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Human Capital Formation: Mid-Day-Meal Programme and Education of Primary School Children

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***Abstract*: Economics of Human Capital was born as a formal area of study only five decades ago and with its emergence, the very concept of 'capital' underwent a serious change. According to human capital theory, expenditures on education and health constitute investment in human beings which enhance the capabilities of the people as producers and consumers in the society. Therefore, economics of education and economics of health emerged as two strong and vibrant areas of study in the main field of economics. The importance of education is now realized world over and the 'Alma Ata' declaration of 1978 which stated 'Education for All' by 2000 AD stands testimony to this. Several efforts have been made by the governments including that of India through policy interventions to achieve this goal. India is also committed to achieve the Millennium Development Goals that emphasise the importance of education as declared by the U.N.O. in 2000 (UNO, 2000, Washington D. C).**

Since the MDM programme among other objectives aims at promoting the physical growth and sound health of children by providing an adequate meal in the school which will meet at least one-third of the daily requirement of calories and nutrients and help children understand the relationship between food, nutrition, health, education and happy life, the present exercise is an attempt to study the impact of MDM on human capital formation at the primary school level.

On the basis of the analysis based on both primary and secondary data, it is found that MDM scheme has become successful little bit in improving the education among the primary school children. Mid-day meal scheme is a massive social welfare programme aiming at attracting children into the educational mainstream. Though the study is confined to four blocks of Mayurbhanj, it may be concluded that the MDM scheme is successful to certain extent in achieving the objectives of increased enrolment and attendance and bringing down dropouts in the primary classes. Over the years enrolment and attendance have increased but the learning level of the students has not developed to a marked extent. That is why MDM's contribution towards human capital formation in the formative years has been arrested.

***Keywords*: human capital formation**

1. Introduction

The importance of human capital in economic discussion encouraged research to find national indicators capable of measuring the genuine aggregate human capital stock for each country (World Bank, 1992; United Nations, 2002; Wossmann, 2003). Following the latest research done in this field there are basically three approaches which are adopted by the international community, the first is derived from the prospective approach, the second (educational performance) is based on the number of units who reach a certain educational level and the third (cognitive skills) is based on the cognitive competence of students. The latter two approaches do not refer to the effects of human capital as an income generating factor whereas the first of the three is exclusively based on this dimension.

2. Mid-day meal programme and education

The government of India launched the National Programme of Nutritional Support to Primary Education (NP-NSPE) in the year 1995. Today, the NP-NSPE is the world's largest school feeding programme reaching out to about 12 crore children in over 9.5 lakh schools across the country. Since the programme among other objectives aims at promoting the physical growth and sound health of children by providing an adequate meal in the school which will meet at least one-third of the daily requirement of calories and nutrients and help children understand the relationship between food, nutrition, health, education and happy life, the present exercise is an attempt to study the impact of MDM on human capital formation at the primary school level with the following objectives.

3. Objectives

a) To assess the impact of the programme on the education of the students at the primary level.
b) To suggest measures to improve and strengthen the implementation of the MDM programme.

4. Materials and methods

The present study is confined to the district of Mayurbhanj in Odisha. This district is home to people of which 70 per cent

belong to SCs& STs. Both primary and secondary data are used for the purpose of analysis. Although primary sources of materials are considered to be more important, yet some thrust is put on secondary level data and materials. The objective is to corroborate primary sources of information (field investigations and findings) with that of secondary sources.

The secondary data are drawn mainly from the published and unpublished reports of the departments such as the Directorate of Economics and Statistics, Government of Odisha; Directorate of Women and Child Development, Government of Odisha; Department of Planning and Co-ordination, Government of Odisha; Annual Work Plan on MDM and Census Publications, Government of India.

The primary sources of data and information are collected through sample surveys and interviews. Multistage sampling method is followed to elicit information from the respondents.

In the first stage, four blocks namely Saraskana, Bangiriposi, Bijatala and Rairangpur are selected at random out of 26 blocks of Mayurbhanj district. In the second stage, four gram panchayats from each block are selected at random. In this procedure, Umadeipur, Jharpokharia, Saraskana and Sirsa gram panchayats from Saraskana block; Chandanpur, Bankati, Dighi and Kumbharmundhakata grampanchayats from Bangiriposi block; Bijatala, Khanta, Badjharan and Banakati gram panchayats from Bijatala block and Halda, Bhalubasa, Purunapani and Sanpekhana gram panchayats from Rairangpur block have been selected.

In the third stage, two schools from selected gram panchayats are taken at random for the purpose of our study. So a total of 32 primary schools have been selected for the purpose. From each school, 10 students (2 students from each class, i.e., from class-I to class-V) are selected randomly. The parents of the selected students and one teacher, especially who is in charge of MDM of the concerned school are also interviewed for the study. Moreover, from each village 5 children and their parents from each primary school-age group but out of school are randomly selected for comparative analysis.

Thus, a total number of 320 school children, 160 out of school children, 480 parents and 32 teachers have been interviewed through well-structured questionnaires meant for each category of respondents.

A. Human Capital Indicators in the Prospective Approach

The first approach refers to indicators such as human capital output through the measurement of those dimensions having an impact on human capital. According to an OECD report (1998), the ratio between the income of highly-educated individuals and lower-educated individuals represents a measurement of human capital of the first group of workers.

To obtain a measurement of the investments in human capital the rates of return on earnings are calculated. Future labour-generated earnings are considered as a proxy of human capital discounted to a certain date. There are also various types of earnings (gross, net, capital-generated, and derived from investments into capital units) (OECD, 1998). In the long-term measurement of earnings other variables such as the probabilities of survival over time and discount rates which are variable over time are taken into account (United Nations, 2002).

There are also other indicators of human capital related to the characteristics of workers in a given market. Some of the most important indicators are: participation in the labour market (aggregate employment rate), ratio of highly skilled workers, share of high added-value sectors, output of high-tech patents and programmes, impact of information and communication technology on the labour market.

B. Human Capital Indicators in the Educational Performance Approach

The educational performance approach suggests that educational performance should be measured using macroeconomic indicators such as: the total number of years of schooling of the labour force, number of educational facilities, ratio of government expenditure on training to GDP, per capita expenditure on education, pupil/teacher ratio (Barro and Lee,1993; Hanushek, 1996; OECD 1998; Wossmann, 2003). References to human capital proxy include: “school enrolment” (Barro, 1991; Levine and Renelt, 1992; Mankiw et al., 1992), adult literacy rate (Romer, 1986), average years of schooling of workers (Pscharopoulos and Arriagada, 1986; Benhabib and Spiegel, 1994; O’Neill, 1995; Temple, 1999; Krueger and Lindahl, 2001) and the number of individuals involved in an economic process with a certain number of years of schooling (Mulligan and Sala-i-Martin, 1997).

Apart from the fact that there is ambiguity in the indicators used and that these are not disaggregated on an individual or household basis, it is clear that a country’s educational stock represents a mere approximate measurement of human capital, disregarding other major aspects such as health, training etc.

C. Human Capital Indicators in the Cognitive Skills Approach

The third approach draws inspiration from the principle that the value of an individual’s formation depends on the amount of education provided (expressed in years), and even more on the quantity of years of schooling as measured through the cognitive skills learnt and developed (Wossmann, 2003). In this sense the level of human capital stock depends on the quality of supply of the educational framework and schemes of that country. The cognitive skills achieved will be positively linked to the investments in human capital.

In recent empirical applications in the field of international research on 15-year-old’s learning skills, e.g. TIMSS (Trends in International Mathematics and Science Study) and OECD-PISA (Programme for International Student Assessment) the relationship between human capital and economic growth has been investigated. The outcomes reported are consistent with the theories of development economics (Hanushek and Kim, 1995). The major breakthrough of these studies was the use of the average national knowledge index in some fundamental subjects like Mathematics, Sciences, Language skills, Problem-

solving skills taken as a proxy of a country's human capital. More specifically, International Agencies such as IALS (International Adult Literacy Survey) and OECD have suggested that the average level of mathematics and science learning should be used as a measure of human capital (OECD, 1998; Wossmann, 2003).

D. Indicators of elementary education

Indicators of elementary education are usually grouped into the following three main areas to assess its impact on human capital formation during the formative years.

a) Coverage of educational system;
b) Internal efficiency of education system and
c) Quality of services and their utilisation.

Indicators on the above aspects answer a variety of questions. System's level of development, accessibility and children taking advantage of educational facilities are some of the questions, which relate to the coverage of an education system. For this purpose, indicators such as entry rate (gross and net), enrolment ratio (gross, net and age-specific), admission rate, attendance rate, out-of-school children and additional children required to enroll are demonstrated by using the actual set of data.

The next set of questions relates to the internal efficiency of the education system. Information on the number of children, who enter into the system and complete an education cycle, those who dropout from the system in between and the number of children who reach to the next higher level (transition rate) are obtained, if indicators of efficiency are computed. For this purpose, methods like Apparent Cohort, Re-constructed Cohort and True Cohort methods are used and indicators are computed, analysed and interpreted. The computation procedure of grade-to-grade promotion, dropout and repetition rates are computed and explained by taking the actual set of data. In addition, computation procedure of a variety of other indicators concerning internal efficiency such as cohort survival and dropout rates, average number of years, wastage ratio, input-output ratio and average stay, repeaters and dropouts are used.

The last set of questions relates to the resources provided to education and how they contribute to the quality of educational services and whether resources are used in the most effective way possible, all of which can be answered efficiently, if indicators for the disaggregated target groups are computed. In the last section, indicators such as time utilisation rate, space utilisation rate and indicator of average audience in a class are used.

Keeping in view the indicators explained above and the data set collected for this analysis we try to explain the impact of mid-day meal scheme on education at the primary level.

5. Results and discussions

A. Enrolment

The category-wise and sex-wise enrolment of students for the period from 1999-00 to 2008-09 is presented in Table-1. It is observed that the total enrolment has increased from 2,848 in 1999-00 to 3,239 in 2008-09. While the enrolment of boys increased from 1,868 to 2,103 that of girls increased from 980 to 1,136 during the same period.

It may be noted that the enrolment of boys decreases from 65.59 per cent in the beginning to 64.93 per cent at the end of the study period. In contrast to this the enrolment of girls increased from 34.41 per cent to 35.07 per cent during the same period. This increase in participation of girls may be attributed to the MDM programme.

The category-wise analysis reveals that there is increase in enrolment in all categories. However, the respective percentages of ST and SC enrolment have increased marginally while that of the general category has slightly declined. This indicates that MDM programme has not only prevented dropouts but also attracted new students to the school particularly from ST and SC categories.

It is also interesting to see that while there is increase in enrolment of girls in all categories, there is decrease in enrolment of boys both in ST and general categories. This analysis has been depicted diagrammatically in fig. 1.

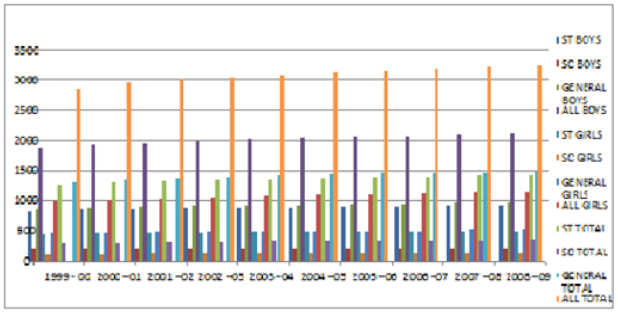

Fig. 1. Category-wise and Sex-wise Enrolment of Students in Sample Schools

B. Annual compound growth rate of enrolment

The annual compound growth rate of enrolment is depicted in Table 2. It is estimated that the annual compound growth rate of enrolment for all communities stands at 1.43 per cent and this rate of growth is almost same both for general and ST categories. But the growth of enrolment (2.01 per cent) of SC category students is seen to be the above this rate.

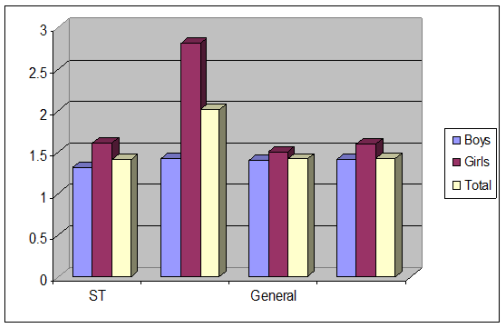

Fig. 2. Annual compound growth rate of enrolment of students

It is heartening to note that the growth rate of enrolment of girls in all categories are more than the annual compound

Table 1
Category-wise and Sex-wise Enrolment of Students in Sample Schools

Academic Year	ST			SC			General			All Communities		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
1999 - 00	822 (28.86)	434 (15.24)	1256 (44.10)	189 (6.64)	98 (3.44)	287 (10.08)	857 (30.09)	448 (15.73)	1305 (45.82)	1868 (65.59)	980 (34.41)	2848 (100.00)
2000 –01	851 (28.83)	450 (15.25)	1301 (44.08)	197 (6.68)	101 (3.42)	298 (10.10)	887 (30.06)	465 (15.75)	1352 (45.81)	1935 (65.57)	1016 (30.43)	2951 (100.00)
2001 –02	864 (28.83)	455 (15.19)	1319 (44.02)	199 (6.64)	105 (3.50)	304 (10.14)	899 (30.01)	474 (15.82)	1373 (45.83)	1962 (65.49)	1034 (34.51)	2996 (100.00)
2002 –03	876 (28.79)	464 (15.25)	1340 (44.04)	202 (6.64)	108 (3.55)	310 (10.19)	911 (29.95)	481 (15.81)	1392 (45.76)	1989 (65.38)	1053 (34.62)	3042 (100.00)
2003 –04	885 (28.76)	469 (15.24)	1354 (44.00)	205 (6.66)	111 (3.61)	316 (10.27)	920 (29.89)	487 (15.83)	1407 (45.72)	2010 (45.32)	1067 (34.68)	3077 (100.00)
2004 –05	895 (28.70)	476 (15.27)	1371 (43.97)	207 (6.64)	113 (3.62)	320 (10.26)	933 (29.92)	494 (15.84)	1427 45.76)	2035 (65.27)	1083 (34.73)	3118 (100.00)
2005 –06	903 (28.65)	482 (15.24)	1385 (43.94)	210 (6.66)	116 (3.68)	326 (10.34)	942 (29.89)	499 (15.83)	1441 (45.72)	2055 (65.20)	1097 (34.80)	3152 (100.00)
2006 –07	909 (28.61)	486 (15.30)	1395 (43.91)	212 (6.67)	120 (3.78)	332 (10.45)	948 (948)	502 (15.80)	1450 (45.64)	2069 (65.12)	1108 (34.88)	3177 (100.00)
2007 –08	916 (28.59)	491 (15.32)	1407 (43.91)	213 (6.65)	122 (3.81)	335 (10.46)	955 (29.81)	507 (15.82)	1462 (45.63)	2084 (65.04)	1120 (34.96)	3204 (100.00)
2008 –09	924 (28.52)	498 (15.38)	1422 (43.90)	215 (6.64)	126 (3.89)	341 (10.53)	964 (29.76)	512 (15.81)	1476 (45.57)	2103 (64.93)	1136 (35.07)	3239 (100.00)

Figures in parentheses indicate percentage, Source: Compiled from the data collected

growth rate of enrolment for all students and this indicates that MDM has intervened to attract students particularly to girls into the fold of education. Diagramatic representation of this analysis is made in Fig. 2.

Table 2
Annual Compound Growth Rate of Enrolment of Students

Category	Boys	Girls	Total
ST	1.32	1.61	1.41
SC	1.43	2.81	2.01
General	1.40	1.51	1.42
All Communities	1.41	1.60	1.43

Figures are in percentage
Source: Compiled from the data collected

Formula used for calculation of growth rate:

$$Y_t = Y_0(1 + r)^t$$

Where, Y_t = Enrolment at the end of the study period
t = time
r = Annual compound growth rate

C. Attendance

The average attendance of students for the month November in three different academic years, namely, 1999-00, 2004-05 and 2008-09, is presented in the Table-3.

It is found that there is continuous rise in the average attendance of the students during the study period. The percentage of attendance for all communities increased from 75.98 in the year 1999-00 to 79.63 in the year 2004-05 and further increased to 83.14 in the year 2008-09. The same trend is also found both for boys and girls.

The category-wise picture is no different. Attendance of students in all categories has shown rising trend. However, absenteeism is found more among girls compared to boys.

While average attendance is found to be the highest (86.45 per cent) in the case of general category boys, it is the lowest (76.62 per cent) for ST category girls. It may be pointed out that there is no much difference between the attendance of the SC and general category students whereas ST students lag behind. Graphically it is presented in Fig. 3.

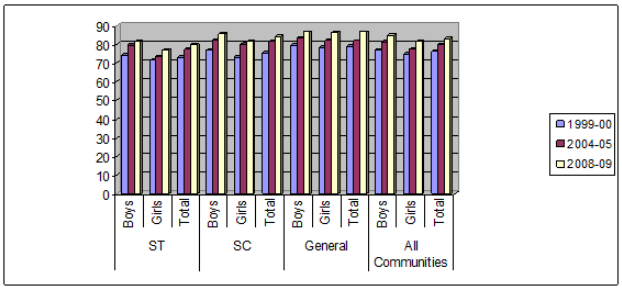

Fig. 3. Average attendance for the month of November in three different academic years

1) Attendance in Pre-Lunch and Post-Lunch Sessions

The average attendance of primary students from Class-I to Class-V on the day of visit to the sample schools is presented in Table 4. The entire school hour is divided into two sessions, namely, pre-lunch and post-lunch. Pre-lunch session is the

Table 3
Average attendance for the month of November in three different academic years

Academic Year	ST			SC			General			All Communities		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
1999-00	74.13	71.25	73.08	76.43	73.10	75.26	79.25	78.25	78.92	76.65	74.69	75.98
2004-05	79.20	73.40	77.16	82.19	79.73	81.25	83.25	81.98	81.63	80.84	77.37	79.63
2008-09	81.15	76.62	79.60	85.40	81.45	84.16	86.45	86.12	86.31	84.45	81.51	83.14

Figures are in percentage
Source: Compiled from the data collected

period before distribution of MDM and the post-lunch session is the period after MDM in the schools.

It is observed that in the pre-lunch session the attendance is more compared to post-lunch session for all categories both for boys and girls. Leaving school after lunch is found to be more among ST followed by SC. This is minimal for the general category students. Graphically it is represented in Fig. 4.

Table 4
Average Attendance in Pre- and Post-Lunch Sessions on the Day of Visit to the Sample Schools

Category	Sex	Pre-Lunch Session	Post-Lunch Session
ST	Boys	88.16	80.21
	Girls	78.15	72.41
	Total	84.67	77.50
SC	Boys	86.30	85.13
	Girls	82.00	81.50
	Total	84.75	83.58
General	Boys	89.25	89.13
	Girls	87.34	87.04
	Total	88.55	88.42
All Communities	Boys	88.49	84.31
	Girls	82.66	79.75
	Total	86.45	82.71

Figures are in percentage
Source: Compiled from the data collected

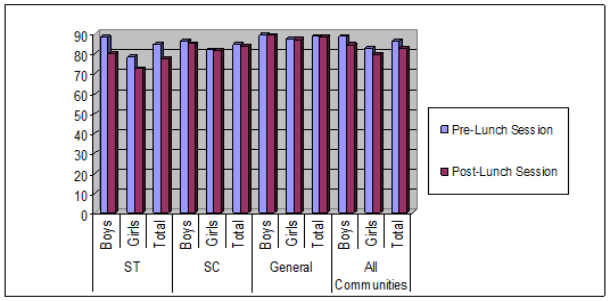

Fig. 4. Average Attendance in Pre- and Post-Lunch Sessions on the Day of Visit to the Sample Schools

D. Drop out

The dropout rate in sample schools of Mayurbhanj district from the academic year 2004-2005 to 2008-09 is presented in Table-5. It is found that the overall dropout rate has reduced from 10.12 per cent in the academic year 2004-05 to 8.45 per cent in the academic year 2008-09. The dropout rates for the boys and girls of all communities which were 9.82 per cent and 10.61 per cent respectively are found to have decreased to 8.13 per cent and 8.21 per cent during the same period. It may be pointed out that the dropout rate of the girls is found to be higher than that of the boys in the study period.

The category-wise analysis of dropouts shows that it is maximum (8.93 per cent) for the ST category students and minimum (5.15 per cent) for the SC category students. While the dropout among girls of SC and ST categories are more than their counterparts, the reverse is found in the case of general category students.

Though there are differences in dropout rates among different categories, a declining trend is observed for all categories both for boys and girls. This is a positive sign for healthy growth of primary education and the credit may be attributed to the MDM programme. Dropout of students is presented diagrammatically in Fig. 5.

Dropout Rate = (Enrolment in Class: I – Enrolment in Class: V) ÷ (Enrolment in Class: I)

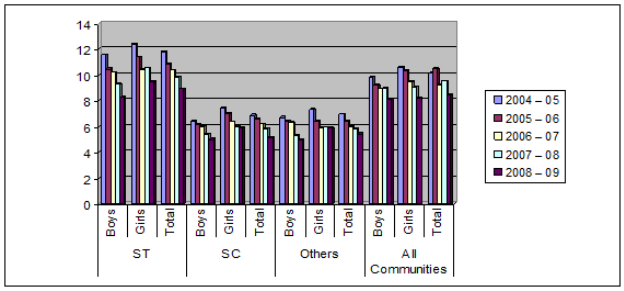

Fig. 5. Dropout Rate in Sample Schools

E. Teacher-taught ratio

Table 6
Teacher-Taught Ratio

Name of the Block	No. of Students	No. of Teachers	Teacher-Taught Ratio
Saraskana	1302	30	1:43
Bangiriposi	1128	25	1:45
Bijatala	1427	30	1:48
Rairangpur	1234	28	1:44

Source: Compiled from the data collected

The teacher-taught ratio in sample schools of different blocks of Mayurbhanj is presented in Table 6. The teacher – taught ratio in the sample blocks such as Saraskana, Bangiriposi, Bijatala and Rairangpur are 1:43, 1:45, 1:48, and 1:44 respectively as against 1:38 for the state. Bijatala block, in comparison to other three blocks has less accessibility and less developed for which the teacher – taught ratio is found to be the highest followed by Bangiriposi, Rairangpur and Saraskana. Thus, it may be construed that there are less number of teachers in the district compared to other districts of the state.

Table 5
Dropout Rate in Sample Schools

Academic Year	ST			SC			Others			All Communities		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
2004 – 05	11.56	12.41	11.79	6.45	7.41	6.88	6.71	7.34	6.96	9.82	10.61	10.12
2005 – 06	10.47	11.38	10.83	6.13	6.99	6.57	6.45	6.41	6.42	9.21	10.34	10.48
2006 – 07	10.18	10.43	10.37	6.01	6.38	6.21	6.31	5.92	6.02	8.95	9.48	9.23
2007 – 08	9.31	10.56	9.85	5.42	6.01	5.84	5.30	5.95	5.83	8.96	9.07	9.54
2008 – 09	8.29	9.47	8.93	5.03	5.90	5.15	5.01	5.89	5.45	8.13	8.21	8.45

Figures are in percentage
Source: Compiled from the data collected

Table 7
Learning Level of Sample Students

% of Marks	ST			SC			General			All Communities		
	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
0-40	48 (51.61)	31 (65.95)	79 (56.43)	08 (33.33)	02 (15.39)	10 (27.03)	17 (14.48)	03 (5.88)	20 (13.99)	73 (34.93)	36 (32.43)	109 (34.06)
41-60	40 (43.01)	14 (29.78)	54 (38.57)	10 (41.37)	06 (46.15)	16 (43.24)	61 (66.30)	37 (72.55)	98 (68.53)	111 (53.11)	57 (51.35)	168 (52.50)
61-100	05 (5.38)	02 (4.25)	07 (5.00)	06 (25.00)	05 (38.46)	11 (29.73)	14 (15.22)	11 (21.57)	25 (17.48)	25 (11.96)	18 (16.22)	43 (13.44)
Total	93 (100)	47 (100)	140 (100)	24 (100)	13 (100)	37 (100)	92 (100)	51 (100)	143 (100)	209 (100)	111 (100)	320 (100)

Figures in parentheses indicate percentage of the column total
Source: Compiled from the data collected

F. Learning level

For measuring the learning level of the students of Class-I to V, different questions were prepared for different classes of students. These questions have been set keeping in view the minimum level of learning at primary stage as prescribed by the Dave Committee (1991) and the report published by NCERT (National Council of Educational Research and Training). Both oral and written tests were conducted for the sample students of each class. The question of each class was designed to test their knowledge in Mathematics, English, Oriya Language and Environment. However, the Class-I students were exempted from English. Moreover, oral test was conducted for all students to answer certain questions based on regularity and punctuality, cleanliness, industriousness/diligence, sense of duty and service, equality, cooperation, sense of responsibility, truthfulness, and national integrity which contribute towards personal and social growth as national development. The marks assigned to the written and oral tests of students of different classes were in the ratio of 70:30. The marks scored by the different categories of students both in written and oral tests were added together and average marks of each category is taken and grouped into three classes, namely, 0-40 per cent, 41-60 per cent and 61-100 per cent. The class-wise distribution of students on the basis of their test scores is presented in Table 7.

It is observed that 34.06 per cent students of all classes taken together are below standard students as they secure less than 40 per cent of marks. Average standard students are found to be maximum (52.5 per cent) on the basis of their test scores in the range of 41 to 60. Only 13.44 per cent of students are good students those who score more than 60 per cent of marks. The performance of girls is found to have an edge over the boys so far as learning is concerned.

The category-wise analysis reveals that general category students perform better than both SC and ST students. The performance of ST category students is found to be dismal as 56.43 per cent students are below standard. 27.03 per cent SC category students also belong to the non-performing category while only 13.99 per cent of general category students are observed to have scored below standard marks. Thus, it may be construed that in spite of increase in enrolment and attendance the standard of the students has remained less than satisfactory. Learning level of sample students is presented diagrammatically in Fig. 6.

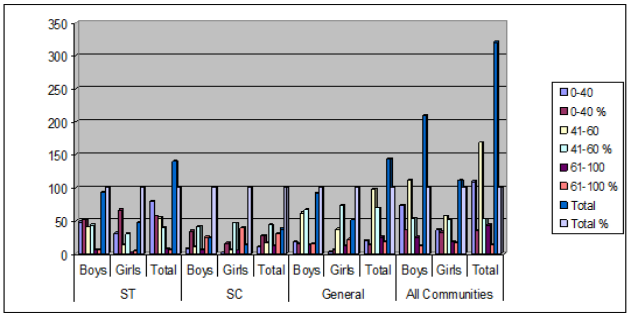

Fig. 6. Learning Level of Sample Students

G. Empirical results

1) Impact on Enrolment

In this section an attempt is made to evaluate the impact of the MDM programme on primary school enrolment. It is found that 92.5 per cent of the enrolled sample students participate in the MDM programme.

Let D_i^E be a variable indicating whether child i is enrolled in a primary school, and D^p be an indicator for MDM participation. The estimating equation takes the form

$$D_i^E = \alpha_p D^p + \beta X_i + u_i \quad (1)$$

where α_p is the impact of MDM programme on school enrolment, and u_i is a child-specific error term representing unobserved determinants of enrolment. X_i is a vector of variables including gender of the child, body mass index (BMI) of the child, household size, father's and mother's years of schooling, total monthly household income, total landholding of the household.

The equation is estimated for gross enrolment. The dependent variable, D_i^E is 1 if a child is enrolled in primary school irrespective of his or her age; 0 if a child between ages 6 and 10 years is not enrolled in school.

It is evident from the regression result that MDM programme has a positive impact on enrolment school. The programme raises gross enrolment by 14.2 per cent. Table-8 presents the results of the estimated probit regression for gross enrolment. Further results on enrolment include:

- A mother's education level has a strong and positive impact on enrolment but a father's education does not.
- Child enrolment rates increase as household income rises.
- Household size is negatively correlated with enrolment.

Table 8
Impact of MDM Programme on School Enrolment: Probit Regression Results

Variable	Gross Enrolment	
	df / dx	z-statistic
MDM Participation = 1	0.093	2.180*
Child's Gender: Male=1	– 0.008	– 0.240
Child's Body Mass Index (BMI)	0.012	0.743
Household Size	– 0.035	– 2.710**
Father's Years of Schooling	0.010	1.521
Mother's Years of Schooling	0.037	3.052**
Total Household Income	0.022	2.84**
Total Landholding of Household	– 0.006	– 0.091
Pseudo R-Squared	0.47	

Source: Compiled from the data collected
* Significant at the 5 per cent level
** Significant at the 1 per cent level

df/dx represents the change in probability for an infinitesimal change in each independent, continuous variable and, by default, the discrete change in the probability for the dummy variables. Standard errors of the coefficients are conventional.

2) Impact on School Attendance

The survey was designed to assess whether the MDM programme has any effect on school attendance of children that are enrolled in primary school. The survey collected information on the number days a child was absent from school in November 2008. This information was converted into the number of days present out of a total of 24 school days in November 2008 in sample primary schools.

The difference in the number of school-attended days in the reference month between MDM programme participant and non-participant students is the impact of the programme on attendance, controlling for child and household characteristics.

Let A_i^S denote the number of days child i attended school in November 2008, and D_i^p be a variable indicating whether child i is a participant of the MDM programme. The equation for school attendance is estimated as

$$A_i^S = \alpha_p + \beta X_i + u_i \quad (2)$$

where $\alpha\ p$ is the impact of MDM programme on school attendance, and u_i is a child-specific error term representing unobserved determinants of attendance. X_i is a vector of variables that include all the X_i variables in equation (1) above, plus a variable representing the number of days the child was sick the previous month. Equation (2) is estimated using the OLS regression, with standard errors corrected for the sampling effects.

Table 9
Impact of MDM Programmeon School Attendance: OLS Regression Results

Variable	Coefficient	t-statistic
MDM Programme Participation = 1	1.214	5.39*
Days Sick the Previous Six Months	– 0.001	– 0.062
Child's Body Mass Index (BMI)	0.083	0.084
Household Size	0.028	0.214
Father's Years of Schooling	0.012	1.394
Mother's Years of Schooling	0.023	3.017**
Total Household Income	0.194	2.810**
Total landholding of Household	0.152	0.290
R-Squared	0.340	

Source: Compiled from the data collected
* Significant at the 5 per cent level, ** Significant at the 1 per cent level

The results of the estimated OLS regression equation are provided in Table 9. The MDM programme has a statistically significant positive impact on school attendance. The MDM programme increases school attendance of participating students by 1.214 days per month (or 5.06 per cent of total school days a month).

The results also indicate that household income, mother's education have significant impact on school attendance.

3) Impact on School drop out

The survey collected information on whether any child in household dropped out of primary school in 2008. The difference in the number of school dropouts between MDM programme participant and non-participant students is the impact of the program on dropout, controlling for child and household characteristics.

Let D_i^D be a variable indicating whether child i dropped out of primary school in 2008, and $D_i\ ^P$be a variable indicating whether child i is a participant of the MDM programme. The specification of the estimating equation is

$$D_i^D = \alpha_P D_i^P + \beta X_I + u_i \quad (3)$$

where $\alpha\ _p$is the impact of MDM programme on school dropout, and $u_i$is a child-specific error term representing unobserved determinants of dropout. $X_i$is a vector of control variables that include all the $X_i$variables in equation (1) above. Equation (3) is estimated using a probit regression.

The MDM programme has a statistically significant negative impact on dropout. Table-10 provides the results of the estimated probit regression. The value of the coefficient is – 0.069, which indicates that the participation in MDM programme reduces the probability of dropping out of school by 6.9 per cent.

Other statistically significant determinants of dropping out of school are household size and mother's education. The likelihood of school dropout decreases as household income increases.

Table 10
Impact of MDM Programme on School Dropout: Probit Regression Results

Variable	df/dx	z-statistic
MDM Participation = 1	– 0.069	– 2.810
Child's Body Mass Index (BMI)	0.002	0.591
Household Size	0.0068	2.013*
Father's Years of Schooling	– 0.002	– 1.239
Mother's Years of Schooling	– 0.015	– 0.543
Total Household Income	– 0.006	– 2.751**
Total Landholding of Household	0.021	1.170
Pseudo R-Squared	0.380	

Source: Compiled from the data collected
* Significant at the 5 per cent level
** Significant at the 1 per cent level

Dependent variable is 1 if any child in household dropped out of primary school in 2008; 0 if no child dropped out of school. df/dx represents the change in probability for an infinitesimal change in each independent, continuous variable and, by default, the discrete change in the probability for the dummy variables.

4) Impact on learning

The MDM aims to enhance concentration span and learning capacity of school children by reducing short-term hunger in classroom, and by contributing to the alleviation of under nutrition. A standard achievement test was administered to sample primary school students and the test scores used to assess the impact of MDM on learning performance of MDM participating students. The test was given to sample students of Class-I to Class-V, and included Oriya, English, Environmental Studies and Mathematics. Because the students did not complete their Class at the time of the survey, Class-V students were given Class-IV standard test and so on.

The impact of the programme on learning; controlling for child, household, and school characteristics is estimated by using the following model.

Let *Ti* be the test score of child *i* in terms of percentage of total points the child obtained in all subjects, and D_i^P be a variable indicating whether child *i* is a student of a school with the programme. The estimating equation takes the form

$$T_i = \alpha_p D_i^P + \beta X_i + u_i \quad (4)$$

where α_p is the impact of programme on test scores, and u_i is a child-specific error term representing unobserved determinants of test scores. *Xi* is a vector of variables representing child's body mass index, father's and mother's years of schooling, and whether the child's household has electricity, teacher – taught ratio, whether school has parent-teacher association, whether school has toilet for students, and number of classrooms in school and whether the student is male or female.

The regression analysis takes into account the nature of the dependent variable and the survey design so as to make correct statistical inferences. The achievement test scores represent per cent of correct answers and range from 0 to 100. Therefore, equation (4) is estimated using a Tobit regression model. This model takes into account the fact that the dependent variable is censored at 0 and 100, instead of a continuous variable that goes from positive to negative infinity. The model also corrects the standard errors for sampling effects.

Table 11
Impact of MDM on Test Scores of Students: Tobit Regression Results

Variables	Coefficient	t-statistic
MDM Participation = 1	9.867	1.895
Child's Gender: Female = 1	4.019	2.712**
Child's Body Mass Index	1.713	3.159**
Father's Years of Schooling	0.004	2.021*
Mother's Years of Schooling	0.698	3.011**
House has Electricity = 1	1.933	0.788
Teacher - Taught Ratio	1.057	2.481
School has Toilet = 1	0.911	1.573
School has Parent-Teacher Association	0.431	2.509
Sigma (Goodness of Fit)	2.88	56.32

Source: Compiled from the data collected from the sample schools
* Significant at 5 per cent level
** Significant at the 1 per cent level

Table 11 provides the results of the Tobit regression. The MDM programme has a positive impact on learning but it not statistically significant. This suggests that the participation in MDM programme does not necessarily increase test scores of the students participating in MDM.

Of the remaining variables it is found that,

- Girls do better in achievement tests than boys.
- Parent's education level has a positive impact on students' test score.
- Students score high in tests if the teacher – taught ratio is low.
- Students score more if they have electricity at home.

6. Conclusion

Mid-day meal scheme is a massive social welfare programme aiming at attracting children into the educational mainstream. Though the study is confined to four blocks of Mayurbhanj, it may be concluded that the MDM scheme is successful to certain extent in achieving the objectives of increased enrolment and attendance and bringing down dropouts in the primary classes. Over the years enrolment and attendance have increased but the learning level of the students has not developed to a marked extent. That is why MDM's contribution towards human capital formation in the formative years has been arrested.

References

[1] Afridi, F. (2005, April 9), Mid-Day Meals in Two States: Comparing the Financial and Institutional Organisation of the Programme, Economic & Political Weekly, 1528-35.
[2] Agarwal, D. K., Upadhyay, S. K., and Agarwal, A. M. (1987), Nutritional Status, Physical Work Capacity and Mental Function in School Children-Scientific Report 6, Nutrition Foundation of India, NewDelhi.
[3] Baldacci, E., Clements B., Gupta S., and Cui O. (2004), Social Spending, Human Capital, and Growth in Developing Countries: Implications for Achieving the MDGs, International Monetary Fund Working Paper, WP/04/217.
[4] Barro, R. (1999), Human Capital and Growth in Cross Country Regression, Swedish Economic Policy Review, n. 6.
[5] Baru, R. V., Dasgupta, R., Deshpande, M., and Mohanty, A. (2008, June 14), Full Meal or Package Deal? Economic and Political Weekly, 20-22.
[6] Baru, R. V., Dasgupta, R., Deshpande, M., and Mohanty, A. (2008, June 17), The Case for Cooked Meals: Concerns Regarding the Proposed Policy Shifts in the Mid-Day Meal and ICDS Programs, Indian Pediatrics, Vol. 45.
[7] Behrman, J. R. (1993), The Economic Rationale for Investing in Nutrition in Developing Countries, World Development 21(11), 1749-1771.
[8] Bhardwaj, R. K. (2003, August 1), Mid-Day Meals in Rajasthan, Nutrition Foundation of India, NewDelhi.
[9] Bhat, R. and Jain, N. (2006), Analysis of public and private healthcare expenditures. Economic and Political Weekly, Vol. XLI (1).
[10] Blue, J. (2005), The Government Primary School Mid-Day Meals Scheme: An Assessment of Programme Implementation and Impact in Udaipur District, Udaipur: mimeo, Seva Mandir.
[11] Brahmam, G. N. (2003, August 1), Evaluation of Mid-Day Meals Programme in the States of Andhra Pradesh, Karnataka, Orissa, Tamilnadu, Kerala and Gujarat, Nutrition Foundation of India, NewDelhi.
[12] Chandrasekhar, U. (2003, August 1), Nutritious Meal Programmes of Tamilnadu: Our Experiences, Nutrition Fondation of India, NewDelhi.
[13] Collaborative Research and Dissemination. (2005), Towards More Benefits from Delhi's Mid-Day Meals Scheme, NewDelhi: mimeo, CORD.
[14] Dasgupta, P. and Weale, M. (1992), On Measuring the Quality of Life, World Development, 20, 119-131.
[15] Development, M. o. (2006), National Programme of Nutritional Support to Primary Education,2006: Guidelines, Government of India, New Delhi.

[16] Dhananjayan, N. and Chandran. (2003, August 1), Origin and Growth of the Nutritious Noon Meal Programme in Tamil Nadu, Nutrition Foundation of India, NewDelhi. Dollar,
[17] Dreze, J. and Goyal, A. (2003, November 1), The Future of Mid-Day Meals, Economic & Political Weekly, 4673-4683.
[18] Dreze, J. and Khera, R. (2008, November). Mid-Day Meals in Primary Schools. Yojana, 36-38.
[19] Dreze, J. and Kingdon, G. G. (2001), School Participation in Rural India, Review of Development Economics 5(1), 1-33.
[20] Filmer, D. and Pritchett, L. (1999), The Impact of public Spending on Health: Does Money Matter?, Social Science & Medicine, 49:1309–1323.
[21] Gopalan, C. (2003, July 31 and August 1), Mid-Day Meal Programmes in Schools in India - The Way Forward, Nutition Foundation of India, New Delhi.
[22] Gopaldas, T. (2003), Gujarat's Improved Mid-Day Meals Programme, Nutriview.
[23] Gopaldas, T. and Gujral, S. (1994), Educability before Education: A Nutrition- Health Education and Sensitisation Handbook, Tara Consultancy Services, Baroda.
[24] Gregson, S, Waddell, H., and Chandiwana, S. (2001). School Education and HIV Control in Sub-Saharan Africa: From Discord to Harmony? Journal of International Development, Vol. 13, 467-485.
[25] Hinrichs, Peter (2010), The Effects of the National School Lunch Programme on Education and Health, Journal of Policy Analysis and Management, Vol. 29, Issue 3, p. 479-505.
[26] IrudayaRanjan, S. and Jayakumar, A. (1992, October), Impact of Noon Meal Programme on Primary Education - An Exploratory Study in Tamil Nadu, Economic and Political Weekly, Vol. - XXVII, n. 43 and 44, 24 – 31.
[27] Judson, R. (2002), Measuring Human Capital like Physical Capital: What Does It Tell Us?, Bulletin of Economic Research, 54(3), 209- 231.
[28] Kiker, B.F. (1966), Historical Roots of the Concept of Human Capital, Journal of Political Economy, 29, 481-499.
[29] Khera, R. (2006, November 18), Mid-Day Meals in Primary Schools: Achievements and Challenges, Economic & Political Weekly, 4742-4750.
[30] Kumar, P. and Sood, T. (2005), Bihar: A Mid-Day Meals Survey Report, Patna: mimeo, Action Aid.
[31] Laxmaiah, A., Sarma, KVR., Rao D. H. et al., (1999), Impact of mid-day meal program on educational and nutritional status of school children in Karnataka, Indian Pediatrics, 36: 1221-1228.
[32] Ministry of Human Resource Development, (2004, December), National Programme of Nutritional Support to Primary Education (Mid-Day Meals Scheme) Guidelines. Government of India, New Delhi.
[33] Ministry of Human Resource Development, (2006, September), National Programme of Nutritional Support to Primary Education (Mid-Day Meals Scheme) Guidelines, Government of India, New Delhi.
[34] Mishra, S. N.and Behera, M. (2000), A Comparative Study of Nutritional Support to Primary Education (Mid-Day Meals Scheme) in Orissa and Tamilnadu, Nabakrushna Choudhury Centre for Development Studies, Bhubaneswar, Orissa.
[35] Nehru, V., Swanson, E., and Dubey, A. (1995), A New Database on Human Capital Stocks in Developing and Industrial Countries: Sources, Methodology and Results, Journal of Development Economics, 46 (2), 379-401.
[36] Nurkse, R. (1953), Problems of Capital Formation in Under-developed Countries, Blackwell, Oxford.
[37] O'Connell, L. and Birdsall, N. (2001), Race, Human Capital Inequality, and Income Distribution in South Africa, Brazil and the United States, Discussion Paper 4, Carnegie Endowment for International Peace, Washington, D. C.
[38] B. K. Sharma Planning Department, Govt. of National Capital Territory of Delhi, (2000), Evaluation of Study Report on Mid-Day Meal Programme.
[39] Ravi, J. (2003, August 1), Mid-Day Meals Scheme in Gujarat, Nutrition Foundation of India, New Delhi.
[40] Sachs, J. (2005), Investing in Development: A Practical Plan to Achieve the Millennium Development Goals, UN Millennium Development Library.
[41] Sethi, B. (2003), Mid-Day Meals Programme and its Impact in Improving Enrolment in Raygada District, mimeo, LalBahadur Shastri National Academy of Administration, Mussoorie, Uttarakhand, India.
[42] UNDP. (2005), Human Development Report, New York: United Nations Development Programme.
[43] A Report on Minimum Levels of Learning at Primary Stage, Dave Committee, Ministry of Human Resource Development, Government of India, 1991.
[44] An Evaluation Study Report on Mid-Day Meal Programme, Planning Department, Government of National Capital Territory of Delhi, March 2000.
[45] A Report on the Cooked Mid-Day Meal Programme in West Bengal, Go WB & UNICEF, Kolkata, mimeo, 2003.
[46] A Report on Impact of Feeding Children in School: Evidence from Bangladesh, Akhter U. Ahmed, International Food Policy Research Institute, Washington, U. S. A, November 5, 2004.
[47] Brief Report of the National Seminar on Feeding the Child, Organised by the Swami Sivananda Memorial Institute (SSMI), India International Centre (IIC), New Delhi, 26 February 2008.
[48] A Report of the Workshop on 'Mid-day Meal Programme in Schools in India – The Way Forward', Organised by Nutrition Foundation of India, New Delhi, 26, February 2008.
[49] http://www.avsi.org
[50] http://www.educationnext.org/2001sp/65.html
[51] http://en.wikipedia.org
[52] http://www.frontlineonnet.com
[53] http://www.indiatogether.org
[54] http://www.outlookindia.com
[55] http://www.parents.org.uk/index.html?health_school_meals_htm&2
[56] http://www.pib.nic.in
[57] http://www.planningcommission.nic.in
[58] http://www.pmindies.nic.in
[59] http://www.righttofoodindia.org
[60] http://www.sccommissioners.org.
[61] http://www.statistica.unimib.it/utenti/lovaglio
[62] http://www.tc.colum-bia.edu/cice