



## Nutritional intervention study - nutritional status of rural school going children and maternal nutritional knowledge

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### Abstract

*Nutrition is a fundamental pillar of human life, health and development across the entire life span. More than 200 million school age children are stunted and underweight and if no action is taken, about one billion school children will be growing up by 2020 with impaired physical and mental development. On the basis of facts a nutrition intervention study was conducted on rural children with an objective to ascertain nutritional status of school going children also nutritional knowledge of mother was assessed before imparting intervention. Total sample was 120 school going children (15 girls and 15 boys from each school) were selected and their mothers for intervention. A Nutritional status of the subjects was assessed by using anthropometric measurements (height and weight), and dietary recall method. As results revealed that the height and weight of respondents was lower than reference value. Dietary intake of respondents was substantially inadequate (<50%) in all food groups. The mean nutrient intake was significantly lower than recommended dietary allowances. Intake of protein of respondents was 81 % of RDA. The results related to intervention the knowledge level was increase from pre test and according to results there was gain in knowledge.*

**Keywords:** Recommended dietary allowances (RDA), Recommended dietary intake (RDI).

### Introduction

Children are the backbone of a nation and development of any nation depends on the health and well being of its child population. India has the second largest child population in the world. Numbering over 2.2 billion worldwide and 263.9 million in India<sup>1</sup>. School age is the active growing phase of childhood it represents a dynamic period of physical growth as well as of mental development of the child. Better the nutritional status of the children more they will be able to contribute to vital human potential and impart strength to the national economy and development. Nutrition is a fundamental pillar of human life, health and development across the entire life span. Good nutrition – an adequate, well balanced diet combined with regular physical activity- is a corner stone of good health. A child's entire life is determined in large measures by the food given to him during his early childhood years. The school age period is nutritionally significant as this is the prime time to build up body stores of nutrients in preparation for rapid growth of adolescence. Thus Health and nutrition in early stages of human life determine, to a great extent, the physical and mental well being of a person. On the other hand, inadequacies in one or more of the three main preconditions for good nutrition: food, care and health leads to Malnutrition. Globally, malnutrition among school age children is becoming a major public health concern. More than 200 million school age children are stunted and underweight and if no action is taken, about one billion school children will be growing up by 2020 with impaired physical and mental development<sup>2</sup>. Developing countries like

India, accounts for about 40 percent of undernourished children in the world and it is largely due to result of dietary inadequacy in relation to their needs. This may be due to insufficient intake, increased loss, increased demand or a condition or disease that decrease the body's ability to digest and absorb nutrients from available food. Many factors can cause under nutrition, most of which relate to poor diet or severe and repeated infections, particularly in underprivileged populations. In a developing country like India, poverty undoubtedly constitutes a major factor for malnutrition in children, but lack of awareness of what constitutes a balanced diet is also a factor, which needs to be considered. As Children are future of society and mothers are guardian of future hence in order to ensure sound foundation and secure future of any society health and nutrition of their children needs protection. Mothers are mostly responsible on this subject<sup>3,4</sup>. Mothers are effective on their children's eating behaviors and preferences. Mothers are the role models of their children about eating behaviors. Therefore, it is important to determine mother's nutritional knowledge to support healthy nutrition of child. Eating behaviors of the children are affected by some factors such as socioeconomic status, educational status, age, working position, and level of nutrition knowledge of mother<sup>5,6</sup>. It is assumed that nutritional knowledge level of the mother could be effective on eating behaviors of their children because the Mothers are the foremost providers of primary care for children their understanding of basic nutrition and health measures strongly influence the care they provide<sup>7</sup>. Nutrition status is a sensitive indicator of child's health and nutrition is an input to and foundation for health and

development. Thus the assessment of nutritional status plays an important role. It is widely accepted that for practical purposes anthropometry is the most useful tool for assessing the nutritional status of children. Of the various parameters, weight for age, weight for height, arm circumference and height for age, either singly or in combination are extensively used for this purpose. The present scenario of health and nutritional status of the school-age children in India is very unsatisfactory. Also most of the research work that has been conducted on nutritional status of children is limited to infants and preschool children only. There is dearth of information on nutritional status of school going children particularly from rural areas. Therefore it is imperative that dietary patterns of school going children are thoroughly assessed which can help in imbibing simple changes in their daily diet, thus improving their nutritional status and as the nutritional status of children is also associated with the nutritional knowledge of the mothers, so keeping this parameter in mind the present study attempts to assess the nutritional status of rural primary school children (7-9 year ) of government school of Bhilwara district and the knowledge of the mothers regarding various aspects of nutrition. The present study has been carried out with following objective: to ascertain the nutritional status of the rural school going children.

## Methodology

The study was conducted in Bhilwara district of Rajasthan panchayat samiti, Hurda was selected, from this Panchayat Samiti, Hurda village was selected as it the largest among the villages of Hurda Panchayat Samiti in terms of area and population, four Government schools were selected randomly. After the selection of schools, the investigator contacted the school authorities to get the list of enrolled students in the school in the age range of 7-9 years. Total of 60 girls and 60 boys in the age group of 7-9 years enrolled in government schools were selected by Systematic Random Sampling.

**General Profile:** It consisted of particulars related to the respondents i.e. name, age class, address, contact number, father's name, religion, caste, father's occupation, type of family, food habits, and total earning members in the family and monthly income of family.

**Anthropometric measurements:** Nutritional status of all the selected children was assessed by measuring body height (cm) and weight (kg).

**Weight:** The recorded mean values for weight was compared with ICMR (2008).

**Height (cm):** These mean values for height was compared with standards of ICMR (2008).

**Anthropometric measurements viz. height and weight** were measured as per the guidelines suggested by ICMR standards. Height was measured by using a height scale nearest to 0.1 cm. A portable personal weighing scale was used to measure the

kilograms nearest to 0.1 kg, with minimal clothing and without shoes.

**Dietary assessment:** Dietary survey of the sample was conducted by using 24 hours dietary recall method for one day using standardized cup sets to assess their food and nutrient intake.

**Assessment of nutrition knowledge of mothers:** The nutritional status of family members is influenced by sound nutrition knowledge of mothers and cooking practices followed by them. Keeping this in view, a Questionnaire was prepared containing different questions pertaining to various aspects of nutrition.

**Selection of different aspects of nutrition:** Different aspects of nutrition were selected after an extensive review of literature available on nutrition. The following aspects of nutrition were finalized for imparting information to mothers of rural school going children. i. Food, ii. Food groups, iii. Functions of food, iv. Balanced diet, v. Nutrient deficiency disorders and their prevention, vi. Nutritional practices.

After collecting data, it is necessary to analyze it with help of statistics to arrive at proper and adequate conclusion. Following statistical measures were used to analyze the data:

Frequency and percentage use for clinical signs and symptoms, Z-test: The Z-test was used to compare food and nutrient intake with standard and anthropometric measurement.

## Results and discussion

The results revealed that majority (67.5%) of the respondents belonged to Hindu religion. About 65 % majority of respondents were from general caste and 21.66 % were from schedule caste. Regarding family type more than half of respondents (65%) were having nuclear family structure. Most of respondent's fathers (31.66%) were having high school education, 19.16 % were having middle school education and 33.33 percent of respondent's fathers were in agriculture whereas % respondent's mothers were illiterate and majority % respondent's mothers were housewives. Maximum respondent's (43.33%) monthly family income was less than ten thousand.

Table-1 Anthropometric measurement revealed that the Observed mean values for both height and weight was compared against the reference values and it was found that the observed values were significantly lower than the reference values at 0.05 % level of significance.

**Dietary adequacy:** i. Food intake, ii. Nutrient intake.

Findings indicate 100 % subjects were vegetarians. Dietary survey was conducted for one day by using 24 hours recall method. Recommended Dietary Intake (RDI) was substantially inadequate (<50%) in fruits, roots and tubers, milk and milk products, green leafy vegetables, other vegetables, pulses,

cereals and fat and oils whereas intake of sugar marginally adequate (83.1%). Further 'Z' value calculated between intake of food group and RDI, showed highly significant difference among these food groups.

Dietary intake of respondents showed that mean nutrients intake of energy, carbohydrates and fat and all nutrient intake was lower than Recommended Dietary Allowances. Protein intake was marginally adequate from RDA.

**Impact of nutrition education programme on nutritional knowledge of mothers:** Nutritional education is one of the effective intervention strategies for bringing about nutritional knowledge, attitudinal and behavioral change in the individual. Nutritional education is one of the effective means of alerting of individuals particularly women and communities of the need for nutrition improvement. It is the step towards improving food habits.

The ultimate goal of nutrition education is to aid individual to effectively apply nutritional knowledge, attitudes beliefs and practices and modify their diets. This is because women are a crucial link between the family and the health care system and in addition, they produce, prepare and serve food and maintain the environment. Similarly, women are the household food securities in many communities. Women should be the important target group in any nutrition education programmes because the maintenance of health particularly of infants and children is a critical maternal role. This justifies the choice of women as the primary target group for the present study.

**Nutritional knowledge of respondents:** To know the overall nutritional knowledge of respondents, three knowledge categories were made i.e. low, medium, and high on the basis of the score obtained by respondents in the knowledge test. Nutritional knowledge of the respondents was assessed before and after delivery of nutrition education programme and change in knowledge scores were calculated.

**Table-1:** Mean ± SD of Anthropometric measurement of school going children. N=120

| Anthropometric parameter |        | Boys(n=60)      |                |         | Girls(n=60)     |                |         |
|--------------------------|--------|-----------------|----------------|---------|-----------------|----------------|---------|
|                          |        | Reference value | Observed value | z-value | Reference value | Observed value | z-value |
| Height                   | 7 year | 124.3           | 109.83±8.63    | 12.98   | 123.6           | 115.52±7.73    | 8.09    |
|                          | 8 year | 130.1           | 114.55±7.66    | 15.72   | 129.2           | 120.84±5.19    | 12.47   |
|                          | 9 year | 134.6           | 119.56±5.8     | 20.08   | 135.0           | 125.14±6.95    | 10.98   |
| Weight                   | 7 year | 22.7            | 19.16±2.76     | 9.93    | 22.3            | 19.14±3.73     | 6.56    |
|                          | 8 year | 25.2            | 21.45±3.33     | 8.72    | 25.0            | 20.72±3.56     | 9.31    |
|                          | 9 year | 28              | 23.06±3.71     | 10.30   | 27.6            | 23.42±3.857    | 8.39    |

Reference values are according to ICMR (2008).

**Table-2:** Mean daily food intake of school children. (N=120)

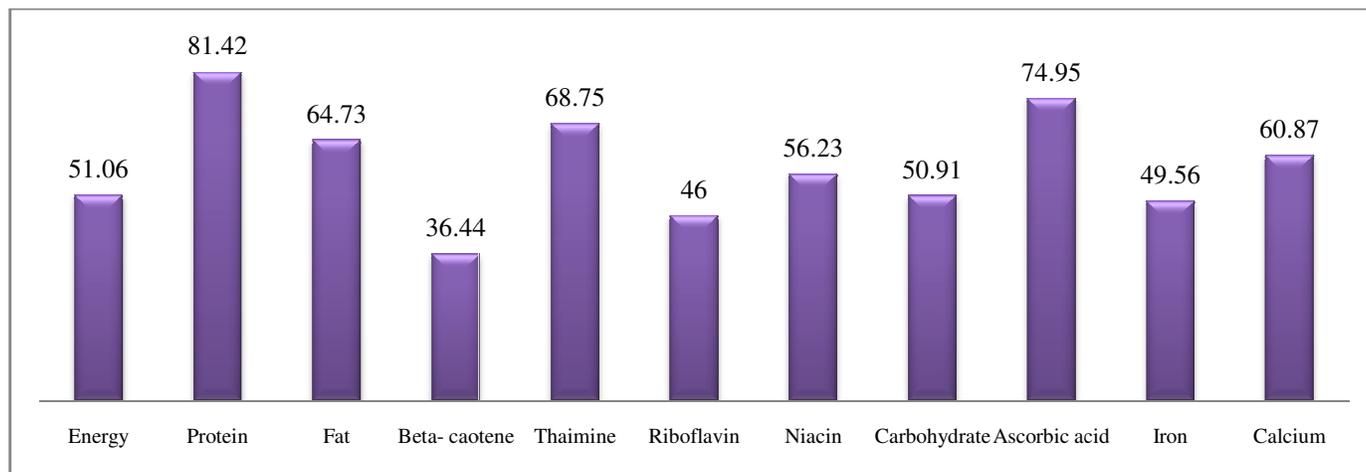
| Food group (g)         | RDI (g) | Mean / SD    | z value | Overall intake (% of RDI) |
|------------------------|---------|--------------|---------|---------------------------|
| Cereals                | 180g    | 121.54±49.26 | 13.00*  | 67.52                     |
| Pulses                 | 60g     | 38.03±10.84  | 22.20*  | 63.38                     |
| Fats and Oils          | 30g     | 14.41±3.84   | 44.47*  | 48.03                     |
| Sugars and Jaggery     | 20g     | 16.62±8.15   | 4.54*   | 83.1                      |
| Green Leafy Vegetables | 100g    | 34.45±10.22  | 70.26*  | 34.45                     |
| Roots and tubers       | 100g    | 54.12±6.97   | 72.10*  | 54.12                     |
| Other Vegetables       | 100g    | 66.75±20.92  | 17.41*  | 66.75                     |
| Fruits                 | 100g    | 45.20±23.02  | 26.07*  | 45.20                     |
| Milk and Milk products | 500g    | 129.58±15.56 | 260.78* | 25.91                     |

RDI: Recommended Dietary Intake (NIN 2010). \*Significant at 5% level.

**Table-3:** Mean daily nutrient intake of school children. (N=120)

| Nutrients            | RDA   | Mean±SD        | z value | Overall intake (% of RDA) |
|----------------------|-------|----------------|---------|---------------------------|
| Energy (Kcal/d)      | 1690  | 863.03±114.82  | 78.89*  | 51.06                     |
| Protein (g/d)        | 29.5  | 24.02±1.28     | 46.89*  | 81.42                     |
| Fat (g/d)            | 30    | 19.429±4.15    | 27.92*  | 64.73                     |
| β- carotene (ug/d)   | 4800  | 1749.39±467.99 | 71.40*  | 36.44                     |
| Thaimine (mg/d)      | 0.8   | 0.55±0.14      | 19.56*  | 68.75                     |
| Riboflavin (mg/d)    | 1.0   | 0.46±0.07      | 84.50*  | 46                        |
| Niacin (mg/d)        | 13.0  | 7.31±1.73      | 36.02*  | 56.23                     |
| Carbohydrate (g/d)** | 253.5 | 129.06±20.02   | 68.09*  | 50.91                     |
| Ascorbic acid (mg/d) | 40    | 29.98±22.57    | 4.8*    | 74.95                     |
| Iron (mg/d)          | 16    | 7.93±0.97      | 91.13*  | 49.56                     |
| Calcium (mg/d)       | 600   | 365.23±73.56   | 34.96*  | 60.87                     |

RDA: Recommended Dietary Allowances (ICMR 2008). \*Significant at 5% level. \*\*CHO-60-65% of Energy (kcal/d).



**Figure-1:** % adequacy of Nutrient intake.

**Table-4:** Overall knowledge of respondents. (N=120)

| Levels          | Score | Pre test |      | Post test |       | t- value |
|-----------------|-------|----------|------|-----------|-------|----------|
|                 |       | F        | %    | F         | %     |          |
| Low             | 14    | 117      | 97.5 | 0         | 0     | 73.38*   |
| Medium          | 26    | 3        | 2.5  | 22        | 18.33 |          |
| High            | 40    | 0        | 0    | 98        | 82    |          |
| Total score =40 |       |          |      |           |       |          |

\*Significant at 0.5 %.

Table-4 and Figures-1 and 2 gives a consolidated picture of the nutritional knowledge scores obtained by the respondents before and after delivery of nutrition education programme. As observed from Table-4 that initially or in pretest all the respondents had low level of overall nutritional knowledge. After the delivery of nutritional education package and from the post test scores it can be stated that majority of respondents (82%) shifted to high level of knowledge thus significant difference was found in the pre and post knowledge scores of respondents.

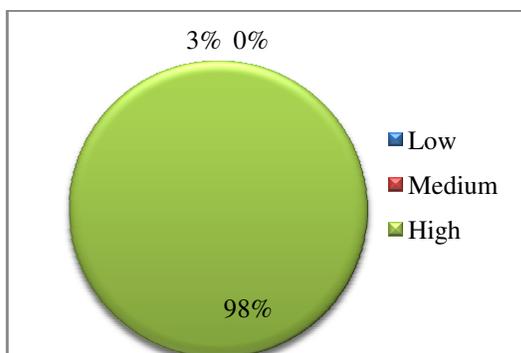


Figure-2: Overall knowledge of mothers during pre-test.

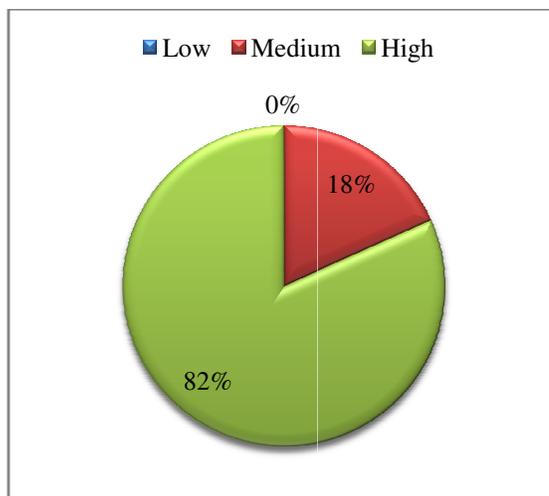


Figure-3: Overall knowledge of mothers during post-test.

**Knowledge of respondents in selected nutritional aspects:**  
 Six aspects of nutrition were used to assess nutritional knowledge of mothers i.e. food, food groups, functions of food, balance diet, nutrient deficiency disorders and their prevention and nutritional practices.

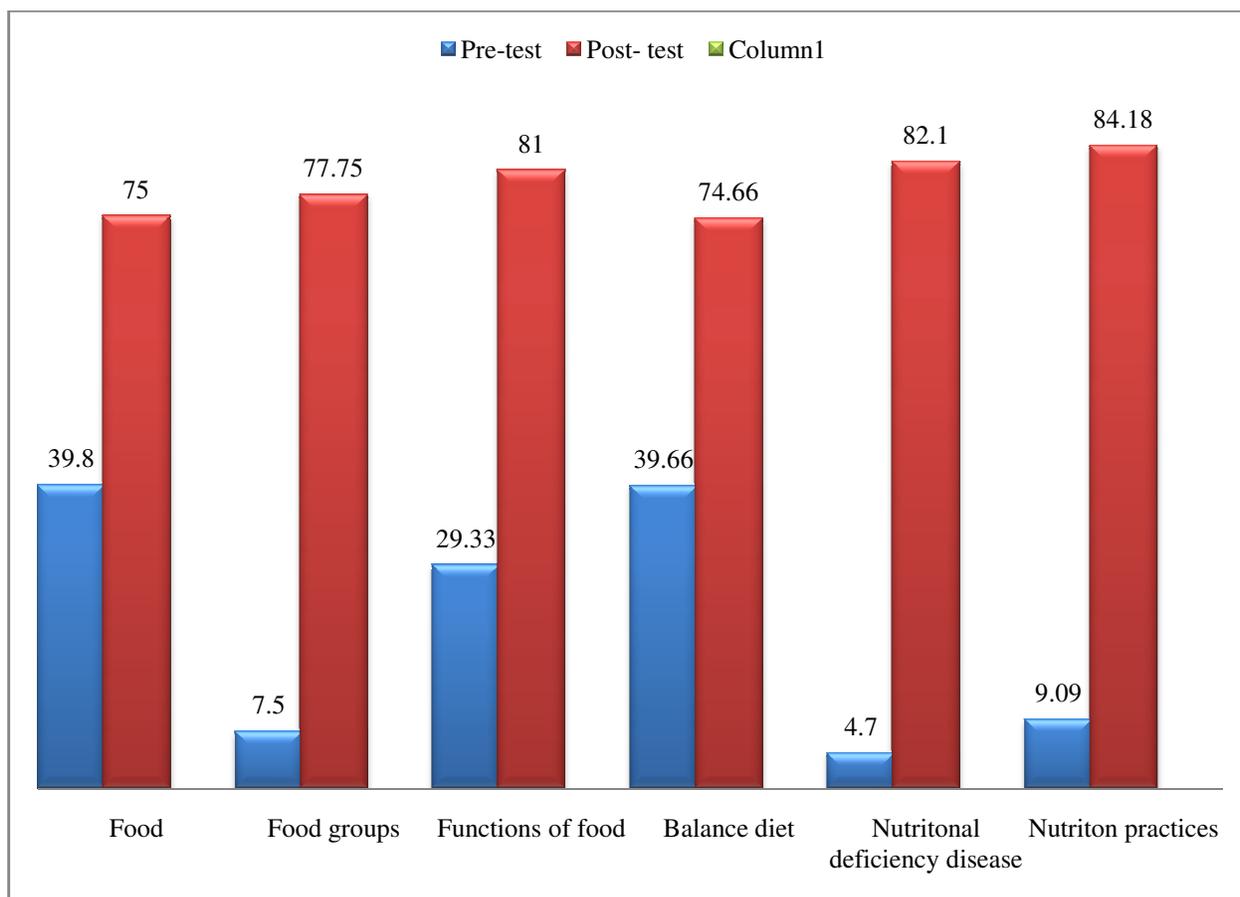


Figure-4: Aspect wise nutritional knowledge (%) of the respondents during pre and post-test.

Data presented in Figure-4 highlights the nutritional knowledge of the respondents in different aspects before and after nutrition education programme. Pre and Post test scores are depicted in the Figure-4. The data from figure reveals that while only 39.8% of respondents were having previous knowledge regarding aspects of food, after imparting nutrition education increase in knowledge was increased up to 75% was witnessed. Data on knowledge regarding ‘food groups shows that initially only 7.5% respondent’s mothers were aware regarding this aspect but after imparting nutrition education the percentage increased to 77.5%.

Similarly in the aspect ‘functions of food’, initially or prior to nutrition education programme only 29.37% respondents had knowledge whereas the percentage increased to 81% after the programme. Information regarding balanced diet shows initially 39.66% respondents were aware regarding this concept but after nutrition education programme gain in percentage was observed to 74.66%. Very few (4.7%) of respondents mothers were aware about ‘Nutritional deficiency disease but after imparting knowledge greater percentage of the respondents (82.1) gained knowledge in this aspect. Similar observation was recorded for nutritional practices where the respondents initial knowledge was 9.09% which was increased to 84.18% was found.

Thus from the results highlighted above it can be concluded that the respondents had very little knowledge regarding aspects of food groups, Nutritional deficiency disease and nutritional practices before the Nutrition Education Programme and this may be due to lack of knowledge and awareness regarding nutrition and its importance in rural area. Low socio economic status and low literacy level of the respondents as revealed through background information of respondents can also be considered as another factor contributing to low levels of nutritional knowledge.

**Table-5:** Aspects wise mean knowledge score of mother’s regarding nutritional (N=120)

| S.No. | Aspects                        | Mean score ±SD |           |
|-------|--------------------------------|----------------|-----------|
|       |                                | Pre test       | Post test |
| 1.    | Food                           | 1.9±1.2        | 3.75±1.0  |
| 2.    | Food groups                    | 0.6±1.1        | 6.2±1.4   |
| 3.    | Functions of food              | 0.8±0.6        | 2.4±0.7   |
| 4.    | Balanced diet                  | 1.1±0.9        | 2.4±0.7   |
| 5.    | Nutritional deficiency disease | 0.4±0.6        | 8.2±1.4   |
| 6.    | Nutrition practices            | 1±1.7          | 9.2±1.6   |

Data presented in Table-5 depicts the pre and post mean scores of respondents on the selected aspects of nutrition.

Table-6 presents the MPS scores on selected aspects of nutrition both before and after nutrition education programme. The findings presented in the Table clearly reveal that in all the selected aspects significant difference was observed in the pre test MPS scores and post test MPS scores and gain in knowledge was observed in all these aspects. The maximum gain in knowledge percentage was observed in the aspects of nutritional deficiency disease, nutrition practices and food groups and it was found 77.4%, 75.09% and 70.25% respectively.

**Table-6:** Mean % score of the mothers regarding knowledge in nutrition during pre and post-test. (N=120)

| S.No. | Aspects                        | Pre test (MPS)* | Post test (MPS)* | Gain in knowledge (%) | t- values |
|-------|--------------------------------|-----------------|------------------|-----------------------|-----------|
| 1.    | Food                           | 39.8            | 75               | 35.2                  | 15.57*    |
| 2.    | Food groups                    | 7.5             | 77.75            | 70.25                 | 37.49*    |
| 3.    | Functions of food              | 29.33           | 81               | 51.67                 | 27.39*    |
| 4.    | Balanced diet                  | 39.66           | 74.66            | 35                    | 14.61*    |
| 5.    | Nutritional deficiency disease | 4.7             | 82.1             | 77.4                  | 54.60*    |
| 6.    | Nutrition practices            | 9.09            | 84.18            | 75.09                 | 42.66*    |

\*MPS- Mean % score, \*Significant at 0.5 percent.

## Conclusion

It is clear that the problem of malnutrition in India is of alarming magnitude. A major part of this problem is contributed by rural population. Tackling malnutrition in rural area requires a holistic approach, especially when targeting populations of school children. From the finding of the present study it can be concluded that, even after the efforts of government the knowledge about nutrition has not reached to rural school going children and mothers up to desired level. The health and nutritional standards of school going children in this study were found to be unsatisfactory. The above results show that majority of the respondents were lying in category of under nutrition. The mean intake of the food intake and nutrient intake was lower than the reference values. The study illustrates that most school going children fail to meet dietary intake recommendations in all food groups. The mean intake of all the nutrients i.e. energy, protein, fat, carbohydrates,  $\beta$ - carotene, thiamine, riboflavin, niacin, carbohydrate, ascorbic acid, iron, calcium was not adequate. This is most likely due to the fact that children were belonging to low socio-economic status, percentage of illiteracy of their mothers was higher they were skipping meals on regular basis. The overall knowledge of women in general, about nutrition was marginally on an average side. They had very low knowledge about some of aspects such food, food groups, functions of food, balance diet, nutrient deficiency disorders and their prevention, nutritional practices. The results of the present investigation reveal that nutrition education was effective in increasing the level of nutrition knowledge of mothers. Further because of their curiosity in learning new things and potential learning power, gain in knowledge was high in all aspects.

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