily and 65% 2-3 times a week. Sprouting of pulses was not done in any of the families. Sprouted pulses can become a good source of iron and other nutrients, and this practice needs to be encouraged in community.

The study was conducted during winter season when green leafy vegetables are easily available, still 59% were consuming them once a week only as these were not prepared frequently at home. The preparation

time is more for green leafy vegetables or sometimes these were not liked by subjects or other family members. In most of the homes mainly potato was given to child daily or mixed with other vegetables like cauliflower, carrots and peas. There is no harm in giving seasonal vegetables to child, however consumption of more of green leafy vegetables needs to be emphasized upon. Green leafy vegetables are rich in nutrients and affordable.

Consumption of fruits was low as 40% consumed them once a week and many even at a lesser frequency. Main reason was economical, as they belonged to low income group families. Banana and guava were the fruits mainly purchased in families. Parents used to give some money to children to buy snacks, which could have been used to buy fruits.

Milk was consumed daily in form of tea only. In that area many vendors supplied butter milk, which was quite cheap and thus purchased by families frequently and children consumed that also. Of the total families, 54 % were vegetarian and 46% were non vegetarian. In non-vegetarian families meat/chicken was consumed mainly once in fifteen days and eggs once a week only. The food habits and high cost of meat and eggs restricted their consumption even in non-vegetarian families.

Mustard oil was mainly used for cooking. *Vanaspati* ghee was used in 3% families. Sugar was consumed by all subjects for sweetening tea. 35% subjects consumed jaggery in lunch 2-3 times a week.

Being lower middle socio-economic group, money is an important factor which affected the diet of subjects, but various other factors like traditional practices, dietary beliefs and convenience appeared to influence the dietary intake patterns of the subjects. Similar findings have been reported in a study by Srihari et al (2007).

Data on Nutrient Intake: On the basis of 24 hours dietary recall, energy, protein, iron, calcium and vitamin A content of their diet was calculated using ICMR (2010) food composition tables. The data reflected that mean intake of all nutrients except proteins was lower than the recommended dietary allowance (ICMR, 2010). This data was further divided in terms of mean intake of these nutrients by boys and girls (Table 2). The aim was to find out if there was any discrimination in giving food in families on the basis of gender.

Table 2: Data on nutrient intake of subjects

Nutrient	All subjects (n=100), Mean± SD	Boys(n=56), Mean± SD	Girls (n=44), Mean± SD	RDA (ICMR),2010 Age (7-9 years)
Energy(Kcal)	1221±108	1229±75	1210±179	1690
Protein (g)	31.4± 5.4	31.8± 5.7	30.8± 5.1	29.5
Iron (mg)	7.7±1.6	7.9±1.7	7.5±1.4	16
Calcium (mg)	420±149	400±162	446±188	600
Vitamin A (Retinol, mcg)	309±108	316±118	293±105	600

ANOVA ($p>0.05$), no significant difference between mean intake of nutrients by boys and girls

In this study no significant difference was found between mean nutrient intakes of boys and girls as tested by ANOVA, which implies that there was no discrimination on the basis of gender in the families of subjects. Similar findings have been reported in studies in Ludhiana, Punjab (Panda et al, 2010) and Patna, Bihar (Kumari, 2005).

Nutrient Adequacy Ratio: Data was also analyzed to determine adequacy of each of the nutrients for individual subjects. This was done on the basis of nutrient Adequacy Ratio (NAR) which represents the index of adequacy for a nutrient and is computed as the ratio of intake of nutrient to its corresponding RDA. The NAR is expressed as follows

$NAR = \text{Actual intake of nutrient} / \text{RDA of the nutrient}$

In order to study the nutrient intake of the subjects, the NAR values of each nutrient viz. protein, calcium, iron and vitamin A were given a score

$NAR \geq 1$: score 3

$NAR \geq 0.66 < 1$: score 2

$NAR < 0.66$: score 1

On the basis of these subjects were distributed according to NAR (Table 3)

Table 3: Distribution of subjects according to NAR of different nutrients

Nutrients	Score 1	Score 2	Score 3
Protein	0	38	62
Calcium	49	39	12
Vitamin A	85	12	3
Iron	96	4	0

It was clear from data that 62% subjects had protein intake which was more than or equal to RDA. Their diet was predominantly cereal pulse based which could provide protein as per RDAs. In case of calcium only 12% had adequate RDA i.e. score 3 while 39% and 49% respectively had score 2 and score 1. They did consume milk but amount was low as it was mostly in form of tea only. Those subjects who also consumed buttermilk, scored better in terms of calcium score. The main area of concern appeared to be Vitamin A and iron intake as 85% and 96% subjects had only score 1 for vitamin A and iron respectively. Low intake of iron and vitamin A in predominantly vegetarian diet was a matter of concern.

Low intake of all nutrients in comparison to RDAs in low income group families was reported in a study from Hyderabad, conducted on different income group families by Mujeeb et al (2000). A multi centric study (Delhi, Pune, Baroda, Chennai and Chandigarh) showed deficiency of iron, Vitamin A, Vitamin C, Vitamin B12, Niacin and Folate among subjects (Srihari et al, 2007). A study conducted on school going children from different socio economic groups in Bihar showed children of low income group families were deficient in all categories of nutrients. The most pronounced deficiency in that was of Vitamin A as around 60% subjects from low income groups received less than 55 percent RDA of vitamin A (Kumari, 2005)

Total Dietary NAR: Nutrient intake of subjects was analyzed not only in terms of score of each nutrient but also as overall combined scores of all the four nutrients taken together. This combined nutrient score was termed as 'Total Dietary NAR'.

Total dietary NAR scores varied from a range of 4-12. A diet with a score of 4-6 was termed as 'poor', with a score of 7-9 as 'fair' and a score of 10-12 as 'good'.

Table 4: Distribution of subjects according to their total dietary NAR score

Total NAR Score (4-6) 'Poor'	Total NAR Score (7-9) 'Fair'	Total NAR Score (10-12) 'Good'
52	48	0

It is clear from Table 4 that more than 50% subjects had poor total NAR (score 4-6), while 48% had fair dietary NAR score (score 7-9) and none of the subjects had good dietary NAR (score 10-12). Stein and Qaim (2007) reported that the estimated economic cost of micronutrient malnutrition is 0.8-2.4% of India's GDP.

Association of total dietary NAR with different variables: It was decided to find out factors influencing total NAR score with the help of regression analysis. Influencing factors selected were gender (boy/girl), category (General/ Schedule caste), Total monthly income of the family (<Rs.5000/ Rs.5000-Rs.10,000/ >Rs.10000), religion (Hindu/ Muslim) and number of siblings (0-1/2 or more).

Table 5: Association of total dietary NAR with different variables

Variable	Standard Error	Effect Parameter (z)	Significance level (p)
No. of siblings	.139	-.267	.007*
Total income	.001	.484	.001*
Category	.246	-.330	.001*
Gender	.224	.021	.839
Religion	.231	.070	.486

*significant association as tested by regression analysis (p<0.01)

The data (Table 5) revealed that important factors which influenced the NAR scores were total income of the family, number of siblings and category of subjects (General/Schedule Caste). High significance of

income indicates that in families from low or low-middle income groups, it is the economic constraints which lead to poor dietary intake, not only in terms of calories but also in terms of protein and important micronutrients viz. iron, vitamin A and calcium. Also in families where number of siblings was 2 or more, the NAR score showed a significant but a negative relationship, that is if a child has to share his meal with more siblings, the quality of diet in terms of protein and micronutrients goes down, hence NAR goes down. A highly significant and negative relationship was found if the child belonged to schedule caste category i.e. in comparison to general category child a schedule caste child had higher chances of low NAR score.

Sex of child was not significantly associated with dietary NAR. This shows that in the present study there was no discrimination in families on basis of gender. Religion of the child also did not show a significant association with NAR of the child in present study (Table 5).

Number of siblings was found to be significantly related to a child's nutritional status in a study by Kumari et al (2007). The NFHS-2 data indicates higher underweight rates in children from SC/ST and other backward classes in comparison to other classes. Family income strongly influenced the nutritional status of a child in a study from Botswana (Mahgoub et al, 2006). Children belonging to backward groups like schedule castes are more susceptible to under nutrition (Uppal et al, 2005).

4. CONCLUSIONS

It was clear from the study that diet of children in age group of 7-9 years, from low to low middle class families of Mawana, Uttar Pradesh was deficient not only in calories and proteins but also in important micronutrients viz. iron, calcium and vitamin A. Along with economic constraints, factors that strongly influenced the quality of diet were number of siblings and caste of child. A child belonging to schedule caste was at a disadvantage, also a child with more than one sibling was at a disadvantage. Thus adopting a two child norm may improve the diet quality.

5. LIMITATIONS OF STUDY

The study was conducted on children (7-9 years) attending a school in Mawana. Thus this group may not represent all children from low middle socio economic group of Uttar Pradesh.

REFERENCES

1. Amrithaveni M, Barikor CW, 2002. Nutritional status of Meghalaya pre-school children. *The Ind. J of Nutr. And Dietetics.* 32: 262
2. Grover K, Singh I, 2006. An analysis of food intake of rural pre- school children in Punjab. *J Hum. Ecol.*, 20:161-164
3. Kumari K., 2005. Health and nutritional status of school going children in Patna. *Health and Population- Perspectives and Issues*, 28 (1):17-25
4. Mahgoub SEO, Nnyepi M, Bandeke T, 2006. Factors affecting prevalence of malnutrition among children under three years of age in Botswana. *AJFAND*, Vol. 6 (1)
5. Mujeeb UR, Rehman, Visweswara Rao K. 2000. Variations in dietary pattern and nutrient intakes by economic status. *The Indian J Nutr. Dietet.* 37:172
6. Panda P, Benjamin AI.2010. Health status of school children in Ludhiana city. *Ind J Community Medicine*, Vol 25, No 4
7. Rao KM, Laxmaiah, Venkaiah K, Brahman GN. 2006. Diet and nutritional status of adolescent tribal population in nine states of India. *Asia Pac. J Clinical Nutr.* 15; 64-71
8. Srihari G, Eilander A, Muthayya s, Kurpad AV, Sheshadri S. 2007. Nutritional status of affluent Indian school children. *Indian Pediatrics*: 44,193-203
9. Stein AJ, Qaim M. 2007. The human and economic cost of hidden hunger. *Food and Nutr Bulletin.* 28:125-134
10. Uppal M, Kumari K, Sidhu S. 2005. Clinical assessment of health and nutritional status of scheduled caste pre-school children in Amritsar. *Anthropologist.* 7: 169-171