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DIETARY PATTERN OF CHILDREN IN NORTH EASTERN KARNATAKA WITH REFERENCE TO HIGH VALUE AGRICULTURE COMMODITIES

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ABSTRACT

The study attempts to analyze the dietary pattern of children in North Eastern Karnataka region to understand the consumption pattern and find out the gap in actual consumption over recommended dietary allowances. The data pertains to previous day diet were collected using 24- hour recall method of diet survey. The findings revealed that cereals consumption was more than RDA for all the age groups except adolescent boys while the consumption of HVAC among children was far below the RDA when compared to non-HVAC. The milk consumption among children declined from 28.4 to 19.6 per cent of RDA revealing the higher consumption with lower ages. The consumption of fruits and vegetables witnessed fluctuations among the age groups. However, the consumption was too less than RDA. The consumption of non-vegetarian food was 46 per cent of RDA in adolescent boys, while adolescent girls consumed only 28 per cent. The study proposes diversification of food habit among school children towards HVAC through mid day meal programme to drive away malnutrition. At the same time, there is a need to revise the existing food policy which is concentrating on quantum of cereals rather than consuming a balanced diet through HVAC to address malnutrition in the country.

Key words: HVAC, RDA, 24-hour recall method, Malnutrition, PDS

INTRODUCTION

Food provides nutrients and plays a vital role in maintaining good health and in prevention of diseases. In order to maintain good health, the consumption of variety of food consisting of cereals, pulses, oilseeds, milk and milk products, vegetables, fruits, nuts, egg, fish and meat is necessary. In India, almost all the households spend a sizeable proportion of income on food. Among food items, milk and milk products, egg, fish and meat, vegetables, fruits and nuts were referred as High Value Agricultural Commodities (HVAC) have occupied a major share in the food basket.

Consumption pattern is varying across regions and income levels. Poor rural households are not getting sufficient income to meet their daily dietary requirement. The consumption of staple food is adequate in almost all rural households due to its distribution through fair price shops under public distribution system (PDS). While the consumption of other food items especially fruits and vegetables that contributes the major part of vitamins and minerals in the diet is very low. This is the major cause of under-five mortality and malnutrition in the country especially in the study area. The expenditure pattern of the household alone cannot give the correct picture of the consumption pattern of the households. Therefore, there is a need to analyze the dietary pattern of households in order to understand nutritional deficiencies and thereby design or modify the present nutritional programmes and food policy. Hence, the present study, a modest attempt to explain the dietary habits of children and adolescents in North Eastern Karnataka region.

MATERIALS AND METHODS

Gulbarga and Raichur districts of North Eastern Karnataka were selected purposively due to prevalence of high malnutrition among children. Purposive sampling technique was adopted to elicit data as not all the households were willing to cooperate with the investigator due to time constraint. Hence, the investigator approached only those households who were willing to provide the required information. Dietary assessment of individuals to obtain the consumption pattern of HVAC was carried out using 24-hour recall method. For this method, researcher was trained to interview individuals to recall all the foods consumed in a past 24 hours, wherein the respondents were prompted for information on portion size, recipe ingredients, condiments, beverages and cooking methods. While interviewing, household measuring instruments were taken into consideration to increase the accuracy of portion sizes.

The 24-hour recall method is more appropriate for assessing the intake of large populations than of individuals. Usual intake of an individual cannot be captured by a one-day recall. If the same method is applied to a large population, the sample population should be representative of the population that is being studied and

interviews should take place on different days of the week in order to reflect both weekday and weekend eating pattern.

In order to get a clear picture of consumption pattern of HVAC, the dietary assessment of children in different age groups up to adolescence was carried out. Further, the children were classified into 3 main categories viz., pre-school children (1-3 years and 4-6 years), school children (7-9 years, 10-12 years and 13-15 years) and adolescence (16-18 year boys and girls). The amount consumed was then compared with Recommended Dietary Allowances (RDA) by ICMR. The female heads of the family were interviewed in all the cases, to corroborate the data obtained by the children in case of 24-hour recall method. However the dietary pattern of 1-3 years, 4-6 years and 7-9 years was collected by interviewing mothers and the older age group children 10-12 years, 13-15 years and adolescents were interviewed by the researcher to elicit the dietary data.

RESULTS

COMPARISON OF ACTUAL INTAKE WITH RDA AMONG PRE-SCHOOL CHILDREN

Among 1-3 yr children the consumption of pulses, vegetables and fruits was found to be one third of the RDA (33.33%, 35.33% and 36.00%) (Table1). The consumption of pulses was higher in 4-6 yr (46.67%) children in comparison with 1-3 yr (33.33%) children. Consumption of vegetables (24.00%) and fruits (27.00%) declined as the age progressed. The children of both these age groups consumed only around 28 per cent of the RDA for milk. Among non-vegetarians, the pulse consumption was replaced with the non-vegetarian foods. According to RDA, for non-vegetarians one portion of pulse (30g) was exchanged with the one portion (50g) of egg/meat/chicken/fish.

COMPARISON OF ACTUAL INTAKE WITH RDA AMONG SCHOOL AGE CHILDREN

The results presented in Table 2 revealed that, among HVAC the vegetable consumption was too meager with 20.67 and 22.50 per cent of RDA among 7-9 and 10-12 yr children. Among 13-15 yr, there was increase in consumption of vegetables with 35.29 per cent of RDA. The fruits consumption was one fourth of RDA among 7-9 yr (25%) and 13-15 yr (26%). But there was slight increase in fruit consumption among 10-12 yr when compared to other two groups. A large gap was found in milk consumption when compared to RDA in all the three age groups with only 27, 26 and 19.6 per cent of RDA among 7-9yr, 10-12yr and 13-15yr, respectively. In case of non-vegetarian group, the meat consumption was inadequate with only one third of the RDA. Among 13-15 yr the non-vegetarian consumption was only 22 per cent of RDA. Cereals consumption was more than RDA (122.22%, 127.78% and 109.87%) in all the three age groups of 7-9 yr, 10-12 yr and 13-15 yr children. The pulses consumption was found to be 31.67, 33.33 and 38.24 per cent of RDA for 7-9 yr, 10-12 yr and 13-15 yr children, respectively. The consumption of fats and oils was satisfactory with 86.67, 74.29 and 62.79 per cent of RDA for 7-9 yr, 10-12 yr and 13-15 yr children respectively. However, the trends in consumption of fats and oil declined as the age increased. The consumption of sugar and jaggery was found to be on par with RDA in 7-9 yr age group, while it was 70.00 and 86.96 per cent among 10-12 yr and 13-15 yr children, respectively.

Table 1- Comparison of actual intake with RDA among pre-school children

Sl. No	Food groups (g.)	1-3 year (n=25)				4-6 year (n=25)			
		Actual diet	SD	RDA	Deviation (Actual diet-RDA)*	Actual diet	SD	RDA	Deviation (Actual diet-RDA)*
1	Cereals	115	28.58	60	55 (191.67)	180	32.68	120	60 (150.00)
2	Pulses	10	8.12	30	-20 (33.33)	14	12.07	30	-16 (46.67)
3	Vegetables	53	19.26	150	-97 (35.33)	60	33.26	250	-190 (24.00)
4	Fruits	36	43.50	100	-64 (36.00)	27	33.81	100	-73 (27.00)
5	Milk	142	57.57	500	-358 (28.40)	138	71.12	500	-362 (27.60)
6	Fats and oils	20	5.68	25	-5 (80.00)	22	4.36	25	-3 (88.00)
7	Sugar and jaggery	20	5.14	15	5 (133.33)	25	9.07	20	5 (125.00)
8	Non-veg items**	9	18.12	50	-41 (18.00)	16	28.01	50	-34 (32.00)

Note: SD – Standard Deviation, RDA- Recommended Dietary Allowances

*Figures in the parentheses indicate the percentage share of food consumed over RDA

**One portion of pulse may be exchanged with one portion (50g) egg/fish/meat/chicken

Table 2- Comparison of actual intake with RDA among School age-children

Sl. No	Food groups (g.)	7-9 year (n=25)				10-12 year (n=25)				13-15 year (n=25)			
		Actual diet	SD	RDA	Deviation (Actual diet-RDA)*	Actual diet	SD	RDA	Deviation (Actual diet-RDA)*	Actual diet	SD	RDA	Deviation (Actual diet-RDA)*
1	Cereals	220	36.87	180	40 (122.22)	345	30.09	270	75 (127.78)	412	37.26	375	37 (109.87)
2	Pulses	19	14.05	60	-41 (31.67)	20	13.27	60	-40 (33.33)	26	17.05	68	-42 (38.24)
3	Vegetables	62	29.16	300	-238 (20.67)	90	33.03	400	-310 (22.50)	150	43.03	425	-275 (35.29)
4	Fruits	25	33.66	100	-75 (25.00)	34	48.81	100	-66 (34.00)	26	42.72	100	-74 (26.00)
5	Milk	135	62.05	500	-365 (27.00)	130	78.33	500	-370 (26.00)	98	76.35	500	-402 (19.60)
6	Fats and oils	26	6.00	30	-4 (86.67)	26	5.15	35	-9 (74.29)	27	6.31	43	-16 (62.79)
7	Sugar and jaggery	21	6.73	20	1 (105.00)	21	5.82	30	-9 (70.00)	20	6.29	23	-3 (86.96)
8	Non-veg items**	18	32.21	50	-32 (36.00)	16	27.52	50	-34 (32.00)	11	29.04	50	-39 (22.00)

Note: SD – Standard Deviation, RDA- Recommended Dietary Allowances

*Figures in the parentheses indicate the percentage share of food consumed over RDA

**One portion of pulse may be exchanged with one portion (50g) egg/fish/meat/chicken

Table 3. Comparison of actual intake with RDA among adolescents

Sl. No	Food groups (g.)	16-18 year Boys (n=25)				16-18 year Girls (n=25)			
		Actual diet	SD	RDA	Deviation (Actual diet-RDA)*	Actual diet	SD	RDA	Deviation (Actual diet-RDA)*
1	Cereals	412	24.71	450	-38 (91.56)	390	42.40	330	60 (118.18)
2	Pulses	22	15.43	90	-68 (24.44)	20	14.46	75	-55 (26.67)
3	Vegetables	150	38.68	500	-350 (30.00)	155	40.94	500	-345 (31.00)
4	Fruits	23	41.69	100	-77 (23.00)	28	48.16	100	-72 (28.00)
5	Milk	89	78.75	500	-411 (17.80)	96	57.56	500	-404 (19.20)
6	Fats and oils	25	7.63	40	-15 (62.50)	27	7.60	35	-8 (77.14)
7	Sugar and jaggery	20	7.21	30	-10 (66.67)	21	9.79	25	-4 (84.00)
8	Non-veg items**	23	38.05	50	-27 (46.00)	14	33.65	50	-36 (28.00)

Note: SD – Standard Deviation, RDA- Recommended Dietary Allowances

*Figures in the parentheses indicate the percentage share of food consumed over RDA

**One portion of pulse may be exchanged with one portion (50g) egg/fish/meat/chicken

COMPARISON OF ACTUAL INTAKE WITH RDA AMONG ADOLESCENTS

The comparison of actual intake with RDA among adolescents (Table 3) made it clear that the overall consumption of all foods irrespective of value was inadequate with an exception to the consumption of cereals among girls (118.18%). In pulses and fruits, the consumption was only one fourth of RDA among both boys and girls. A little less than one third of RDA for vegetables was consumed by both adolescent boys and girls. Milk consumption was far below the RDA with only 17.80 and 19.20 per cent of RDA among boys and girls, respectively. Among non-vegetarian foods, boys consumption was higher in comparison with girls, with 46

and only 28 per cent of RDA. In consumption of fats and oils, adolescent girls consumed little more i.e., 77.14 per cent in comparison with adolescent boys with 62.5 per cent of RDA. Similar trend was observed in consumption of sugar and jaggery with 84 and 66.67 per cent of RDA among adolescent boys and girls.

DISCUSSION

COMPARISON OF ACTUAL INTAKE WITH RDA AMONG CHILDREN

The consumption of HVAC among children was far below the RDA in comparison with non-HVAC (Table 1 and 2). The milk consumption among children declined from 28.4 to 19.6 per cent of RDA revealing the higher consumption with lower ages. Milk is considered as children food, its cost is quite high, and hence it is not affordable by all. Similar results observed from studies conducted by NNMB (2002) and Chengappa *et al.* (2006). Vegetables and fruits are the major sources of minerals, vitamins and fibre in the Indian diets, even though cereals, millets, pulses and legumes do provide minerals like calcium and iron. Vegetables and fruits are rich in micronutrients and bioactive compounds to meet the nutritional requirements for good health (Narasinga Rao, 2013). The consumption of fruits and vegetables witnessed fluctuations among the groups. However, the consumption was too less than RDA. Among 1-3 yrs, the consumption of fruits and vegetables was little more than one third of RDA, because at tender ages parents strive to provide the fruits and vegetables to children irrespective of their economic levels. These results are in line with the NNMB (2002). The percentage share of non-vegetarian food consumed was far below than RDA. Among younger age, the consumption of non-vegetarian food was only 18 per cent of RDA. This trend is because younger children are not fed with non-vegetarian food except egg. The non-vegetarian consumption was one third of RDA in 4-6, 7-9 and 10-12 yr and it declined with increase in age. The average non-vegetarian consumption was 28 per cent of RDA across all age groups. These results are in contradiction to the results obtained by surveys conducted by NNMB (2002), where the non-vegetarian consumption was 7g per day per head for Karnataka state. The consumption was higher due to high preference for non-vegetarian food items among people in North Eastern Karnataka. However, the quantity was below RDA.

Among non-HVAC, the consumption of cereals was satisfactory and was more than RDA, which is the major source of energy. The pulses consumption was at least, one third of RDA and was highest among 4-6 yr children. However, none of the age group children consumed even half of the pulses recommended for their age. These results are in agreement with the findings of Soe and Singh (2006). The consumption of fats and oils, sugar and jaggery was satisfactory. The consumption of sugar and jaggery among 1-3 and 4-6 yr children was more than RDA. Overall, the food contributing calories, i.e., cereals, fats and oils, sugar and jaggery formed the major share of the diet. The consumption of pulses and other HVAC food was less than RDA, which are the major source of proteins, vitamins and minerals. Hence, the prevalence of micronutrient deficiencies associated with malnutrition found in the study area. The results are in line with the findings by NNMB (2002) stating that, 73 per cent of the households in India, the intake of pulses and legumes were deficient compared to the recommended level contributing to high prevalence of underweight, stunting and wasting among pre-school children. Similar findings reported from the studies conducted by Shetty (2001), Arlappa *et al.* (2010), Labadarios *et al.* (2011) and Nurul Izzah *et al.* (2012).

Extensive diet survey carried out in different parts of the country both in rural and urban areas highlighted that diets predominantly based on cereals. Diets of poor income groups were deficit in several nutrients, namely energy, vitamins, calcium, riboflavin and iron. Dietary deficiency of these nutrients occurs more frequently and to a greater degree among children, pregnant and lactating women whose requirements of nutrients were higher than that of others. Therefore, general deficiency of these nutrients in their diet has resulted in widespread prevalence of deficiency diseases like anaemia, PEM, Vitamin A and B-complex deficiencies and goiter. Although dietary deficiencies of nutrients are primary cause of these deficiencies, they aggravated by infective morbidity among the poor due to bad environmental and personal hygiene. Only diet of the high-income and middle-income groups in urban area were said to be satisfactory. Diets of the poor will continue to be grossly inadequate for long time to come unless there is phenomenal improvement in their economic status to afford an adequate diet. (Gopalan *et al.*, 2012)

COMPARISON OF ACTUAL INTAKE WITH RDA AMONG ADOLESCENCE

Among 16-18 yr age groups, the percentage share of consumption of HVAC and non-HVAC over RDA was differed for both boys and girls (Table 3). Among adolescent boys and girls, the consumption of fruits was only 23 and 28 per cent of RDA. These results are in line with the findings of Chaturvedi *et al.*, 1996. The consumption of milk was only 17.80 and 19.20 per cent of RDA for both boys and girls. It was interesting to note that the consumption of non-vegetarian food was 46 per cent of RDA in boys, while girls consumed only 28 per cent. Among boys and girls, the cereal consumption was 91.56 and 118.18 per cent of RDA. The adolescent boys and girls consumed only 24.44 and 26.67 per cent of RDA for pulses. The consumption of fats and oils, sugar and jaggery was higher among girls compared to boys, which indicate the existing gender discriminating practices in providing food or preferences of girls towards sweets and fried foods. There are increased physiological demands for energy and nutrients for adolescents. Because of social pressures and physical developments, eating patterns may not adjust to actual needs. They shift over to habit of eating fast foods for meal or snacks are especially popular with busy adolescents. (Saraswathi *et al.*, 2008). The mean nutrient intake of protein (g), energy (kcal), ascorbic acid

(mg), vitamin B12 (µg), folic acid (µg) and iron (mg) was lower than the recommended dietary allowances in both adolescent boys and girls. (Sajjan, 2008).

CONCLUSION

The actual intake of HVAC among different age group of children was far less than RDA. The milk consumption among children declined from 28.4 to 19.6 per cent of RDA revealing the higher consumption with lower ages. The consumption of fruits and vegetables witnessed fluctuations among the age groups. The consumption of vegetables and fruits was little higher than one third of their RDA in 1-3 yr age group, but the consumption found to be decreased as the age progressed. The average non-vegetarian consumption was 28 per cent of RDA across 1-15 yr age children. The consumption of fats and oils was more than 60 per cent of RDA in all age groups. Similarly, the consumption of sugar and Jaggery was also more than 60 per cent of RDA in all age groups. The actual intake of cereals among all age group children was much higher in comparison with RDA except for adolescent boys. Therefore, diversification of food habit of school children towards HVAC through mid day meal programme overcomes the malnutrition among children. At the same time, there, there is a need to revise the existing food policy which concentrates on quantum of cereals rather than consuming a balanced diet through HVAC to address malnutrition in the country. In addition, the women welfare development programmes initiated by the government should concentrate on enhancing income and providing quality education on nutrition resulted in providing balanced diet and better care among children

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