

## Evaluation of a Mid-Day Meal Program for Primary School Children in the State of Chhattisgarh

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**ABSTRACT** Malnutrition is widely prevalent among Indian children as well as in other developing countries. Malnutrition affects physical as well as mental growth and also prevents a child developing into a fully functional adult. The Mid Day Meal (MDM) program was launched on 15<sup>th</sup> August 1995. It was based on one meal provided to the children, who are attending elementary school (primary school). This program was started with an objective of universalizing of education by enrolment, attendance and nutritional status. Several states in our country are running this program fully or partially. In Chhattisgarh, this program was started in July 2001. The present work was carried out on 400 children studying in Government primary schools of Raipur city. Out of 400 students, 271 were girls and 129 were boys. All the subjects were analyzed for nutritional status (weight, height); haemoglobin estimation was done by cyanmethemoglobin method to find out the anaemic status. The clinical examination was carried out as an indicator of deficiency symptoms of diseases. Other parameters like enrolment, attendance, and cost analysis were also examined to analyze the impact of program. The mean weight of experimental group was increased by  $20 \pm 5.17$  kg to  $22.87 \pm 5.02$  kg (14.34 percent increase), whereas the mean height increased by  $117.77 \pm 12.64$  to  $119.01 \pm 12$  cm (6.48 percent). The mean haemoglobin level was increased by 6.49gm/dl to 11.11gm/dl. The mean weight of experimental girls (56) was increased by 19.76 kg to 22.74 kg. In the present study 42.5 percent students had dull and dry hair, 53.25 percent had teeth carries where as 32.25 percent had dull and dry eyes. The enrolment of students was increased 2548 to 2793 (9.62 percent). 55 percent (220) children had attendance more than 90 percent. The result of the work shows improvement in nutritional status and haemoglobin level. Major advantage of the program was improved enrolment and attendance, which is the most beneficial aspect. In the second phase of the study one school was selected for nutrition education. One months' consecutive training was organized for the children to eat their meal hygienically. The children were encouraged to develop habits like (cleaning hands before meals, use of clean utensils, avoiding wastage of food, etc.). The result shows positive impact but it required continuous monitoring and guidance. Centralise kitchen made good response for school authority as well as students. The overall results are good but some untouched area required much attention for the success of this program.

### INTRODUCTION

The nutritional status of primary school children in India is poor as 44 percent adolescent girls and school children are still suffering from iron deficiency anemia and are underweight (NFHS-3 2006). Thus, nutritional status of children belonging to 6 - 11 years of ages has been a matter of concern in India and its tribal states, along with the other developing countries. The target group remained unattended and also lies under the malnourished label; (illiteracy, unawareness and poverty being the major causes for it) in spite of putting all the efforts by the State and Central Government (NFI 2005). Malnutrition and micronutrient deficiencies among young children causing diseases like Iron Deficiency Anemia, Iodine Deficiency Disorder and Vitamin A deficiency. It has been a threat to the health of the nation. Though, the universal im-

munization program, the oral rehydration therapy, and integrated child development programs have had a considerable impact on child survival and malnutrition (Silkei Pietzsch 2006). Various studies based on nutritional programs had been implemented with mixed results of successes to improve school participation in target groups (Yazali and Vetukuri Raju 2008; Mishra and Singh 2010).

Similarly, another study carried out on this topic show that the children had been enjoying mid day meals. Drez and Kingdom (1999) had carried out study in four states to assess the impact of mid day meal. They found positive impact on attendance, socialization and hygiene status of primary school children. The present study was planned to assess the effect of food supplementation under the mid day meal scheme in Chhattisgarh state as well as its impact on nutritional status of primary school children. The major objectives of our study were as follows

### Wellness and Health Objectives

- ♦ To assess and understand whether the present program is sufficient for the mental and physical development of the children.
- ♦ If found insufficient in terms of supplements; assessment and preparation of list of required additional supplements that would help to overcome deficiencies.
- ♦ To study the additional diet and micronutrient supplementation required for the children that satisfies both physical and nutritional needs and continue to attract the children towards school.

### Social Objectives

- ♦ To study the impact of MDM on enrolment of school children.
- ♦ To study the impact of MDM on dropout rate of children.

## MATERIAL AND METHODS

### Selection of Schools

The present study was carried out in Raipur City, the State Capital of the State of Chhattisgarh in India. There are about 96 Government School in the city, which are divided in 5 zones including East, West, North, South and Central zone. A total of 78637 children were studying in all the Government schools of Raipur City. Out of the 96 schools present, 6 schools were identified and 400 students were randomly selected, (271 girls and 129 boys) for the purpose of survey. It was ensured that samples were evenly distributed according to their class from 1 to 5. The total number of the subjects for different classes was 80, 80, 80, 78 and 82 for class 1, 2, 3, 4 and 5 respectively.

Location being the key factor in the selection procedure for study; 4 schools from the outskirts of the city and 2 schools from the heart of the city were selected for the same. 6 schools, comprising of 2 girls schools, 1 boys school and 3 co-educational schools were selected for the study.

### Formation of Experimental Group (n=100)

To assess the impact of scheme, a pre and post study design with experimental and con-

trol group was found best for the study. So, out of 400 subjects, 100 were selected as experimental group. The experimental group consisted of 54 girls and 46 boys. This group was de-wormed before being fed with Iron syrup for consecutive 3 months daily along with mid day meal (MDM). The process of de-worming was observed twice a month; in a gap of 15 days. After the additional supplementation of Iron Syrup, physical and haemoglobin examinations were carried out. In each school following were evaluated.

### Assessment of Nutritional Status

The assessment of nutritional status was carried out by studying physical measurements and other examinations by using the following techniques:

#### *Anthropometry*

Anthropometric measurements are the best parameters to assess the physical growth of human beings. Weight (kg.) and height (cm.) were taken as an indicator of health status. Weight was measured by using platform beam balance .Students were asked to stand on beam balance bare footed .Reading was measured to the nearest .5kg. Weight was measured thrice and then mean was taken. Height was measured using non- stretchable tape bare foot. Height was measured to the nearest .1 cm.

Body Mass Index (Quetlet's Index) was calculated by weight and height measurement using the following formula.

$$\text{BMI} = \text{Weight (Kg)} / \text{Height (m)}^2$$

All the above results of the subjects were further classified according to weight by age (Gomez 1956), height by age (Waterlow 1972) and BMI categories.

#### *Clinical Examination*

Clinical examination is the best indicator of deficiency symptoms of micronutrients. The clinical examination of deficiency disease was carried out as prescribed by Jelliffe (1966).

#### *Haemoglobin Estimations*

Haemoglobin estimation of all the subjects was carried out using Cynamythmoglobin meth-

od by finger prick (Soemantri and Insun 1985). 2 ml blood was collected by pipette, and then by using Drabkin's solution, haemoglobin was estimated by digital photo-colorimeter. All the haemoglobin levels were compared with standards.

100 subjects (experimental group) were supplemented with fesovite (iron and multivitamin syrup) then the final haemoglobin levels were checked. All these results were compared with the control group (300).

### Other Analysis

- ◆ The amount of food served to the students was measured in terms of cup.
- ◆ Enrolment of the student; attendance of the students, dropout rate from the school and scholastic performance was also observed during this survey project.
- ◆ The hygiene condition around the cooking area and wash/utility area, hand wash facility and toilet practices were also observed during this exercise.
- ◆ The monthly expenditure on fuel was also recorded by oral questionnaire.

### Statistical Analysis

Using standard methods, statistical analysis was performed. Mean, Standard Deviation, and 't' tests were applied to get the significance of the collected data.

## RESULTS

### Nutritional Status

The overall impact of mid day meal was assessed on 400 school going children, out of which 100 were experimental and 300 were considered as a control group. The anthropometric measurements are the best indicator of the physical growth. The positive impact of MDM and iron supplementation on their physical growth was observed during this exercise.

The results of present study revealed that the overall physical development of children was higher in experimental group 14.35 percent than 9.03 percent of control group. The mean weight and height of the subjects was lower than Indian and international standards. Although, the mean weight and height was increased as age. The increase in weight was better in girls, (Tables 1 and 2).

### Clinical Examination

As we all know that clinical examination is the best parameter for the external diagnosis of deficiency symptoms of any nutrient. Table 3 depicts the presence or absence of deficiency symptoms of the nutrients among school children. In the present study, out of 400 students, about 66 percent were of thin built, where as only 52 percent had normal skin, 60 percent students had dirty nails, 42 percent had dull and

**Table 1: Comparison of anthropometric measurements between experimental and control group**

Variable	Experimental group			Control group		
	Pre (Reading I) N=100	Post (Reading II) N=100	Percent increase	Pre (Reading I) N=300	Post (Reading II) N=300	Percent increase
Weight (Kg.)	20.00	22.87	14.35	20.59	22.49	9.03
Height (Cm)	111.77	119.01	6.48	112.45	118.04	4.96
Haemoglobin gm/dl	6.49	11.11	71.19	7.05	10.26	45.53

**Table 2: Comparison between pre and post MDM readings of experimental group**

Variable	Pre MDM		Post MDM		t- value	Level of significance
	Mean	SD	Mean	SD		
Weight (Kg)	20.00	5.17	22.87	5.02	3.98	0.01*
Height (CM)	117.76	12.64	119.00	12.00	4.15	0.01*
BMI	15.92	2.70	16.10	2.39	0.52	NS

\*P<00.1

**Table 3: Clinical assessment of the primary school children**

Details	Particulars	No N=400	per- cent	Total N=400
Hair	Dry and dull	168	42	168
	Easily pluckable	36	9	36
	Normal	196	49	196
Teeth	Carries	213	53.25	213
	Normal	187	46.75	187
Lips	Angular-stomatitis	18	4.5	18
	Normal	379	94.75	379
	Cheiliosis	3	.75	3
Eye	Pale	131	32.75	131
	Normal	269	67.25	269
Nails	Normal	388	97	388
	Koilonychias	12	3	12
	Dirty	240	60	240
Built	Thin	284	66	284
	Normal	116	34	116

dry hair, the researcher found rare cases of cheiliosis, as only .75 percent students had problem of cheiliosis, the prominent clinical problem we observed was teeth carries. Out of 400 students 53.25 percent students were facing the problem of teeth carries due to bad habit of Gudakhu (paste containing tobacco). Excessive use of Gudakhu in the form of tobacco-tooth powder mix has resulted into mottled enamel of teeth. The researcher found pale eyes in 32.75 percent children. All the above deficiency symptoms clearly indicate the deficiency of various nutrients in the diet of school children. As we all know that dull and dry hair are the symbol of protein deficiency, similarly diet deficient in vitamin-B group, vitamin-C, Calcium and Iron shows various clinical signs of deficiency symptoms. In the researcher's opinion this is a result of deficiency of nutrients along with unhygienic conditions, unawareness and illiteracy. The children should be encouraged to eat all foods. While interacting with the children, it was noticed that children did not like leafy vegetables or we can say they don't consume them. Unfortunately, the children were neither persuaded, nor compelled by their parents to eat affordable

fruits and vegetables. These children never ate sprouted grains, although, they had *chana*, *Soya-badi* and eggs occasionally. The problem of clinical deficiency diseases can be solved by the MDM, Iron and multi-vitamin supplementation and nutrition education to these children.

### Anaemia

All the results show the positive impact of mid day meals on haemoglobin status of children (Table 4). However, it is not sufficient for bringing the children into acceptable zone (haemoglobin ranges from 9 to 12). Thus, to reduce the prevalence of anaemia, iron supplementation is necessary. The result reveals that there was a significant increase in the haemoglobin levels of the experimental group as compared to control group. Anaemia reduces from 85 percent to 45 percent. 23 percent school children became normal, only 32 percent were found moderate anemic.

The supplementation of iron with Vitamin C can increase the iron absorption in our body. As it is stated earlier that Iron deficiency anaemia occurs due to inadequate diet and poor bioavailability. Indian diet is basically cereal based diet which contributed 60-70 percent of total calories. Cereals are normally consumed unrefined and have phytates which interfere with Iron absorption. Thus, it is observed that the anemic level of our subjects were not satisfactory. In this study, physical growth was satisfactory, but the scholastic performance was not as good as other parameters. In the researcher's opinion, the cause of anaemia in this study is poor diet and low bioavailability. This problem can be solved by promoting consumption of Iron rich foods in the diet. Several studies in this field showed that anaemia lowers the school performance. The causes of poor school performance may be parent's illiteracy, lack of proper school environment, lack of proper teaching and lack of proper guidance by the teachers. It can be concluded that, taking a longer view, there is a much potential for MDM with continuous supplement-

**Table 4: Comparison of haemoglobin levels of control group and experimental group**

Pre MDM	Experimental group (N=100)			Control group (N=300)		
	Post MDM	Percent increase		Pre MDM	Post MDM	Percent increase
6.49	11.11	71.19		7.10	10.26	45.53

tation, health services and nutrition education. Karnataka and Tamil Nadu are already doing this up to some extent (Singh 2006; Yajeli and Vetukuri Raju 2008; Sharma et al. 2006). Thus, the same can be replicated in this state. Extensive efforts by social workers and media can help in achieving the target.

### Attendance and Enrollments

A major positive impact of Mid Day Meal was observed on the total number of enrolments. Table 5 showed the number of enrolment in the schools. On an average, the number of children enrolled in schools after MDM program was increased. The sharp increase in girls' enrolment showed the positive impact of Mid Day Meal. The cause of this could be the parents' confidence in Mid Day Meal Program.

The MDM program has played a pivotal role in the increase of the student's enrolments/attendance. The eradication of the root cause of "Food" or "Hunger" was taken seriously by the government by making it available in schools; attractive enough offer for the children to attend the school and for the parents to send their children to schools for fulfilling the basic need of food.

While interacting with parents it was noticed that some parents enrolled their kids only because of MDM. Some parents reported that, it was much easier for them to encourage their children to go to school as the food was one of the motivating factors.

Besides, another observation was that some parents sent their children only during the lunch break for the want of food. In the opinion of most of the teachers MDM program increased the enrolments. The greatest impact of MDM was noticed for girls in this study.

### Absence

The survey required consistent interaction with the teachers and the parents. Teachers from

all the schools reported that MDM programme made it much easier for the children to stay back in the school after the lunch break, whereas there have been records of children not returning to school after the lunch break.

MDM seemed to have been on the way to solving the problem of hunger. The assurance of at least one free meal a day for their children has been a great boon to the poor/labour class and family headed by single women (widows/separated) in terms of vulnerability for food availability. MDM has definitely contributed in offering food security to the deprived classes.

While interacting with teachers it was observed that the meal was served to those children, whose attendance was more than 80 percent. Total attendance of the subjects was collected. The attendance data of these samples appears to be satisfactory. On weekends the attendance rate has been much higher as the MDM program offers deserts on these days (The Indian deserts *Halwa* and *Kheer*). It was observed that children had their specific demands for food of their choices; right from *soya-badi* (dried soybean balls) to *chana* (gram seeds), *poha* (flattened rice), *dalia* (porridge) and *kadhi* (cooked and flavoured butter milk). The availability of food has definitely lessened the absence.

### CONCLUSION

It, therefore, can be concluded that the present study becomes the representative study which shows the positive effect of mid day meals on the primary school children of the Chhattisgarh state. Since, India has the largest child population in the world; child rights need more attention. A range of government programs have been launched to increase the health status of the children. There has been a wave of interesting studies on mid day meals during last few years. A number of useful insights emerge from these studies. The provision of mid day meals is

**Table 5: An analysis of data of total enrolled students before and after MDM**

Year	School (g)No.1	School (g)No.2	School (b)No.3	School (b,g)No.4	School (b,g)No.5	School (b,g)No.6	School Total
2000	262	272	457	334	683	683	2691
2001	294	231	381	371	698	728	2703
2002	272	221	298	273	684	594	2342
2003	275	230	325	367	659	692	2548
2004	280	255	370	503	665	720	2793

fairly regular in most states. It is popular between children, parents and teachers. Children enjoy the food. The findings of the present study reveals that most of the schools provides mid day meals regularly. All the schools had a cook to prepare the meals. Although limited resources and funds sometimes creates problems as the cook was supposed to undertake cooking, serving and cleaning job. There is a need for further improvements in the qualitative aspects of the mid day meals. Basic facilities such as cooking sheds, fuel and drinking water are still lacking in many schools. Further, on various occasions teaching staff was found engaged in MDM program, hygiene and health safeguards are often neglected, these problems need to be firmly resolved.

The mid day meals seem to be quite effective in promoting attendance and enrolment, the enrollment of girls were found to be higher than the boys. This may be due to the fact that girl child in community always had the last priority of going to school and MDM possibly provided them with the privilege of being able to attend the school. There was no remarkable improvement in scholastic performance of experimental group and control groups' results. Scholastic performance was affected by several factors such as balanced diet, domestic environment, parents' education, parents' motivation etc. In the present study all the students were belonging to low socio-economic class, so the above influencing factors were more dominant for school performance.

Further, it is beyond all shades of doubts that the MDM has benefited the children but not to the desired level. Nobel Prize winner Dr Amartya Sen, economist has rightly said that MDM shall help in reducing illiteracy. Today's child having primary education (may be due to the attraction of meal) shall definitely be a better parent than his own Parents and thus the results can be seen in the third generation to come. The society is not obliging the children by giving them a meal but is paying for an annuity which will secure a better and prosperous future of the country.

It is not a program where concept of cost benefit applies. The benefits are intangible but beyond the preview of any measurement scale. The program should not go down to the mechanism as a routine but should be undertaken with zeal of "Revolution".

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