# OPERATIONAL RESEARCH ON MID DAY MEAL PROGRAM AND ITS OUTCOME ON GROWTH OF SCHOOL CHILDREN IN RURAL AREA

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**ABSTRACT: Background:** Mid Day Meal (MDM) program has been launched by the government of India with objective to improve nutritional status of school children. **Objective:** To assess the impact of MDM on nutritional status of children. **Methods**: 1503 students from 4 schools were enrolled in the study. Anthropometric measurements and MDM consumption data was collected. **Results:** Prevalence of underweight ranged from 71.3 % according to CDC 2000 standards while it was 67.8 % according to WHO 2007 standard.  The prevalence of stunting was almost 33 % signifying long standing chronic malnutrition. MDM consumption ranged from 52.8 % in one school to 63.6 % in other school. MDM consumption was maximum in December (66.6%) and January (61.7 %). Weekly consumption pattern varied from 58 % to 74 % according to likes and dislikes of the children **Conclusion:** Proper monitoring of the program should be done to improve the nutritional status of school children.

**Key Words**: Mid day Meal, malnutrition, nutritional status, consumption pattern

## INTRODUCTION

About 21.8% of the country's population comprises of school going children and there are still about 21 million children who are unable to attend school. According to NFHS-3, 90.1% of the 6-10 years & 74.2% of 11-14 years old children attended primary school in 2005-06.Though the number of children of primary age group who were out of school has dropped by 33 million since 1999 still 72 million children worldwide were denied the right to education in 2007 [1].

School children may be at increased risk of micronutrient deficiencies owing to increased energy expenditure combined with decreased meal frequency, reduced maternal attention, and parasitic infections. Undernutrition reduces immunity and infections reduce appetite, impair absorption and lead to catabolic losses of precious nutrients. The Programme of Nutritional Support to Primary Education popularly known as the Mid-day Meal (MDM) scheme was launched in 1995 as a fully funded Centrally Sponsored Scheme. Under this scheme, all school children in the primary schools in Government and Government-aided schools have to be covered. The main objectives of MDMP are to improve child nutrition, to promote school attendance and to foster social equality in school going children.MDMP has been evaluated many times for its efficacy in relation to its objectives. However, the main focus of those studies has always been on changes in enrolment of the students and not the nutritional status of the children. The reason behind low contribution of MDMP in improving nutritional status of children can be due to the fact that school meal becomes a substitute rather than supplement for the home meal in poor households [2]. Besides, the mid-day meal supplies only one third of the dietary requirements, and that too for 200-250 days in a year. Thus it is not possible to demonstrate significant improvement in the nutritional status of the child [3].

Recent evidence suggests that mid-day meals have made a promising start in many states. The quality of the MDM program varies widely across states due to differences in financial allocations, administrative arrangements, infrastructural facilities, etc. Thus keeping in mind the regional variation in the functioning of the MDMP program and to see the effect of MDMP on the growth of children the study was planned with an objective to carry out operational research to assess the mid day meal consumption pattern in Rural Vadodara and to verify its impact on nutritional status of school going children.

**METHODS**

The present study was conducted in rural industrial area of Vadodara. In all there are 45 schools in this area catering to the students from standard 1st to 7th. Four schools were randomly selected for the study. All the students in the schools were enrolled for the study. The sample size was 2102 students registered in the school. After 3 consecutive visits to each school, data could be collected for 1503 children. Consent was taken from the school authorities to carry out the research in their school premises. Ethical clearance was obtained from the department ethical clearance board for the study.

The study was divided into two phases. Phase 1 consisted of anthropometric measurements of all the school children from 1st to 7th standard of four schools.  Weight measurement was done for all the subjects using a calibrated digital weighing scale. It was portable and could be conveniently used in the field. The subject was asked to stand erect on the scale without touching anything, with no heavy clothing and footwear and looking straight ahead. Height measurements of all the subjects were taken using a flexible, non- stretchable fiber glass tape. The tape was fixed vertically on a smooth wall of the school perpendicular to the ground, ensuring that the floor was smooth. The subject was asked to stand erect with the shoulder, hips and heels touching the wall and with no footwear, heels together and looking straight ahead. The head was held comfortable erect, arms hanging loosely by the sides. A thin smooth scale was held on the top of the subjects head in the center, crushing the hair at the right angles to the tape and the height of the subject was read from the lower edge of the ruler to the nearest 0.1 cms.

In Phase 2, data was collected on the Mid day meal consumption of the school children. Through secondary data the overall Mid day Meal consumption of entire school was elicited. Consumption data was collected standard wise for weekdays and for all the months of the year.
Statistical Analysis: The data was entered in windows excel and analysis was done for mean and standard deviations. The data entered in excel was imported into epi info 6 package and z score were derived by the CDC standards for undernutrition. Z score by WHO standards were derived by Anthro + package of WHO.  The percent consumption of Mid Day Meal by children was arrived by the number of registered students for that month. 95 % confidence interval was calculated using formulas in excel spread sheet.
**RESULTS**

The children were in the age group of 6-13 years. There was almost equal representation of sample for boys and girls. The anthropometric data i.e. height and weight collected on the students helped to arrive at the prevalence of malnutrition in school children.  The sex prevalence of malnutrition in the study subjects is shown in Table 1. The prevalence of underweight was 71.3 % according to CDC standards while 67.8 % according to WHO 2007 standards. The prevalence of thinness ranged from 68 % to 58 % for CDC and WHO standards respectively. Based on 95 % CI limits, the prevalence for underweight and thinness ranged from 65-74.5 % indicating that malnutrition was very high among rural school children. The prevalence of stunting was almost 33 % signifying long standing chronic malnutrition. When gender wise differences were looked into, it was observed that stunting was more in girls than boys (34.8 % vs. 33.1%), whereas thinness was more in boys than girls (71% vs. 65.2%). The study revealed that prevalence of severe underweight children was 38 % by CDC standards while it was 27.9 % by WHO 2007 standards. Severe stunting was seen in almost 9.8 % of the children while prevalence of severe thinness was 36 % according to CDC standards and it was lower (25 %) by WHO 2007 standards.

**Table 1: Gender wise prevalence of malnutrition by CDC and WHO 2007 standards**

| Nutritional Standards | Boys | Girls | Total | 95 % CI |
|---|---|---|---|---|
| Weight for Age (<-2SD) | | | | |
| CDC | 72.3 | 70.3 | 71.3 | 65.2-74.5 |
| WHO | 67 | 68.2 | 67.8 | 60.5-68.6 |
| Height for age (<-2SD) | | | | |
| CDC | 33.1 | 34.8 | 33.9 | 30-36.2 |
| WHO | 30 | 33 | 31.5 | 28-33 |
| BMIZ (<-2SD) | | | | |
| CDC | 71.4 | 65.2 | 68.3 | 63-73.1 |
| WHO | 62 | 54 | 58 | 53.3-63.1 |

The data of Mid Day Meal (MDM) consumption was used to elicit weekly, monthly and standard wise data for the children. The comparison was made from the registered number of students in each school and also in each class. Table 2 shows the overall consumption pattern of Mid Day Meal of all the 4 schools. The actual students present in the school as against that of registered one ranged from 60 % to 75 %. Mid day meal consumption was 52.8 % in one school which was lowest while the maximum percent was 63.6 %.

**Table 2: Average consumption of Mid Day Meal for the School**

| School | Registered | Present | | 95 % CI | Consumed | | 95 % CI |
|---|---|---|---|---|---|---|---|
| | N | N | % | | N | % | |
| 1 | 288 | 206 | 71.5 | 65.3-77.7 | 173 | 60.0 | 52.6-67.4 |
| 2 | 625 | 450 | 72 | 67.8-76.2 | 398 | 63.6 | 58.8-68.4 |
| 3 | 736 | 552 | 75 | 71.4-78.6 | 291 | 52.8 | 47-58.6 |
| 4 | 453 | 270 | 59.6 | 53.7-65.5 | 263 | 58.2 | 52.2-64.2 |

The number of students registered according to standard was also noted. The number of students present in the school did not vary much as per standard and was in the narrow range of 78 % to 84 %. The maximum number of students remained present in 3rd, 4th and 5th standard to avail the benefit of mid day meal. The consumption was lower in 1st and 2nd standard as the children were very small and new to the school setup. At the same time they had their own likes and dislikes. The consumption seemed to be increasing in 3rd (62.8 %) and 4th (69%) standard Table 3.

**Table 3: Standard wise consumption of MDM by school children**

| Std | Registered | Present | | 95 % CI | Consumed | | 95 % CI |
|---|---|---|---|---|---|---|---|
| | N | N | % | | N | % | |
| 1st | 90 ± 4 | 71 ± 3 | 78.8 | 61.5-80.5 | 52 ± 4 | 57.7 | 44-71.4 |
| 2nd | 87 ± 3 | 68 ± 4 | 78 | 58-78 | 48 ± 3 | 55.1 | 40.8-69.3 |
| 3rd | 113 ± 7 | 89 ± 3 | 78.7 | 83.2-94.5 | 71 ± 6 | 62.8 | 51.4-74.2 |
| 4th | 122 ± 6 | 103 ± 5 | 84.4 | 77.3-91.5 | 85 ± 4 | 69 | 59-79 |
| 5th | 79 ± 6 | 64 ± 6 | 81 | 71.2-90.8 | 44 ± 5 | 55.7 | 40.7-70.7 |
| 6th | 60 ± 4 | 46 ± 4 | 76.6 | 64.2-89 | 29 ± 6 | 48.3 | 30-56.8 |
| 7th | 60 ± 3 | 46 ± 3 | 76.6 | 64.2-89 | 30 ± 3 | 50 | 32.8-68.2 |

Again a down ward trend was seen from 5th standard because of two possible reason. One is that at this age they start getting minimal pocket money and they eat from the outside hawker. The second reason being that the older children prefer going home during recess time and did not avail the mid day meal benefit.

The monthly consumption pattern of mid day meal was also derived. The Table 4 shows that consumption ranged from 53 % to 66 %. The consumption was lower in initial months of academic session within the range of 53 % to 57 %. After august the percent consumption went up and was maximum during December (66.6%) followed by January (61.7%). Thus during the winter season the mid day meal consumption increases.

**Table 4: Month wise consumption pattern of MDM by school children**

| Month | Registered | Present | | 95 % CI | Consumed | | 95 % CI |
|---|---|---|---|---|---|---|---|
| | | N | % | | N | % | |
| June | 79 ± 1 | 63 ± 4 | 79.7 | 69.5-89.8 | 42 ± 3 | 53.1 | 37.7-68.5 |
| July | 83 ± 2 | 69 ± 5 | 83.1 | 74.0-92.1 | 44 ± 4 | 53.0 | 37.9-68.0 |
| August | 85 ± 1 | 68 ± 2 | 80 | 70.3-89.7 | 49 ± 3 | 57.6 | 43.4-71.7 |
| Sept | 88 ± 4 | 71 ± 5 | 80.6 | 71.2-89.9 | 50 ± 3 | 56.8 | 42.7-70.8 |
| October | 90 ± 3 | 69 ± 4 | 76.6 | 66.4-86.7 | 51 ± 5 | 56.6 | 42.7-70.4 |
| November | 90 ± 4 | 70 ± 2 | 77.7 | 67.7-87.6 | 52 ± 2 | 57.7 | 44-71.4 |
| December | 90 ± 3 | 73 ± 6 | 81.1 | 71.9-90.2 | 60 ± 3 | 66.6 | 54.4-78.7 |
| January | 89 ± 5 | 73 ± 3 | 82.0 | 73.0-90.9 | 55 ± 3 | 61.7 | 48.5-74.8 |
| February | 89 ± 2 | 70 ± 4 | 78.6 | 68.8-88.4 | 54 ± 6 | 60.6 | 47.3-73.9 |
| March | 89 ± 5 | 72 ± 4 | 80.8 | 71.5-90.0 | 55 ± 2 | 61.7 | 48.5-74.8 |

Weekly menu was followed by the school authorities for which the guidelines are given by the Government. On Monday *Dal Rice*, Tuesday *puri bhaji*, Wednesday *Khidi shak*, Thursday *Phada ni Khidhi*, Friday *Dal dhokli* and Saturday *Shukdi* was served to the children. It was a cyclic menu and the menu was not changed unless there is shortage of some ration. Table 5 shows the weekly consumption pattern of school children. The consumption pattern ranged from 58 % to 74 %. The consumption trend was more or less similar varying in very narrow range of 57 % to 58 %. During the week as per the convenience of the cook and the availability of the ration, dal-bhat, puri bhaji or spicy rice was being prepared. Green leafy vegetables were not added to any of the recipe. The Saturday consumption was the highest i.e. 73.5 %. This variation may be because of personal likes and dislikes of the children and the recipe cooked on the particular day. On Saturday, mostly in all schools *shukdi* (a sweet made of wheat flour and jaggery) was being served. It is ready to eat food item and is sweet in taste so children liked it most. The other reason was that such items were not prepared at their home as they cannot afford it, so they like this change in their diet.

**Table 5: Weekly consumption pattern for Mid Day Meal by school children**

| Days | Registered | Present | | 95 % CI | Consumed | | 95 % CI |
|---|---|---|---|---|---|---|---|
| | N | N | % | | N | % | |
| Monday | 87 ± 2 | 69 ± 2 | 79.3 | 69.5-89.0 | 51 ± 2 | 58.6 | 44.8-72.3 |
| Tuesday | 87 ± 1 | 70 ± 2 | 80.4 | 69.5-89.0 | 51 ± 3 | 58.6 | 44.8-72.3 |
| Wednesday | 87 ± 4 | 69 ± 4 | 79.3 | 70.9-89.8 | 51 ± 2 | 58.6 | 44.8-72.3 |
| Thursday | 87 ± 3 | 69 ± 3 | 79.3 | 70.0-89.8 | 50 ± 4 | 57.4 | 43.4-71.3 |
| Friday | 87 ± 2 | 70 ± 2 | 80.4 | 44.8-72.3 | 52 ± 1 | 59.7 | 46.1-73.3 |
| Saturday | 87 ± 1 | 70 ± 3 | 80.4 | 44.8-72.3 | 64 ± 3 | 73.5 | 62.4-84.5 |

The other important observation during the study was that it was not made compulsory for the children to have food in the school. The serving size of the Mid Day Meal also varied from child to child. It depended on the size of plates or the Tiffin boxes which the children brought from home. If the children had not brought any tiffin then he was not given food.

## DISCUSSION

Nutrition monitoring helps to assess nutritional problems prevalent in the community, in terms of their nature, magnitude and distribution among the population groups as well as geographical areas. Such monitoring over a period of time gives us an opportunity to study the changes occurring over a period of time. This information is necessary to evolve policies, to formulate appropriate programmes and implement the same for the prevention. It highlights the need to evaluate the ongoing nutrition programmes, identify bottlenecks if any and to initiate corrective steps, wherever necessary [4].

In the present study nutritional status of school children was obtained were MDMP was running. The high prevalence of malnutrition i.e. Undernutrition (68 %), stunting (31 %) and thinness (60 %) was evident through the first phase of the study. Thus it was not difficult to come to an agreement that though MDMP started in 1995, it has failed to bring about required change in the nutritional status of school children Since MDMP started in 1995 there have been lots of changes in the program to suit to the situation and meet the nutritional demands of the beneficiaries i.e. the children [5].

A study conducted by National Institute of Rural Development in 2006 involved 7,200 school going children (9-12 y) at three different areas - urban, rural and slum of two representative districts-Lakhimpur Kheri and Sitapur (Uttar Pradesh) and Bharatpur and Jodhpur (Rajasthan) to assess the impact of MDM supplementation on the nutritional status of school going children [6]. The MDM did not make any appreciable and significant impact on improving the nutritional status of the children. One important impact was that there was a reduced dropout among the girls. Another similar study on impact of MDMP on educational and nutritional status of school children in Karnataka on 2,694 children (MDM: 1361; Non-MDM: 1333) from 60 schools indicated better enrolment (p <0.05) and attendance (p <0.001), higher retention rate with reduced dropout rate (p <0.001) a marginally higher scholastic performance and marginally higher growth performance of MDM children [7]. A study conducted by Amartya Sen in Birbhum West Bengal revealed that MDM had a positive role in eliminating classroom hunger to a substantial level [8].

In Gujarat only 71% of children aged 6-17 years attend school. School attendance is somewhat higher in urban areas (74%) than in rural areas (69%). About 90% of the primary school children (6-10 years) attend school (92% of urban and 89% in rural areas). The percentage fall in children attending school drops to 74% for children age 11-14 years and 32% for 15-17 years. Gender disparity in education is quite evident in school age population 66% girls of the 6-17 years of population attend school to 75% of the boys of similar age group [9]. The major problem which comes in effective implementation of MDMP is the poor enrollment and absenteeism. Although these two are major objectives of MDMP they still remain unachieved. In the present study also 30 % of absenteeism was observed in the rural school.

The study data revealed that MDM consumption is limited to only 52-60 % of the children which is further supported by a recent field survey of MDM initiated by the Centre for Equity Studies, New Delhi [10]. This study suggests that mid-day meals have made a promising start around the country. In each of the three sample areas (three districts each in Chhattisgarh, Rajasthan, and north Karnataka); mid-day meals were being served regularly in all primary schools. However, achievements of mid-day meals have been seriously compromised, if not defeated, by inadequate quality and low budgets.

The monthly consumption pattern was also discrete while the weekly pattern showed the consumption from 58 % to 74 %. An evaluation report on 112 schools of Delhi revealed that only 47% of schools were found to have distributed MDM in their school for a period of over 150 days. Teachers felt that continuation of the same item gradually make students develop dislike towards it.  A healthy MDM can help to protect children from hunger, and to provide supplementary nutrition.  MDM is not enough to guarantee the right to food, but they are an important step towards it. Similarly, cooked midday meals contribute to the right to education by facilitating regular school attendance and enhancing children's learning abilities. There are serious problem relating to the infrastructure and logistics of mid day meals. Shortage of utensils is a common problem. There is similar issue with the lunch plates. Children are expected to bring plates or bowls from home. Some parents however are reluctant to let children take plates or bowls away from home, for fear of losing them. It is worth noting that some poor parents simply don't have containers. In Rajasthan, many children were found to be eating on pieces of paper [11]. Thus the study throws light on few conclusions that recipe which provide adequate micronutrients should be incorporated in the menu. Children's likes and dislikes should be taken into consideration. Plates and bowls should be provided by the school authorities itself.  MDM should be made compulsory for all the school children and the school authorities should be strict about it. Monitoring system needs to be overhauled. Close supervision and regular inspections are essential to achieve higher quality standards.

Mid Day Meal have much to contribute to the well being and future of Indian children.  As things stand, mid day meal program have many flaws, but the way to go is forward and not backward. With adequate resources and quality safeguards, mid day meals can play a major role in improving nutritional status, school attendance and eliminating classroom hunger.

## REFERENCES

Millenium Development Goals Report 2009.     un.org/millenniumgoals/pdf/MDG_Report_2009_ENGpdf

Misra, Surendra N. and Manaranjan, Behera. "Child Nutrition and Primary Education: AComparative Study of Mid-day Meal Programme in Orissa and Tamil Nadu", Indian Journal of Social Development 2003. 3 (2): 267-99

NFI. Nutrition Foundation of India Scientific report 18 (2006) Sharma S, Jain P, Salila T, Gopalan G. Evaluation of Mid Day Meal Programme in MCD schools. New Delhi, 2006 nutritionfoundationofindia.res.in/pdfs/evaluation.pdf

Brahmam GNV. 2005. Indian Association of preventive and Social Medicine, Annual report 2005,

K. Bose, S. Bisai & S. Mukherjee : Anthropometric characteristics and nutritional status of rural school children . The Internet Journal of Biological Anthropology. 2008; Vol. 2, No. 1.

Seetharam S. Impact of Mid day meal on nutritional status of school going children. NIRD, Hyd. 2002.

Laxmaiah A. ; Rameshwar Sarma K. V. ; Hanumantha Rao D. ; Gal Reddy C.; Ravindranath M. ; Vishnuvardhan Rao M.  ; Impact of mid day meal program on educational and nutritional status of school children in KarnatakaVijayaraghavan K. Indian pediatrics. 1999; 36 (12):  1221-1228.

Sen A. "Cooked Mid-Day meal programme in West Bengal". Pratichi Research Team(2005). pib.nic.in/archieve/flagship/bkg_mdm1.pdf

National Family Health Statistics (NFHS)–3 2005-2006. www.nfhsindia.org/nfhs3.html Accessed on 10th August 2009

The centre for equity study. 2003. Assessment and monitoring of Mid Day Meal schemes in Rajasthan, Karnataka and Chattisgarh.

Dreze J. & Goyal A. Future of Mid Day Meals. 2003. Economic and political weekly. Nov1:4673-4683