SUMMARY AND CONCLUSION

The Mid Day Meal (MDM) is a welfare scheme funded by the government of India, which offers free cooked meals to students in primary and upper primary schools, aiming at improving nutritional status and school enrollment. This programme was meant for students up to fifth class until recently. However, now it has been extended till eighth class. In addition to Government and aided schools, alternative education centers, which are outside the formal schools, could also be included under the programme. This nutrition programme is the largest school nutrition programme in the world. According to a recent circular of District Magistrate (DM) of Allahabad, one serving of MDM must provide 450 kcal and 12g protein in primary schools, and 700 kcal and 20g protein in upper primary schools. The present study entitled “Impact of Mid- Day Meal Programme on nutritional status and school attendance of girls in Allahabad” was undertaken with five objectives: (i) to assess nutritional status of girls in schools which serve mid day meal and to compare the same with non –beneficiaries, (ii) to find out the nutritional contribution of mid day meal towards the recommended dietary allowances of the school girls, (iii) to find out school attendance of girls with and without mid day meals, (iv) to find out the knowledge and attitudes/ opinion of beneficiaries, parents and school personnel about mid day meals, and (v) to develop a set of nutrition – communication material for nutrition counseling of mid day meal beneficiaries, parents and school personnel.

After obtaining the list of schools in Allahabad district from the District Office (Vikas Bhawan) eight schools were selected. Four which were government schools had the mid day meal programme and remaining four which were private schools did not have MDM. The schools were coded as I, II, III, IV, V, VI, VII and VIII. A total of 500 girls (5-16 years) who were studying in class 1, 2, 3, 4, 5, 6, 7 and 8 were selected. Mid day meal beneficiaries were coded as MDM and non- beneficiaries as NMDM. With the help of a structured schedule general information about the schools and data on mid day meal programme were collected. Information on general management aspects, weekly menus and quantity of food served was obtained by interviewing the school principals/ teachers and by the investigator’s own observations. Each MDM and NMDM subject was interviewed personally with the help of a
pre-tested schedule that contained questions related to general profile. Their diet survey including (i) food consumption frequency and (ii) 24 hour dietary recall method (for one day) was carried out as per the procedure of Swaminathan (2002). The nutrient intakes of MDM and NMDM subjects were computed for an average day with the help of the food composition tables of Gopalan et.al. (2002). The intakes were compared with the ICMR (2001) RDA. The contribution of MDM towards RDA was also computed in terms of energy, protein, fat, calcium, CHO, beta-carotene, folic acid and vitamin C. Heights and weights of MDM and NMDM subjects were measured by the standard procedure of Gibson (1990) and were compared with the 50th percentile values of NCHS and with well-to-do-Indian children (ICMR 2001; Srilakshmi 2008). Prevalence of malnutrition was assessed by two methods as published by Srilakshmi (2008) (i) Gomez classification (ii) IAP classification. The standards used for comparison were NCHS 50th percentile and ICMR well-to-do-Indian children. Hb estimation of the subjects was done by cyamatment hemoglobin method. The subjects were also examined for clinical signs of nutritional deficiencies, if any, and scores were allotted to the signs by using the method of Gibson (1990). The number of days on which the children attended school for a period of six months was recorded by collecting the information from the attendance registers maintained in schools by the teacher. For obtaining data on knowledge and attitude/opinion regarding MDM and other related nutritional aspects, 130 MDM beneficiaries, 80 parents/guardians and 12 school personnel were selected. These were categorized into two (i) Experimental group; (ii) Control group. A booklet and C.D. containing nutrition information related to MDM were developed and entitled “Mid day meal ke duara bachcho ki shiksha evam swastha mei sudhar” (Hindi). Nutrition counseling was given to experimental group, using the developed communication material and impact was assessed by comparing pre and post exposure knowledge scores obtained by respondents in a knowledge test.

General findings about the schools were: (i) the student teacher ratio was 1:32, 1:60, 1:46, 1:78, 1:43, 1:49, 1:70 and 1:43 respectively in schools I,II,III,IV,V,VI,VII and VIII, (ii) general facilities including toilets, playground, kitchen, number of class rooms were not satisfactory.

General findings about MDM were: (i) the grains for mid day meals were brought from the Vikas Bhawan or FCI by the “Sarpanch” of the village and delivered to Principals of the
schools. (ii) for the purchase of items other than grains the principals were getting required money from Vikas Bhawan and the cooks purchased them from the local market. (iii) the budgetary provision for the MDM per day per child was reported to be ₹ 2.33 in primary and ₹ 4.33 in upper primary schools. (iv) cooking facilities existed in two of four schools surveyed and the remaining two got cooked food from a nearby NGO. (v) the meal preparations and services were normally supervised by some teachers. (vi) left over food was usually given to animals or thrown away.

The MDM menu actually served in the schools did not vary much from that prescribed by the government, and included the following:

- **Monday** - Roti; Subji mixed with soya chunks
- **Tuesday** - Rice; Dal
- **Wednesday** - Kadhi and Rice
- **Thursday** - Roti; Subji mixed with potato and other vegetables
- **Friday** - Thahari
- **Saturday** - Rice; Soya chunks curry with vegetables

The quantity of food served per head was 100g in primary and 150g in upper primary schools. The mid day meal of class I-V had following nutritive value per day on an average:
- energy 463 kcal, protein 14 g, fat 6.24g, calcium 67.23mg, CHO 88g, iron 4.30mg, beta-carotene 11µg, folic acid 33µg and vitamin C 6.11 mg, whereas the seniors’ (Class VI-VIII) MDM gave: energy 694 kcal, protein 21 g, fat 9.64 g, calcium 101 mg, CHO 134 g, iron 6.48 mg, beta-carotene 17µg, folic acid 49 µg and vitamin C 9.16 mg.

Study of per cent contribution of MDM towards the children’s ICMR (2001) Recommended Dietary Allowances showed thus: in the class I-V category comprising children of 5-12 years age group, energy contribution was 23.50 to 27.40 per cent, protein 24.58 to 46.70 per cent and iron 16.54 to 23.89 per cent. The MDM is providing one third or more of the RDA of protein to most of the children, however energy is not reaching 1/3 RDA in the 5 to 9 years age group i.e. primary school category.

In the class VI- VIII category having children aged between 12-16 years, energy contribution towards RDA was 33.69 to 35.23 per cent, protein 32.34 to 36.88 per cent and iron 21.50 to
33.95 per cent. Thus most of the children in upper primary are obtaining 1/3 RDA of energy as well as protein.

General profile survey of the MDM and NMDM girls (pooled data) revealed that the age range was 5-16 years. Majorities (84%) were Hindus and belonged to nuclear families. Most (53.2%) of the families had 5-6 members. Occupation-wise majority belonged to small-scale business or labor class. Vegetarians predominated with 53.8 per cent, followed by non-vegetarians (42.6%) and remaining were egggitarians. Family income ranged from ₹500-4500 with a mean of ₹2500/month. Greatest proportion (48%) of children had three meals per day in MDM and NMDM groups. The food item consumed daily by all the subjects of both MDM and NMDM subjects included only cereals. The other common items were oils, sugar, root vegetables (mainly potatoes), and pulses. GLVs or vegetables other than roots as well as milk and fruits were consumed in a frequency of about one to four times a week by a good proportion Non-vegetarian foods were comparatively less frequent.

In the MDM category of subjects the age group-wise mean daily intakes of energy (kcal), protein (g), fat (g), calcium (mg), iron (mg), vitamin C (mg), beta-carotene (µg) and folic acid (µg) were 1451, 30.19, 19.16, 290,16.27,26.67, 425 and 45.52 for 5 to 6 years; 1709,39, 20.75,280,15.27, 34.95, 425 and 53.33 for 7 – 9 years; 1862, 45.40,16.39,362, 14.92, 31.56, 797 and 61.44 for 10-12 years; 2040, 52.15, 26.61, 461, 16.74,37.64, 913 and 84.21 for 13-15 years; and 1934,53.37, 19.95, 348,18.98, 35, 892 and 89.77 for 16 years. Similarly in the NMDM category the mean intake values were: energy 1141 kcal, protein 24.26g, fat 17.66g, calcium 213mg, iron 14.21mg, vitamin C 21.42mg, beta-carotene 401µg, and folic acid 20.57µg for the 5-6 years group. The values for 7-9 years group were: energy 1309 kcal, protein 30.21 g, fat 16.49g, calcium 255 mg, iron 14.23mg, vitamin C 30.46mg, beta-carotene 410 µg, and folic acid 22.22µg. The 10-12 years group obtained: energy 1475 kcal, protein 35.51 g, fat 15.54g, calcium 314 mg, iron 11.81 mg, vitamin C 29.40mg, beta-carotene 792µg, and folic acid 40.05µg. The 13-15 years group got: energy 1515 kcal, protein 42.4 g, fat 17.85g, calcium 421mg, iron 12.25mg, vitamin C 32.0mg, beta-carotene 847µg, and folic acid 56.05µg. Those belonging to the 16-18 years age group of NMDM consumed diets contributing: energy 1427 kcal, protein 43.70g, fat
16.87g, calcium 345mg, iron 14.57mg, vitamin C 25 mg, beta-carotene 876µg, and folic acid 64.32µg.

In general the total day’s nutrient intakes of MDM category were significantly better than their NMDM counterparts, although deficiencies existed on the MDM categories also.

Average body weights (kg) of MDM girls of the age 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15 and 16 years were 12.88±0.49, 16±1.47, 14.91±0.94, 20.52±0.998, 25.9±1.17, 27.12±0.66, 32.37±1.14, 38.78±1.76, 42.23±1.51, 44.09±1.56, 48.82±1.67 and 42.9±0.92. NMDM girls in the same age order weighed: 13.63±0.351, 17.05±1.37, 18.61±1.70, 16.65±1.41, 26.58±2.25, 26.77±1.69, 30.38±0.24, 32.59±0.215, 42.11±1.51, 45.63±1.78, 46.75±1.62 and 43.33±3.59 respectively.

The mean heights (cm) of MDM girls of the age 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16 years were 109.58±0.98, 114.99±0.67, 118.79±2.52, 125.85±1.95, 128.43±1.56, 134.06±2.22, 144.32±2.03, 147.13±0.86, 152.79±2.01, 152.05±0.99, 153.08±1.67 and 150.40±2.24. For NMDM girls the average height values were 108.84±1.36, 111.59±0.45, 107.24±0.79, 124.89±1.04, 130.81±0.87, 136.06±1.36, 133.72±1.12, 149.98±1.17, 153.06±0.97, 150.17±1.82, 149.70±0.59 and 153.63±3.18 respectively.

In general, the weight and height measurements were significantly lower than the NCHS standards and ICMR reference values. When the weight and height of MDM and NMDM subjects were compared by t-test three out of the 12 age groups under the MDM category showed significantly higher body weights and two age groups had better heights. However, overall difference between MDM and NMDM categories was non significant.

About 51 per cent of the NMDM subjects and a relatively lower proportion (46.4%) of MDM subjects were found to be having different degrees of malnutrition varying between grade I to grade IV, based on the IAP classification. Based on the international (Gomez) method of classification it was found that prevalence of malnutrition was much higher, children in the normal category being only 24 per cent in the MDM category and 16 per cent in the NMDM category.
The mean Hb level of MDM and NMDM subjects were 8.3g/dl and 8.0g/dl respectively in the age 5-16 years. Based on degree of anaemia 28.4 per cent and 24.8 per cent respectively in MDM and NMDM category were mildly anemic; 65.7 per cent and 69.2 per cent were moderately anemic and 3.6 per cent and 4 per cent were severely anemic. It was observed that there was a significant difference between the MDM and NMDM categories.

Clinical signs of deficiency were noticed in a considerable proportion of MDM and NMDM subjects. Per cent of important signs in the two groups respectively were: pale nails 56.8 and 58; pale conjunctiva 31.6 and 32.8; headache 13.2 and 18; pale coated tongue 38 and 38.8; red or raw tongue 22.8 and 23.2; gum bleeding 22.4 and 24.4 and night blindness 1.6 and 1.2.

High clinical scores of 4 or more based on nutritional deficiency signs indicative of very poor or poor nutritional status were obtained by 23.8 per cent of MDM and 34.8 per cent of NMDM children. Scores ranging between 1-3 representing fair status were obtained 57.6 per cent and 58.4 per cent in MDM and NMDM respectively. Only a small proportion (9.6 per cent in MDM and 7.6 per cent in NMDM groups) could obtain zero score corresponding to good nutritional status.

Based on the school attendance records for six months, it was found that MDM children performed better than their NMDM counterparts. Excellent attendance of 100 per cent was found only in the MDM group, although such subjects formed only a small proportion (1.2%) and none of the NMDM girls could achieve the excellence. Similarly the proportion in the 80-99 per cent attendance corresponding to “very good” was also higher (32.8%) on the MDM than on the NMDM girls (26.4%). Statistically there was significant difference in school attendance of MDM and NMDM girls.

Survey of the MDM beneficiaries, parents/ guardians and school personnel, regarding their level of satisfaction about the MDM, revealed that although majority were satisfied, there was a considerable proportion who were not fully satisfied. Reasons reported for their lack of satisfaction included: (i) poor quality of food (ii) lack of cleanliness and (iii) too little vegetables; mostly potatoes.
The nutrition counseling given to MDM beneficiaries, parents/guardians and school personnel exerted a positive influence. The mean pre-exposure knowledge scores (%) of MDM children, parents and school personnel which were 9.75, 6.6 and 11.45 per cent increased to 57.8 per cent, 46.3 per cent and 52.15 per cent respectively as a result of exposure to the combination of booklet and C.D. developed under the research study. The gain in knowledge of all three groups of experimental category was statistically significant whereas control group was not affected in a similar manner.

Based on findings of the study, the following conclusions are drawn:

1. The nutritional status of MDM girl beneficiaries on the whole, is better than that of the non-beneficiaries. However, in comparison to standards the condition of even the beneficiaries is not satisfactory.
2. The MDM is providing 1/3 or more of the RDA of protein to most of the MDM girl beneficiaries. Energy is reaching 1/3 RDA of upper primary school beneficiaries but not in the primary school level. The MDM contribution of some of the important micronutrients viz. iron, beta-carotene are far below 1/3 RDA.
3. The menus and quantities of foods which are being served under the MDM in the primary and upper primary schools of Allahabad in general are as per the norms laid down by the government/DM. Sources of important micronutrients are, in general, inadequate.
4. The school attendance of MDM girl beneficiaries is better than that of the non-beneficiaries.
5. The existing nutrition knowledge of MDM girl beneficiaries, parents/guardians and school personnel is low. The booklet and C.D. entitled “Mid day meal ke duara bachcho ki shiksha evam swastha mei sudhar” (Hindi), meaning “Improving children’s education and health through mid day meal” developed under the present study are suitable for imparting to them MDM related nutrition education.

Taking into consideration the observations made during the study, the researcher makes the following recommendations:

1. The existing overall poor nutritional status of majority of the children appears to be due to insufficient food intakes, mainly on account of economic reasons. Hence, it is recommended that more quantity of low cost foods may be provided to the children, through govt. schemes such as the PDS so that the children’s total day’s requirements of energy and nutrients are met.
2. Nutritional quality of the MDM may further be improved by the school authorities by judicial purchase of vegetables and fruits. Inclusion of green leafy vegetables every day is recommended. Fortified foods which will take care of micronutrient deficits are also recommended.

3. Some of the children in the primary schools are of the upper primary age group. Their RDA of nutrients are higher and hence they may be served higher quantity of MDM than the quantity allowed for primary school children.

4. Parents need to be counseled that mid day meal is an additional meal and not a substitute for home meal. The practice of some children not having breakfast or lunch at home needs to be discouraged.

5. Nutrition education may be given to MDM beneficiaries, parents/guardians and school personnel from time to time. Topics which may be included are: nutrient requirements of the children, benefits of MDM, ways to improve overall health and nutritional status etc.

6. The school authorities may be advised to ensure that the MDM girl beneficiaries utilize the governments’ special provisions (free of cost) such as iron and folic acid tablets for adolescent girls, deworming, immunization programme etc.

7. Monitoring of MDM may be done by an independent third party. From time to time evaluation may be done to see if the programme is fulfilling its objectives.

8. Provision of proper kitchen, water taps and other infrastructure in the schools is highly recommended.