THE IMPACT OF SCHOOL MEALS ON SCHOOL PARTICIPATION: EVIDENCE FROM RURAL INDIA

1 Introduction

The elementary education system of India is one of the largest in the world. There are about 150 million children officially enrolled in nearly 800 thousand schools throughout the country (Department of Education, Government of India, 2002-03). Despite this seemingly extensive coverage, almost 40 million children in the age group of 6-14 years are out of school and an almost equal number do not reach grade 5 (Department of Education, Government of India, 2002-03). Additionally, there exists a wide disparity between female and male children's school participation rates. The enrollment rate of girls is almost 7 percentage points lower than that of boys in the primary school age group. This gap widens dramatically to 13 percentage points at the secondary level of education. Not only is the overall participation rate lower in rural areas but the bias against female attainment is much higher compared to urban India [1].

According to the National Family Health Survey (NFHS, 1998-99), the primary cause of a child having never been enrolled in a school in rural India is the cost of education. This is surprising considering that tuition in public primary schools is negligible and almost completely subsidized. However, the overhead costs of books and uniforms can be quite high, dissuading poor families from sending their children to school. The PROBE (Public Report on Basic Education for India, 1999) report estimates

[1] The gender gap is almost 6 percentage points higher in rural India compared to the urban areas for children in the primary school age group (National Family Health Survey of India, 1998-99).

that the average annual cost of sending a child to a rural primary school in 1996 was Rs.318, far from negligible[2]. Households, thus, may be unable to invest in education because of income or credit constraints. Besides pure sex preference, the cost of education could further exacerbate gender disparity if, for instance, the expected returns to female education in the labor market are lower and the opportunity costs of sending girls to school are higher.

In this paper I assess the impact of a nationally mandated free cooked meal program in public primary schools on participation rates using school and household level data that I collected in a rural area of the central Indian state of Madhya Pradesh. One of the stated aims of this scheme is to reduce the gender inequality in schooling outcomes (Government of Madhya Pradesh, 2002). The analysis, therefore, aims to evaluate whether the scheme has been effective in reducing gender gaps in addition to raising the overall current enrollment and average school attendance rates.

Both survey and experimental studies suggest that school subsidies are effective means of improving participation rates. For instance, in a randomized evaluation of the impact of provision of uniforms and textbooks along with classroom construction in Kenya, Kremer et al. (2002) find a decline in drop out rates in treatment schools. In another study Dearden et al. (2005) show that a means-tested grant paid to secondary school students in England lead to a 4.5 percentage point higher participation rate. The program had a larger impact on boys and children from poorer socio-economic groups.

Using data from an experimental study, Schultz (2004) finds a significant effect of Progresa, a cash subsidy to mothers conditional on 85% attendance on school days of their children in grades 3 to 9 in Mexico, on raising primary school enrollment especially of girls. These grants increased at higher grade levels and were also larger for girls in grades 7 to 9. He finds an average increases in enrollment of 3.4% for all students in grades 1 to 8 and a 14.8% increases in enrollment of girls who had completed grade 6.

There has been an increased interest in evaluating the impact of school meal programs in developing countries since this form of subsidy has implications for both educational as well as health outcomes of school age children. Survey studies on take-

[2] The official exchange rate is $1= Rs. 44 and the average per capita income of an Indian was $564 in 2003. Based on purchasing power parity, about 35% of the population lives on less than $1 a day (Human Development Report, 2005)

home raw foodgrains program in Bangladesh (Ravallion and Wodon, 2000) and India (Dreze and Kingdon, 2000) show a significant effect on increasing enrollment rates in schools (particularly of girls in India). Vermeersch and Kremer's (2005) randomized evaluation of a preschool feeding program in Kenya suggests an increase in school participation by 30% compared to schools in the control group. Another randomized school feeding program in chronically food insecure areas of Bangladesh raised school enrollment by 14.2% (Ahmed, 2004).

However, research on the effects of cost subsidies on school attendance rates is scant since most subsidies are conditional on enrollment. In one such study, Schultz (2000) finds insignificant effect of Progresa on school attendance rates. In Bangladesh school attendance increased by 1.3 days per month (Ahmed, 2004) with the provision of meals. Effects of on-site school meal programs on attendance rates in India have been analyzed in government reports but are not very informative[3].

This paper assesses the effect of the cooked meal scheme on both school enrollment and attendance through an analysis conducted at two levels: a panel of schools and a cross-section of households. The impact of the school meal program on the total enrollment and average attendance rates is estimated by grade and gender using panel data on schools in the survey region. I adopt a difference-in-differences estimation strategy, comparing the difference in the participation rates before and after the introduction of the program in schools which implemented the cooked meal program within the first six months of a new academic year to that of a control group whose program participation status did not change during this period[4]. This allows me to control for time invariant unobservables that are correlated with program implementation and the

[3] Studies commissioned by the Indian government (Planning Commission, 2000 and Laxmaiah et al., 1999) either compare the trends in enrollment and attendance in periods before and after the Mid Day Meal Program was implemented in select states or conduct a cross-sectional comparison of participation rates in treatment and control schools. The results mostly show success of the program in raising enrollment and attendance rates, especially of girls.

[4] Survey studies (Dreze and Goyal, 2003 and Planning Commission, 2000) evaluate the impact of cooked school meals in India by comparing enrollment rates across academic years in treatment schools. However, this estimation strategy does not account for the introduction of other welfare program during the study period. To elucidate, in 2003-04 academic year the government introduced the program of distribution of free school textbooks to all primary school children while in the previous academic year free textbooks were distributed only to socially disadvantaged students. Thus, any difference in the enrollment and average attendance rates in treatment schools between 2002-03 and 2003-04 academic years cannot be attributed solely to the introduction of the school feeding program in 2003-04.

participation rates to rigorously assess program impact. The robustness of the results for enrollment obtained from the difference-in-differences strategy is checked through a probit model at the individual child level using household data. This analysis accounts for family or community characteristics that maybe correlated with presence of the school meal program and which may influence individual participation decisions as well.

The analysis indicates a significant effect of the introduction of cooked school meals on the school attendance rates of girls in lower grades. The average monthly attendance rate of girls in grade 1 jumps up by more than 10 percentage points. There is a positive but insignificant impact of the scheme on the attendance rates of boys in grade 1. However, the results suggest that the on-site school meal program did not lead to a significant increase in overall enrollment levels although there was a small positive effect on the enrollment rate of girls from disadvantaged socio-economic groups. Individual child level analysis using the household data leads to similar conclusions for enrollment effects. This result does not necessarily imply that the cooked meal program did not lead to improvement in enrollments. Since schools in the survey area were distributing free food grains every month before transitioning to cooked meal provision, the finding most likely indicates that cooked meals did not provide any additional incentives for enrollment over the previous program. Nevertheless, overall, the findings do indicate that the program has been successful in reducing gender disparity in school participation rates.

The results can be explained by two features of this school subsidy scheme. First, given that the cost of schooling increases for upper grade levels while the cash value of a cooked school meal is constant across grades, the meal subsidy is implicitly relatively larger for lower grade children. Second, the finding that there is almost no redistribution of nutrients away from a program participant within the household (Chapter 2) coupled with the fact the food transfer through school meals forms a larger proportion of the daily dietary requirement of the young and females, it affects the incentives of parents of these children. These two factors reinforce each other to induce households to send girls in lower grades to school more regularly.

From a policy perspective the findings suggest that introduction of public programs which subsidize the cost of schooling can be useful policies for improving

participation rates. Further, subsidies which even implicitly target girls can be effective in reducing gender disparities against females in education.

The remaining paper is organized as follows. The characteristics of the meal program and the survey data are discussed in section 2. Section 3 describes the methodology for estimating the program's impact. The results are discussed in section 4 while section 5 concludes.

2 Data and Methodology

2.1 School Meal Program in Madhya Pradesh

This paper is based on data obtained through a survey conducted by me in the central Indian state of Madhya Pradesh (MP) in January and February, 2004. MP is one of the most underdeveloped states in the country and, therefore, a good representative of the poverty regions of India[5]. The survey was conducted in one of the eleven census blocks of Chindwara district of the state[6]. The selected block has a low literacy rate of 55% in its rural areas compared to the national rural average of 59% (Census, 2001). This block is also officially designated as one of the 120 most underdeveloped blocks in MP by the state government.

Under the Mid Day Meal Program, cooked meals were to be introduced in all public and government aided primary schools across India, including MP, in 2002 as mandated by a Supreme Court of India judgment in November, 2001[7]. All children enrolled in grades 1 to 5 in these schools were to be provided with a free meal of wheat porridge (either sweet or salty) cooked from 100 grams of raw wheat for each student and supplying a total of 413.80 kcal and 8.20 grams of protein per student per school day.

[5] While the poverty ratio in non-urban areas of India was about 26% in 1999-00, rural poverty in this state was more than 30% (Deaton and Dreze, 2002)

[6] In India each state consists of several districts and each district is subdivided into census blocks. In 2001, there were a total of 48 districts and 311 census blocks in MP.

[7] The federal government in India launched the National Program of Nutritional Support to Primary Education in August 1995 (Government of India, 1995). The program mandated cooked meals in public primary schools across *all* states in the country within two years. The judgment passed in November 2001 directed all state governments, which were yet to implement the program, to provide cooked meals in all targeted schools within six months.

The federal government was to provide the raw food grains free of cost to the state. However, the expenditure for converting food grains into cooked meals was to be borne by the state itself. But the government of MP was unable to raise resources to implement the cooked meal program universally within the state. Thus, in the meantime, public primary schools in the survey region were providing raw wheat grains at the rate of 2 kilograms per month for a 10 month academic year to all enrolled students subject to an individual monthly attendance rate of 80%. This quantity of food grains was equivalent to the 100 grams of wheat provided under the cooked meal program on a school day (i.e. 10 school months each of which comprises of 20 school days).

The public schools in the surveyed rural area transitioned from distributing food grains to providing meals in school in July 2003 (the first month of a new academic year). However, some schools continued to distribute raw food grains even after July. The administrative and financial responsibility of implementing the meal program in all public primary schools in a village lies with the elected village governing body or GP (gram panchayat). Each GP has 1 to 5 villages and the public primary schools therein within its purview. Thus, the implementation of the school meal scheme may be endogenous to that particular village or community due to the democratic nature of the program enforcing body.

The cash value of the cooked school meals (food grains and other ingredients including oil, sugar and salt) is equivalent to more than 160% of the annual cost of public schooling borne by households for grade 1 children and 78% of the costs for grade 5. Thus although the quantity of the ingredients used in the meals is invariant across all levels of primary schooling, the scheme provides a proportionately higher subsidy to children in lower grades because the costs of schooling (including tuition and other fees) rise with the grade level[8]. To elucidate, Table 3.1 shows the annual household expenditure on public schooling by grade and the proportion of the costs covered by the cooked school meal program using the household survey data. Each category of school expenditure increases with the grade level. There is more than a two-fold increase in

[8] Information from the household survey on expected annual expenditure on fees and tuition, textbooks, stationary, school uniforms and other expenses including transportation was obtained for each individual child currently enrolled. Administrative guidelines on program expenditure and village survey data on the market price of food grains was used to estimate the cash value of the cooked meals.

schooling expenditure on an individual child progressing from grade 1 to 5. With a grade invariant cash value of cooked meals (excluding the cost of labor, fuel and milling of grains) of approximately Rs. 19.10 per student per month, the program is effectively providing relatively lower subsidy to children in higher grades[9]. While tuition, textbooks and school uniforms constitute the cost of school enrollment, expenditure on other fees (such as, fees paid before examinations) stationary and transportation costs depend more on the regularity of school attendance. Thus the subsidy is relatively larger for both enrollment and attendance in lower grades.

2.2 Data

The survey, designed and implemented by me, collected data at three levels – household, school and village. 15 households were sampled through systematic random sampling in each of the 41 randomly selected villages in the surveyed census block (in 2001 there were 150 villages in this block). In the household survey, information was gathered on current enrollment and the type of school of all primary school age children (5 to12 years old) residing within the household.

Information was obtained on public and private primary schools, both within and outside the village boundary in which the sampled children were currently enrolled. Data on characteristics of the village such as access to public goods, daily wages and on the GP president were gathered through interviews with the president himself (herself) or a member of the GP. In total, information was obtained on 615 households, 74 primary schools and 41 villages in this census block.

Detailed data on the national school meal program were obtained through interviews with the school headmaster and the cook appointed for the school meal scheme in the mandated public primary schools. The enrollment and attendance data were obtained from official school registers for two months, July and December, 2003, in each of the surveyed public as well as private primary schools. Enrollment figures were

[9] The school academic year in the sampled district is for 10 months from July to April. Each school month consists of approximately 20 school days, constituting a total of 200 school days in a year.

collected by grade, gender and caste while the average monthly attendance rate was calculated only by gender and grade.

There are two significant reasons for choosing these two months. First, the staggered implementation of the school meal program from July 2003 onwards makes possible a before and after comparison of the school enrollment and attendance rates between schools which introduced cooked meals and those schools whose program participation status did not change during this period (schools which provided raw grains or had no program and those which served cooked meals in both July and December). This estimation strategy is aided by the fact that all public schools accept new enrollments through September and private schools accept new entrants through August in an academic year. One can, therefore, compare participation rates in schools which introduced the cooked meals vis-à-vis schools which did not change the nature of the meal program between July and December. Second, in poor agrarian economies children's attendance usually varies according to the agricultural season. For instance, during the harvest season in November and March children are usually employed either on the family farm or for daily wages on someone else's land. Typically during heavy agricultural seasons the attendance in schools is lower than normal. But in both July and December agricultural activity is low, thus, I do not expect the average attendance rates of children in schools to be systematically different between these two months.

The summary statistics for the school level data are presented in Table 3.2. The school survey collected information on the implementation of the cooked meal program in the first six months of the 2003-04 academic year, the month before the survey interview and the last seven days before the interview. 41 of the 74 surveyed schools implemented the cooked school meal program between July and December. The remaining 33 schools did not change their implementation status during this period. This includes 17 schools which implemented the cooked meal program in July itself and 16 which did not implement the program at all. The latter group includes all private primary schools which were *not* mandated to provide cooked meals or distribute raw food grains and six public primary schools (three of these were distributing raw food grains and the other three did not have any program, in both July and December). On the whole, both school participation and intensity of the program improved between July and December,

2003. The cost of primary schooling (tuition and miscellaneous fees) is much higher in private schools as also is the quality of schooling indicated by the low pupil-teacher ratio. The increase in attendance rates during the first six months of the academic year was significant in private primary schools. This may imply that households which want better and higher quality education are more likely to enroll their children in private schools and lay greater stress on their schooling. Such families probably belong to a relatively higher income group or are less credit constrained. The statistics in the last row suggest that there were insignificant changes in enrollment rates in all the school groups during this period.

Figures 3.1-3.4 show the raw average monthly school attendance data in July and December. Figure 3.1 shows the average attendance rate in July by sex and grade, in schools which implemented the cooked meal program between July and December. Figure 3.2 presents similar statistics for schools whose participation in the program did not change during the first six months of the academic year. This group includes both public and private primary schools. Figures 3.3 and 3.4 compare the two groups in December. Across the two months and groups, the attendance rate in grade one is lower than the upper grades. The attendance rates tend to rise from grade one to two and then decline, particularly for girls in July. Typically, fifth grade attendance rate jumps up for both girls and boys in December compared to July. Though the trends in attendance differ between July and December, they are similar across the two groups of schools. Girls' attendance is higher than boys' in first and fifth grade in December for both groups of schools while in the middle grades their participation is lower compared to boys. From the raw statistics we can conclude that the trends in attendance rates are comparable across the treatment and control schools.

In Table 3.3 the school participation rates of children from the household level data is classified by gender and socio-economic groups[10]. The current enrollment rate of girls in the 5 to 18 age group is 11 percentage points lower than that of boys. This gap is smaller for being ever enrolled in school, indicating that girls are more likely to drop out than boys. When the sample is restricted to children who are 12 to 18 years of age, the

[10] The Constitution of India lists certain socio-economically disadvantaged groups in the population in a schedule. The groups listed in this schedule are referred to as 'scheduled' tribes/castes (ST/SC) and 'Other Backward Castes (OBCs).

gender disparity in completion of primary schooling is glaring. Disaggregating the data by socio-economic groups (the excluded group is non-SC/ST/OBC) shows that participation rates of ST children, particularly girls, is the poorest. Only 41% of ST girls in the 12-18 age group have completed primary education. The school participation rates are representative of the picture at the national level.

Table 3.4 shows the summary statistics for a sample of 1106 children in the 5-12 age group residing with the surveyed households. In MP, primary school (grades 1 to 5) begins at age 5 or 6 and ends at age 10, while high school is usually complete by age 18. However, due to deferred enrollment or grade repetition primary schooling might get delayed to after age 10. The average age in the sample, therefore, is 8.47 years. 88% of the sample is currently enrolled in a school. 54% of the households are headed by a scheduled tribe (ST). On average, within a family, there are 1.32 dependents for each household member in the working age group of 15 to 60 years. Half of the sampled children belong to an officially designated Below (or on) Poverty Line (BPL) household[11]. While 60% of the parents indicated that they would support a male child's education up to the level he desires, only 45% of the parents of the sampled children favored continuing the education of a girl child to her desired level, indicating a bias against girls' education.

From the village survey, information is available on the characteristics of the GP president such as whether the GP president's seat was reserved for scheduled caste (SC), scheduled tribe (ST) or other backward castes (OBC) and the gender of the president. Daily labor wages of adult men and women is less than $1 in this region but work for wages by children is negligible.

Before going on to explain the estimation strategy, I present Table 3.5 which shows the summary statistics on the characteristics of the individual sample by the nature of the school meal program. A village is defined as participating in the program if all public primary schools within the village boundary implemented the cooked meal

[11] The state government carries out a survey of household expenditure and ownership of assets in order to classify households as above or below poverty line. Based on this survey, all households are typically given ration cards for purchasing food grains at subsidized prices from government outlets. These ration cards are of different colors and signify the income level of the household. On and below poverty line (BPL) households are given green and yellow colored ration cards, respectively. In the household survey the respondent (usually the household head) was asked whether they owned a ration card and if so of what color to classify families by economic status.

program by the end of September, 2003[12]. The cut-off month is September since late enrollments are accepted until the end of this month in an academic year. Thus, implementation of the cooked meal program will significantly affect enrollment rates within an academic year only if the program is introduced between July and September of that year. Eyeballing the numbers across the two groups indicates no systematic differences in most observable characteristics of the two groups of children. However, a larger proportion of children belonging to treated villages have a non-ST household head and come from BPL households. In villages of treated schools the distance to the public secondary school is shorter and they are more likely to have a male and ST GP president.

3 Empirical Methodology

3.1 Difference-in-differences (DID)

The ideal estimation strategy for evaluating the impact of the cooked meal scheme on school participation would be through randomization of program participation. However, the scheme was mandated for all public primary schools. But not all the schools in the survey region had implemented the program at the time of the survey. The initiation of the program was most likely not random in the survey region as suggested in section 3.2.1. In order to address the potential endogeneity of program placement I take advantage of the staggered implementation of the program to estimate its true impact. I run the following model to evaluate the program's effect between July and December, 2003.

$$A_{gcst} = \alpha_0 + \alpha_1 D_s + \alpha_2 D_t + \alpha_3 D_s * D_t + \nu_{gcst} \quad (1)$$

A_{gcst} is the monthly participation rate of gender g in grade c in school s in month t. D_s is a dummy variable for whether the school changed its participation status in the cooked meal program between July and December. D_t is a dummy variable for the month of December. ν_{gcst} is a time invariant error term. Thus, $D_s * D_t$ is the difference-in-

[12] There is uniformity in implementation of the cooked meal program across public primary schools within a village in the data. There was only one village whose public schools were neither providing raw food grains nor cooked meals by September, 2003.

differences estimator of implementing the cooked school meal program on participation rate at the school level.

The summary statistics from the data for all 74 schools indicates that the variation in attendance rates is higher for grade 1 and upper grades between July and December. This is even more evident for girls. The data suggest that the average attendance rate of girls in grade 1 increases by 7 percentage points and by 9 percentage points for grade 5 girls from July to December. There is a small or insignificant change in attendance rates for the middle grades. The trend is similar for boys though the change in attendance rates is lower in magnitude. It is unlikely that this variation is due to agricultural season since the two months were low intensity farming season and were not harvesting periods. However, it is critical to take into account this time trend which can be incorrectly attributed to the implementation of the cooked meal program. This variation in average attendance rates in addition to the fact that the subsidy is implicitly and relatively larger for lower grades necessitates analysis by grade and gender.

The analysis is conducted for enrollment levels and both attendance levels as well as attendance rates. The enrollment level is the total number of students listed in the school register by grade, gender and socio-economic group in July and December. The average monthly attendance rate has been calculated by dividing the average number of students (by grade and gender) who attended school in the month with the total school enrollment in that month. However, this measure does not take into account any possible increase in the enrollment rate due to the program and could, therefore, bias downward the program's impact on attendance rates. Thus, in order to account for any changes in enrollment rates between July and December I also run the analysis for the average level of attendance (by grade and gender) which is the sum of the number of students who attended on each school day in the month over the total number of school days in that month.

A pertinent concern, however, remains about the reliability of the school records used to obtain the participation data. In developing countries public school records of enrollment and attendance are well known to be exaggerated. What is not clear, however, is whether this exaggeration is at the school level or at a higher level of aggregation. Assuming that the records are not reliable even at the school level, the difference-in-

differences estimate will be able to correct for this bias if there is no change in the degree of exaggeration before and after the introduction of the meal program. There are two very compelling reasons to believe that this assumption holds. First, food grains were being released to the schools at the beginning of the month based on the enrollment figures, and not the average attendance, in the previous month in the survey region unlike in some urban municipalities in India where grains are released after the distribution of meals and verification of attendance records. Second, most public schools were distributing raw food grains before the introduction of the cooked meals program. All schools were directed to implement the program from July onwards and, therefore, the quantity of grains released at the rate of 2 kilograms per child per month was the same irrespective of whether the school was implementing the cooked meal program or distributing raw food grains. Thus there was no differential incentive to exaggerate the enrollment records either. Since the nature of the program is unlikely to be correlated with the either the level or direction of the fudging of school records, α_3 should give a true estimate of program impact.

3.2 Cross- sectional Estimation

In order to check the robustness of the results obtained from the panel data to variation in individual, household and community characteristics, I utilize the data on the sample of households in the villages to which each of the sampled public primary school belonged. The individual school participation information through the household survey was obtained in January and February, 2004, that is at least six months after the beginning of the academic year in July, 2003. If H_{iv} is the current enrollment of child i in village v then,

$$H_{iv} = f(\alpha_0 + \alpha_1 X_{iv} + \alpha_2 \mathbf{X}^h_{iv} + \alpha_3 \mathbf{X}_v + \alpha_4 D_v + \mu_{iv}) \quad (2)$$

where X_{iv} is individual characteristics of child i, $\mathbf{X}^h_{iv}$ is a vector of household characteristics such as parental education, the dependency ratio in the household, annual income and ownership of assets. It also includes parental preferences for schooling of a girl as a dummy variable which equals 1 if in the household survey the parent's response to the question "How much education do you wish to give your daughter?" was "As much as she desires". The coefficient on this variable reflects the attitudes of the parents

towards schooling of both sons and daughters. $\mathbf{X}_v$ is a vector of village characteristics such as distance from the village center to the nearest public secondary school and daily adult labor wage. D_v is a dummy variable indicating whether all public primary schools in the village introduced the cooked meal program by the end of September, 2003. I estimate equation (2) separately for girls and boys to identify any differential impact of the cooked meal program on current enrollment for children in the 5 to 12 age group. To sum, while the DID strategy tests whether the rate of change in participation was greater in schools which implemented the program between July and December, the cross-sectional strategy tests whether the level of enrollment is higher in schools which implemented the program by the end of September.

As discussed in an earlier section, although the cooked meals program was mandatory it was not uniformly implemented. The placement of the program may be endogenous to the GP. For instance, suppose the scheme was initiated in villages with lower enrollment levels. Then in a cross sectional analysis the impact of the cooked meal program on raising enrollment levels would be biased downwards. Dreze and Kingdon (2000) suggest that the PROBE data indicates that this scheme was more likely to be adopted in socio-economically deprived areas.

I address the potential endogeneity of program placement by instrumenting for the presence of a cooked school meal program in a village. The 73rd amendment of the Constitution of India in 1992 allowed for one-third of GP presidents' seats in a state to be randomly reserved for women. Chattopadhyay and Duflo (2003) take advantage of this randomization to show that the gender of the GP president affects the nature of provision of local public goods in rural India. In particular, they find a significant effect of a GP president's gender on pubic good investments which are relevant to the needs of their own gender[13]. Male GP presidents showed a preference for investing in education while females invested more resources in improving drinking water facilities (since women usually have to travel long distances to collect water daily, especially in Rajasthan which has desert vegetation). Officially, Madhya Pradesh too has implemented a set of rules which would ensure randomization in reserving seats for women in GPs.

[13] Their survey findings show that a very small percentage of female GP presidents were elected from unreserved GPs (6.7% in West Bengal and 1.7% in Rajasthan).

I use the gender of the GP president as an instrument for the implementation of the cooked meal program. Since the GP has to allocate funds to various competing needs, including the cooked meal program, in each village within its jurisdiction and the resource allocation preferences of male and female presidents may differ this variable may influence program placement but is unlikely to have a direct effect on individual enrollment decisions. Given the findings of the above mentioned paper one would expect male GP presidents to be quicker at implementing the cooked meal program. However, the literature on intra-household bargaining suggests that women's preferences differ from those of men in the allocation of household resources. Mothers are more likely to invest in the health and education of their children, particularly girls, relative to fathers (Lundberg, Pollak and Wales, 1997; Duflo, 2003). The empirical evidence from the literature on resource distribution, therefore, suggests that women may prefer investing resources in spheres in which females are disadvantaged or discriminated against. However, the direction of the impact of the gender of the GP president on the implementation of the cooked meal program is ambiguous in view of the conflicting empirical evidence in the literature on public versus household resource allocation preferences of men and women. Also, this instrument may be correlated with the provision of other educational resources and public school facilities that directly affect enrollments. In the analysis, therefore, I control for measurable school characteristics as well.

4 Results

Table 3.6 shows the results of the analysis of the effect of cooked meals on school level enrollments in December, 2003. Results are reported for the complete sample of both public and private primary schools in specification 1 and for the sample restricted to only public primary schools in specification 2. Each column shows the results of separate regressions for the impact of a change in school's participation in the cooked meal program between July and December on total, boys' and girls' monthly school enrollment level. The main coefficient of interest is the difference-in-differences impact of the program shown by the coefficient on the interaction of the December dummy with a dummy for whether the school changed its participation status in row 1. The point

estimate of the DID effect is negative but insignificant across all samples in specification 1, suggesting that implementation of the program did not lead to an impact on enrollments.

In Table 3.2 I had shown that private primary schools have significantly different features from that of the public primary schools. I take into account the possibility that the trends in enrollment rates in private and public primary schools, therefore, may be different and bias the program's impact by restricting the sample to only public primary schools in specification 2. The negative, though insignificant, coefficients on December in column 2 suggest that in public primary schools students may be dropping out as the academic year progresses. However, the point estimate of the effect of the cooked school meal program is still insignificant, though positive, as indicated by the coefficients in the first row. It may be that the program's impact on enrollment levels varies across grades and gender (and possibly socio-economic groups as well) producing a zero aggregate effect of the scheme.

In Table 3.7, therefore, I analyse the total enrollment in public primary schools by gender and socio-economic groups. The coefficients in the first row for boys suggest that there is no differential impact on boys' enrollment levels in schools which initiated cooked meals before December. However, SC boys are more likely to drop out in December as indicated by the negative coefficient on the December dummy. The positive coefficient on the DID term for ST girls indicates that their enrollment levels increased due to the school meal program. But insignificant coefficients in the first row for SC and OBC girls imply that the program did not affect enrollment of girls in other socio-economic groups. Given that the participation rates of ST girls is the poorest as discussed in Table 3.3, it seems that the cooked meals program is effective in improving enrollment levels of children on the margin.

A further disaggregation of the data by gender and grade in Table 3.8 again indicates insignificant program effect on boy's enrollment levels in public primary schools across all grades. However, the coefficients on the December dummy suggest a time trend in enrollment levels which varies across grades for boys. Enrollment levels of boys rises in grade 1 from July to December but fall for higher grades, the decline being larger in upper grades as suggested by the larger magnitude of the coefficient on

December for grade 4 boys. The trend across grades is similar for girls with a significantly negative coefficient on December for grade 5 girls' enrollment level. Although the coefficient on the DID term for girls in grade 2 is significantly negative suggesting that implementation of the cooked meal program lead to a fall in their enrollment levels, it is small in magnitude.

The analysis so far indicates that the cooked meals program did not improve enrollment level for boys. However, it did increase the total enrollment of ST girls marginally. The results do not necessarily imply that school meal programs are ineffective in increasing enrollments. Since schools were distributing raw food grains in the survey region from the previous academic year, the results suggest that the subsidy provided by cooked meals did not affect enrollment incentives over and above that presented by the raw food grains program. This is apparent from the fact that the difference between cash value of the two programs is marginal (equivalent to the value of ingredients other than food grains used in cooked meals) since more than 76% of the cooked meal subsidy consists of the value of food grains. Given that availing the subsidy provided by the cooked meals requires daily school attendance, one would expect the program's impact to be more significant on this indicator of participation rather than enrollments.

Table 3.9 presents the results for school attendance rates. In both specifications 1 and 2, the attendance rate of boys is higher than that of girls by about one percentage point when we compare the constants. In schools which implemented the cooked school meal program during the first six months of the academic year the attendance rates are lower and significantly so when the sample consists of only public primary schools in specification 2, suggested by the negative coefficients on 'change in participation in cooked meal scheme' for total and girls' attendance rates. The significant positive coefficients on the December dummy in specification 1 across all sample groups is mostly driven by private schools which were not mandated to implement the meal program. Their inclusion in the sample, therefore, leads to negative point estimate of the DID effect as shown in row 1 of specification 1. Restricting the sample to public schools in specification 2 produces a positive but insignificant effect of implementation of the cooked meals program on attendance rates as indicated by the coefficients on the DID

term in row 1. But the point estimate of the DID effect for girls is much larger in magnitude than for boys in specification 2.

The first five columns in Table 3.10 show the results for the average monthly attendance rate of boys in grades 1 to 5 while the next five show the effect on attendance rate of girls. The coefficient on the DID estimate is insignificant across grades for boys. But the point estimate for grade 1 boys is positive although the standard error is large probably due to the small sample size. The attendance rate of girls in grade 1 increases by 10.5 percentage points in schools which implemented the cooked meal program after July as indicated by the DID coefficient in row one.

Schools whose program participation status changed had lower attendance rates in grade 1, especially for girls as indicated by the negative coefficient in the second row for grade 1 girls. In addition, comparing the constants across grades suggests that attendance rates are lowest in grade 1 for both for boys and girls. The attendance rates rise in the middle grades and then decline in higher grades for both genders. This is particularly true for girls' attendance rate which jumps down from 84% in grade 4 to 81% in grade 5. Boys' attendance rates decline steadily from grade 2 to 4. This trend coupled with the negative coefficient on December dummy for enrollment levels in Table 3.8 reflects the large drop out rates between primary and secondary schooling in India, particularly for girls[14]. However, while the level of enrollment falls in higher grades in December relative to July (Table 3.8), the trend in the attendance level is opposite as suggested by the positive coefficient on December for boys and girls in grade 5.

A similar analysis for the level of attendance in Table 3.11 leads to the same conclusions. The number of girls attending grade 1 increased by 1.77 and in grade 3 by 0.81 due to the school meal program, as shown by the coefficients in row 1. The effect on attendance level of boys was not significant.

The robustness of the results for enrollment is checked by household level analysis. Table 3.12 shows the first stage probit regression results of the presence of a cooked meal program on current individual enrollment in public primary schools. The results are reported for all children in 5-12 year age group and also separately for boys

[14] According to the NFHS (1998-99), the enrollment rate of girls falls by almost 14 percentage points between the age groups 6-10 and 11-14 years while for boys the drop is of about 5 percentage points.

and girls in this age range. The implementation of the cooked meal program in public primary schools in the village by September 2003 is regressed on the gender of the GP president. The coefficient on the gender of GP president in the first row is positive and significant across all sample groups suggesting that having a male president increases the probability that the cooked meal program was implemented in public primary schools of the village by September. This conclusion is robust to the inclusion of measures of school characteristics in model 2 as well. The first stage relationship is in keeping with the results obtained by Chattopadhyay and Duflo (2003) for provision of public goods.

The second stage results of the impact of the school meal program on current enrollment are presented in Table 3.13 In the probit regression in model 1 the coefficient on the cooked school meal program dummy is insignificant for the complete sample and for boys and girls. Instrumenting for the meal program in model 2 (ivprobit) does not change the interpretation of insignificant program effect on the current enrollment of girls as well as boys though the point estimate for the program impact is positive for females and negative for boys. This result is robust to the inclusion of school characteristics in model 3 which are correlated with the presence of the meal program and current individual enrollment decisions as indicated by the significant coefficients on almost all the school variables in model 2 in the first stage regression (Table 3.12). Thus the overall result of small or insignificant effect of cooked school meals on enrollment from the school data analysis is held up. Recall that most villages, whose public primary schools had not started serving cooked meals, were distributing free grain rations. The insignificant effect of the former program on individual enrollment decisions again suggests that introduction of cooked meals did not influence investment incentives over and above the impact that distribution of grain rations might have already had on school enrollments.

Overall, the results imply that the cooked meal scheme program was effective in raising the school attendance of children in lower grades particularly girls'. This result is not surprising considering that the scheme effectively gives a proportionately larger subsidy to lower relative to the upper grades. This feature of the program is reinforced by the fact that, based on the child nutrition survey data collected in this survey, on average the wheat porridge meal was providing only 183 kcals of energy and 5.2 grams of protein

to each enrolled child on a school day in the public primary schools. Since the daily energy requirement (RDA) of younger children is lower (Gopalan, Sastri and Balasubramaniam, 2004) it is reasonable to conclude that the wheat porridge meal formed a larger proportion of the total daily intake of younger children. This would be particularly true for girls who are more likely to be provided fewer daily nutrients within the household in India (Pitt, Rosenzweig and Hassan, 1990). Analysis of the proportion of the nutrient transfers by which the daily intake of program participants increases in Chapter 2 indicates a one-for-one increase. In addition, there appears to be less reallocation of food away from younger and female program participants within the household. In effect, therefore, the food transfer is larger for younger girls and boys compared to older kids in public primary schools.

On average, therefore, the impact of the program on participation rates of girls is higher. The scheme affects the attendance decisions of those whose school participation rate is on the margin: those whose attendance rates were low in the absence of the program and for whom the food transfer forms a significant proportion of the daily intake.

A note of caution, however, must be exercised in interpreting the results of the analysis. As discussed in section 3.3 the official school participation figures may not be very reliable in India. If the enrollment or attendance rates were already artificially inflated before the introduction of the cooked meals program then there would be little scope for further manipulation of the records after the scheme was implemented. In such a case, the impact of the school meal program on school participation may be biased downwards.

5 Conclusion

In this paper I use household and school survey data from a rural area of India to investigate whether a nationally mandated cooked school meal program has been successful in raising the overall school participation rates and reducing the existing gender disparity in enrollments and attendance.

The results indicate that the cooked school meals did not have an impact on enrollments over and above the effect which may have been induced by the pre-existing

program of distributing raw food grains to primary school students. But the differentially larger subsidy provided by the cooked meals vis-à-vis raw food grain distribution did lead to an overall increase in the enrollment level of ST girls. There is a large and significant increase in the attendance rates among girls in early grades and a positive, although insignificant impact on first grade boys. The attendance rates of girls in grade 1 increased by more than 10 percentage points due to the cooked school meals.

The significant impact on lower grades is explained by two factors. First, the cash value of the meal subsidy is implicitly relatively larger for lower grade children. Second, the food transfer forms a larger proportion of the daily intake of younger children and girls. These two factors reinforce each other to increase the incentives of parents to send girls in lower grades to school more regularly. Thus the program is indeed effective in reducing the gender disparity in school participation rates.

The results are supported by the evidence from previous survey data and anecdotal evidence on the impact of the meal program in India (Dreze and Kingdon, 2000; Dreze and Goyal, 2003). These studies suggest that school meal programs are particularly effective in increasing the school enrollment rates of first graders and girls. Qualitative data on perceptions of school headmasters and parents from this survey also suggests that younger children are more attracted to attending school due to the program which makes it easier to ensure that their school participation is more regular.

There are two important policy implications of these results. First, school subsidies can be an important policy instrument for making schooling more desirable for resource poor households. Second, school subsidies which even implicitly target girls can be effective in reducing gender disparities in education. However, in order to stem the high drop out rates before completion of primary school it would require either provision of meals whose quantity increases proportionally with the daily dietary requirement of children by age and thereby grade or supplementing the meal program with other subsidy schemes such as scholarships or both.

Table 1: Annual Household Expenditure on Public Schooling of an Individual Child
(Rs. per annum)

Expenditure Category	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
Tuition and other fees	23.84	25.58	33.27	31.89	39.8
Text Books	7.78	10.68	17.00	23.79	29.83
Stationary	26.23	36.75	48.37	55.34	62.35
Uniform	60.47	75.06	83.6	93.71	112.02
Other expenses (including transportation)	0.00	0.06	0.05	0.23	0.74
Total Annual Cost	**118.32**	**148.13**	**182.29**	**204.96**	**244.74**
Cash value of cooked meals as % of annual schooling cost [+]	161.43	129.41	104.78	93.19	78.04

Note: [+] Cash value of cooked meal includes the market value of wheat (Rs. 0.70 per 100 grams) and cost of ingredients (Rs. 0.255 per student per school day). There are approximately 200 schools days each academic year. With each student receiving 100 grams of wheat per school day the annual cash value of the program is Rs. 191 per student.

Table 2: Mean School Characteristics (July-December, 2003)

	Change in Program Participation Status	No Change in Program Participation Status		
	Implementation of Scheme Between July and December	Implementation of Scheme in both July and December	Non implementation of Scheme	
			Public Primary Schools	Private Primary Schools
Number of schools	41	17	6	10
Regularity of cooked meal program in July[a]	-	0.75	-	-
		(0.06)		
Regularity of cooked meal program in December[a]	0.92	0.96	-	-
	(0.02)	(0.02)		
Total fees for five years of primary schooling	131.09	62.32	74.67	1347.20
(Rs.)	(59.93)	(9.84)	(6.06)	(308.23)
Pupil-teacher ratio	50.33	61.22	41.92	13.14
	(3.97)	(12.90)	(5.66)	(1.69)
Blackboards per grade	0.61	0.52	0.47	1.25
	(0.04)	(0.05)	(0.12)	(0.24)
Drinking water on school premises	0.43	0.53	0.50	0.30
	(0.08)	(0.12)	(0.22)	(0.15)
Toilet facility on school premises	0.12	0.06	0.00	0.30
	(0.04)	(0.06)	(0.00)	(0.15)
School has a playground	0.57	0.53	0.67	0.30
	(0.08)	(0.12)	(0.21)	(0.15)
Change in attendance rates between July and	0.02	0.02	-0.02	0.08
December	(0.02)	(0.02)	(0.02)	(0.03)
Change in enrollment rates between July and	-0.00	-0.01	-0.01	0.01
December	(0.01)	(0.01)	(0.01)	(0.04)

Notes: [a] proportion of school days meals were served in the school month. Standard errors in parentheses.

July

Figure 1: Average Attendance in July in Schools Whose Program Participation Status Changed

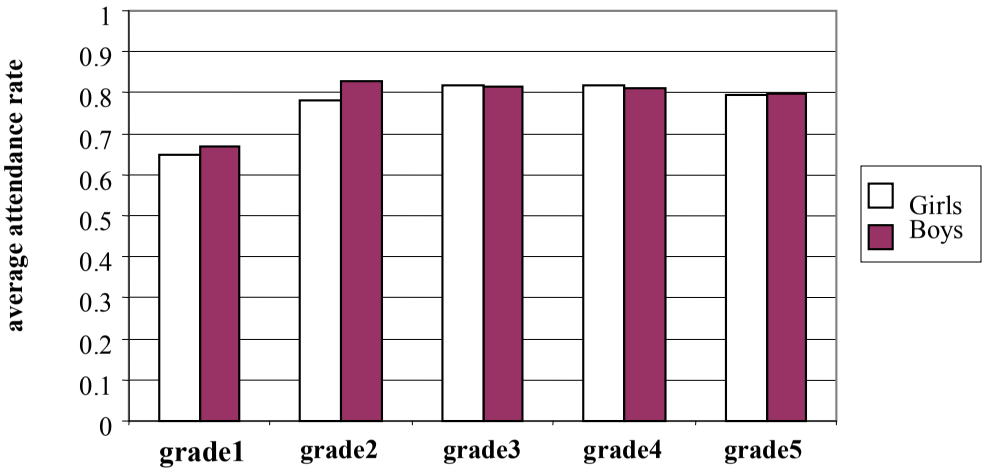
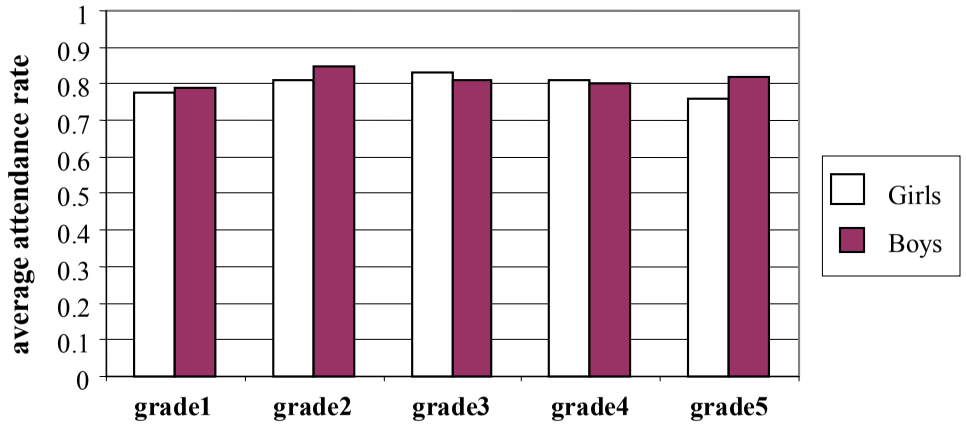


Figure 2: Average Attendance in July in Schools Whose Program Participation Status Did NOT Change



December

Figure 3: Average Attendance in December in Schools Whose Program Participation Status Changed

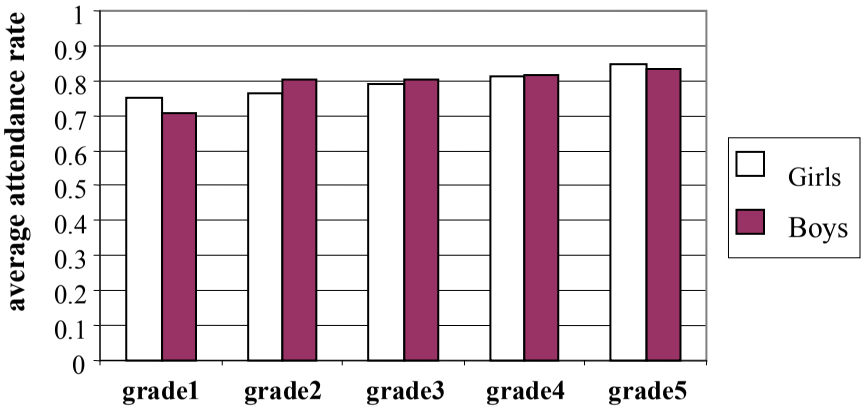


Figure 4: Average Attendance Rates in December in Schools Whose Program Participation Status Did Not Change

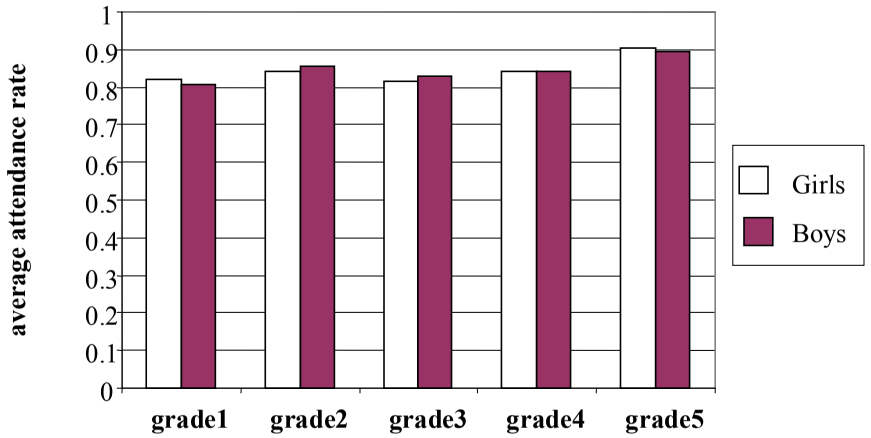


Table 3: Educational Attainment by Gender and Socio-economic Groups (Household Data, 5-18 year olds)

	Current enrollment (N=1643)	Ever enrolled (N=1643)	Primary school complete+ (N=670)
TOTAL	0.75	0.88	0.54
	(0.43)	(0.33)	(0.50)
SC	0.88	0.95	0.72
	(0.33)	(0.22)	(0.45)
ST	0.71	0.84	0.49
	(0.46)	(0.37)	(0.50)
OBC	0.77	0.90	0.52
	(0.42)	(0.30)	(0.50)
	GIRLS		
TOTAL	0.70	0.84	0.46
	(0.46)	(0.37)	(0.50)
SC	0.83	0.93	0.67
	(0.38)	(0.26)	(0.48)
ST	0.63	0.79	0.41
	(0.48)	(0.41)	(0.49)
OBC	0.73	0.87	0.45
	(0.45)	(0.34)	(0.50)
	BOYS		
TOTAL	0.81	0.92	0.61
	(0.39)	(0.28)	(0.49)
SC	0.94	0.98	0.80
	(0.25)	(0.15)	(0.43)
ST	0.78	0.90	0.58
	(0.42)	(0.31)	(0.49)
OBC	0.81	0.93	0.58
	(0.39)	(0.27)	(0.50)

Notes: +The sample consists of children who are 12-18 years of age.
Standard deviations in parentheses.

Table 4: Summary Statistics (Household Data)

Variable	Observations	Mean	Std. Dev.	Min.	Max.
Male child	1106	0.51	0.50	0	1
Child's Age	1106	8.47	2.24	5	12
Current enrollment	1106	0.88	0.32	0	1
Literate mother	1071	0.18	0.38	0	1
Literate father	1051	0.51	0.50	0	1
Dependency ratio	1106	1.32	0.67	0.17	4
Male household head	1106	0.98	0.15	0	1
Age of household head	1106	39.90	10.38	22	90
Scheduled tribe household head	1106	0.54	0.50	0	1
Arable land ownership (acres)	1106	3.99	6.05	0	55
Below or on poverty line household	1106	0.50	0.50	0	1
Girl child can study as much as she desires	1106	0.45	0.50	0	1
Male child can study as much as he desires	1106	0.60	0.49	0	1
Village Characteristics					
Village population (2001 census)	1106	799.55	389.91	248	1974
Distance to metalled road from village center (kms.)	1106	5.18	4.54	0	20
Distance to public secondary school from village center (kms.)	1106	2.48	1.80	0	9
Age of GP president	1106	42.18	8.42	28	60
Male GP president	1106	0.58	0.49	0	1
Seat of GP president reserved	1106	0.78	0.41	0	1
Current GP president's years in office	1106	4.67	2.42	1	15
Scheduled tribe GP president	1106	0.68	0.47	0	1
Adult male daily wage (Rs.)	1106	33.12	11.60	13.5	90
Adult female daily wage (Rs.)	1106	29.60	11.78	13.5	90

Table 5: Sample Characteristics by Type of School Meal Program in Village by September, 2003

Variable	Cooked Meal Program (N=763)	Raw Food grains/ No Program (N=276)
Current enrollment	0.88	0.87
	(0.012)	(0.020)
Male	0.51	0.50
	(0.018)	(0.030)
Age	8.44	8.53
	(0.081)	(0.133)
Literate mother	0.18	0.16
	(0.014)	(0.022)
Literate father	0.50	0.54
	(0.018)	(0.030)
Dependency ratio	1.30	1.37
	(0.023)	(0.042)
Male household head	1.00	1.00
	(0.002)	(0.000)
Age of household head	39.41	40.97
	(0.367)	(0.634)
Scheduled tribe household head	0.51	0.63
	(0.018)	(0.029)
Arable land (acres)	4.08	4.10
	(0.208)	(0.440)
Below or on poverty line household	0.52	0.45
	(0.018)	(0.030)
Girl child can study as much as she desires	0.44	0.51
	(0.018)	(0.030)
Male child can study as much as he desires	0.61	0.60
	(0.018)	(0.029)
Village population (2001 census)	825.00	720.30
	(13.175)	(26.864)
Distance to metalled road from village center (kms.)	5.16	5.25
	(0.165)	(0.273)
Distance to public secondary school from village center (kms.)	2.25	3.12
	(0.054)	(0.140)
Age of GP president	42.89	39.83
	(0.312)	(0.434)
Male GP president	0.66	0.36
	(0.017)	(0.029)
Reserved seat of GP president	0.77	0.82
	(0.015)	(0.023)
Years in office of current GP president	4.53	5.14
	(0.092)	(0.131)
Scheduled tribe GP president	0.71	0.61
	(0.016)	(0.029)
Male daily wage (Rs.)	32.84	33.70
	(0.447)	(0.572)
Female daily wage (Rs.)	29.10	30.80
	(0.462)	(0.518)

Note: Standard errors in parentheses.

Table 6: Impact of School Meal Program on School Enrollments (School Panel Data)

	PUBLIC AND PRIVATE PRIMARY SCHOOLS			PUBLIC PRIMARY SCHOOLS		
	(1)			(2)		
	ALL	BOYS	GIRLS	ALL	BOYS	GIRLS
December*Change in participation in cooked meals program	-1.425	-0.681	-0.744	0.091	0.505	-0.414
	(1.791)	(1.012)	(0.955)	(1.292)	(0.591)	(0.887)
Change in participation in cooked meals program	17.494	6.444	11.050	13.176	5.464	7.712
	(13.079)	(7.255)	(7.804)	(14.734)	(8.098)	(8.534)
December	0.500	0.281	0.219	-1.091	-0.864	-0.227
	(1.543)	(0.924)	(0.689)	(0.895)	(0.411)	(0.583)
Constant	85.656***	46.031***	39.625***	91.773***	47.818***	43.955***
	(9.694)	(5.265)	(4.613)	(11.786)	(6.317)	(5.652)
R-square	0.02	0.01	0.03	0.01	0.01	0.01
N	144	140	140	122	122	122

Note: Standard errors corrected for clustering on the school reported in parentheses. Model (1) includes public and private primary schools and in model (2) the sample has been restricted to only public primary schools.
* Significant at 10%, ** 5% and ***1%

Table 7: Impact of School Meal Program on School Enrollments in Public Primary Schools by Gender and Socio-economic Groups (School Panel Data)

	BOYS			GIRLS		
	SC	ST	OBC	SC	ST	OBC
December*Change in participation in cooked meals program	0.085	0.691	0.354	-0.635	0.848*	-0.578
	(0.166)	(0.471)	(0.756)	(0.400)	(0.490)	(0.580)
Change in participation in cooked meals program	1.183	6.189	-1.296	2.244	6.383	0.754
	(1.792)	(0.471)	(7.723)	(2.287)	(4.073)	(7.439)
December	-0.136*	-0.409	-0.636	0.045	-0.182	0.091
	(0.074)	(0.251)	(0.699)	(0.080)	(0.242)	(0.516)
Constant	5.227***	22.272***	19.091***	5.500***	18.591***	17.682***
	(1.106)	(3.948)	(6.569)	(1.012)	(2.969)	(5.838)
R-square	0.01	0.03	0.001	0.01	0.04	0.0001
N	122	122	122	122	122	122

Note: Standard errors corrected for clustering on the school reported in parentheses. The sample has been restricted to only public primary schools. SC-scheduled caste, ST-scheduled tribe, OBC-other backward castes.
* Significant at 10%, ** 5% and ***1%

Table 8: Impact of School Meal Program on School Enrollment in Public Primary Schools by Gender and Grade (School Panel Data)

	BOYS					GIRLS				
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
December*Change in participation in cooked meals program	0.010	0.273	-0.009	0.321	-0.090	0.429	-0.379**	-0.140	-0.399	0.075
	(0.469)	(0.175)	(0.206)	(0.287)	(0.377)	(0.487)	(0.165)	(0.172)	(0.267)	(0.537)
Change in participation in cooked meals program	1.048	1.105	1.559	1.078	0.674	-0.793	1.672	1.735	2.833	2.263
	(2.040)	(1.606)	(1.852)	(1.938)	(1.709)	(1.915)	(1.931)	(2.024)	(1.753)	(2.177)
December	0.682*	-0.273*	-0.273**	-0.500*	-0.500	0.545	0.045	-0.091	0.091	-0.818***
	(0.396)	(0.149)	(0.117)	(0.252)	(0.327)	(0.398)	(0.080)	(0.091)	(0.196)	(0.298)
Constant	10.773***	8.818***	9.364***	9.409***	9.455***	11.818***	8.045***	9.136***	7.500***	7.455***
	(1.559)	(1.202)	(1.294)	(1.436)	(1.356)	(1.554)	(1.371)	(1.540)	(1.043)	(1.148)
R-square	0.01	0.01	0.01	0.01	0.005	0.005	0.01	0.01	0.03	0.02
N	122	122	122	122	122	122	122	122	122	122

Note: Standard errors corrected for clustering on the school reported in parentheses. * Significant at 10%, ** 5% and ***1%

Table 9: Impact of School Meal Program on Average Monthly School Attendance Rates (School Panel Data)

	PUBLIC AND PRIVATE PRIMARY SCHOOLS			PUBLIC PRIMARY SCHOOLS		
	(1)			(2)		
	ALL	BOYS	GIRLS	ALL	BOYS	GIRLS
December*Change in participation in cooked meals program	-0.008	-0.018	-0.008	0.016	0.001	0.025
	(0.024)	(0.025)	(0.030)	(0.026)	(0.027)	(0.030)
Change in participation in cooked meals program	-0.033	-0.028	-0.032	-0.053**	-0.048	-0.053*
	(0.025)	(0.027)	(0.027)	(0.027)	(0.029)	(0.029)
December	0.037**	0.035**	0.045**	0.012	0.017	0.009
	(0.014)	(0.014)	(0.018)	(0.016)	(0.018)	(0.019)
Constant	0.805***	0.810***	0.797***	0.823***	0.826***	0.818***
	(0.015)	(0.016)	(0.016)	(0.017)	(0.019)	(0.018)
R-square	0.05	0.04	0.05	0.05	0.05	0.04
N	144	140	140	122	118	118

Note: Standard errors corrected for clustering on the school reported in parentheses. Model (1) includes public and private primary schools and in model (2) the sample has been restricted to only public primary schools.
* Significant at 10%, ** 5% and ***1%

Table 10: Impact of School Meal Program on Average Monthly School Attendance Rates in Public Primary Schools by Gender and Grade (School Panel Data)

	BOYS					GIRLS				
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
December*Change in participation in cooked meals program	0.060	-0.017	0.011	-0.018	-0.029	0.105**	-0.010	0.035	0.008	-0.036
	(0.042)	(0.036)	(0.040)	(0.039)	(0.048)	(0.043)	(0.049)	(0.039)	(0.045)	(0.052)
Change in participation in cooked meals program	-0.139***	-0.037	-0.022	-0.006	-0.031	-0.148***	-0.041	-0.044	-0.020	-0.006
	(0.048)	(0.034)	(0.044)	(0.036)	(0.047)	(0.042)	(0.043)	(0.033)	(0.038)	(0.046)
December	-0.008	0.001	-0.011	0.027	0.074**	0.008	0.002	-0.049*	-0.008	0.098***
	(0.030)	(0.029)	(0.026)	(0.026)	(0.033)	(0.028)	(0.032)	(0.025)	(0.032)	(0.037)
Constant	0.802***	0.864***	0.833***	0.816***	0.829***	0.795***	0.823***	0.856***	0.837***	0.806***
	(0.037)	(0.023)	(0.026)	(0.027)	(0.036)	(0.029)	(0.033)	(0.021)	(0.026)	(0.033)
R-square	0.10	0.03	0.003	0.01	0.05	0.13	0.02	0.02	0.003	0.06
N	118	118	118	118	118	118	116	118	118	116

Note: Standard errors corrected for clustering on the school reported in parentheses. * Significant at 10%, ** 5% and ***1%

Table 11: Impact of School Meal Program on Average Monthly School Attendance Level in Public Primary Schools by Gender and Grade (School Panel Data)

	BOYS					GIRLS				
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
December*Change in participation in cooked meals program	0.680	-0.064	0.197	0.152	-0.519	1.768**	-0.563	0.814**	0.127	-0.080
	(0.593)	(0.302)	(0.303)	(0.411)	(0.384)	(0.731)	(0.380)	(0.404)	(0.311)	(0.382)
Change in participation in cooked meals program	-0.867	0.813	1.012	0.838	0.482	-2.527*	1.103	0.884	2.000	2.063
	(1.399)	(1.342)	(1.604)	(1.415)	(1.203)	(1.497)	(1.497)	(1.649)	(1.419)	(1.592)
December	0.564	-0.254	-0.407**	-0.050	0.558**	0.400	0.139	-0.601**	-0.123	0.159
	(0.386)	(0.207)	(0.169)	(0.322)	(0.278)	(0.530)	(0.281)	(0.238)	(0.189)	(0.275)
Constant	8.372***	7.523***	7.968***	7.392***	7.445***	9.338***	6.476	7.735***	6.250***	5.648***
	(1.165)	(0.983)	(1.218)	(1.065)	(0.896)	(1.327)	(1.086)	(1.287)	(0.874)	(0.772)
R-square	0.01	0.01	0.01	0.01	0.002	0.05	0.01	0.01	0.03	0.02
N	122	122	122	122	122	122	122	122	122	122

Note: Standard errors corrected for clustering on the school reported in parentheses. * Significant at 10%, ** 5% and ***1%

Table 12: Impact of School Meal Program on Individual Current Enrollment (First Stage PROBIT)

Control Variables	Dependent Variable: Cooked School Meal Program in Village					
	ALL		BOYS		GIRLS	
	(1)	(2)	(1)	(2)	(1)	(2)
Male GP President[+]	0.285***	0.295***	0.303***	0.304***	0.255***	0.273***
	(0.036)	(0.036)	(0.042)	(0.042)	(0.047)	(0.045)
Child's age	-0.027	-0.019	-0.070	-0.056	0.008	0.003
	(0.036)	(0.035)	(0.055)	(0.053)	(0.057)	(0.055)
Child's age squared	0.001	0.001	0.003	0.003	-0.001	-0.001
	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Mother literate	0.015	0.020	-0.043	-0.044	0.085	0.097
	(0.051)	(0.050)	(0.063)	(0.062)	(0.063)	(0.063)
Father literate	-0.055	-0.051	-0.091*	-0.081*	-0.016	-0.012
	(0.040)	(0.040)	(0.047)	(0.046)	(0.049)	(0.048)
Main occupation of household head is casual labor	0.004	-0.005	0.029	0.037	-0.019	-0.046
	(0.044)	(0.042)	(0.052)	(0.051)	(0.054)	(0.053)
Household owns livestock	0.029	0.019	0.025	0.030	0.031	0.006
	(0.059)	(0.060)	(0.073)	(0.070)	(0.069)	(0.073)
Dependency-ratio	-0.040	-0.036	-0.040	-0.035	-0.052	-0.049
	(0.033)	(0.033)	(0.040)	(0.039)	(0.040)	(0.038)
ST head of household	-0.042	0.000	-0.041	0.003	-0.041	-0.004
	(0.038)	(0.040)	(0.044)	(0.047)	(0.049)	(0.049)
Parental attitude	-0.021	-0.013	0.038	0.044	-0.078*	-0.071
	(0.038)	(0.037)	(0.045)	(0.045)	(0.046)	(0.044)
Arable land ownership	0.002	0.002	0.002	0.003	0.002	0.000
	(0.004)	(0.004)	(0.006)	(0.005)	(0.005)	(0.005)
Household has below/on poverty line ration card	0.048	0.059	0.015	0.023	0.080	0.084
	(0.040)	(0.039)	(0.044)	(0.044)	(0.054)	(0.051)
Distance to nearest public secondary school	-0.063***	-0.072***	-0.063***	-0.067***	-0.065***	-0.080***
	(0.011)	(0.013)	(0.013)	(0.016)	(0.013)	(0.015)
Male daily wage	0.049***	0.049***	0.053***	0.051***	0.044***	0.044***
	(0.008)	(0.007)	(0.009)	(0.008)	(0.010)	(0.009)

Female daily wage	-0.051***	-0.052***	-0.057***	-0.055***	-0.046***	-0.047***
	(0.007)	(0.006)	(0.008)	(0.007)	(0.009)	(0.008)
Pupil-teacher ratio		0.002***		0.002***		0.002***
		(0.000)		(0.000)		(0.001)
Proportion of primary school teachers residing in village		-0.030		0.018		-0.079*
		(0.039)		(0.048)		(0.047)
Number of classrooms per grade		0.345***		0.303***		0.373***
		(0.069)		(0.083)		(0.085)
Proportion of classrooms which leak		0.065		0.062		0.057
		(0.061)		(0.073)		(0.071)
Constant	0.827***	0.512***	1.040***	0.654***	0.694***	0.503*
	(0.170)	(0.180)	(0.244)	(0.246)	(0.262)	(0.277)
Observations	1039	1039	529	529	510	510
Wald test of exogeneity:						
χ^2	0.02	0.05	2.25	1.20	0.68	0.34
P-value	0.88	0.83	0.13	0.27	0.41	0.56

Note: Standard error in parentheses. Standard errors corrected for clustering on the household. The sample consists of 5-12 year olds.
†Insrumental variable.
* Significant at 10%, ** 5% and ***1%

Table 13: Impact of School Meal Program on Individual Current Enrollment (PROBIT)

	ALL			BOYS			GIRLS		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Cooked meal[†] program	-0.013	-0.082	-0.092	0.022	-0.743	-0.565	-0.050	0.513	0.399
	(0.149)	(0.472)	(0.488)	(0.203)	(0.528)	(0.596)	(0.198)	(0.640)	(0.668)
Child's age	1.955***	1.952***	1.940***	2.400***	2.183***	2.328***	1.842***	1.776***	1.823***
	(0.213)	(0.217	(0.218)	(0.363)	(0.433)	(0.430)	(0.283)	(0.302)	(0.302)
Child's age squared	-0.103***	-0.103***	-0.102***	-0.129***	-0.117***	-0.125***	-0.096***	-0.092***	-0.094***
	(0.012)	(0.012)	(0.012)	(0.021)	(0.024)	(0.024)	(0.017)	(0.018)	(0.018)
Mother literate	0.643***	0.641***	0.629***	0.757***	0.621**	0.683**	0.629**	0.577**	0.519**
	(0.180)	(0.180)	(0.182)	(0.280)	(0.288)	(0.291)	(0.252)	(0.264)	(0.262)
Father literate	0.125	0.121	0.117	0.092	0.011	-0.013	0.193	0.191	0.183
	(0.138)	(0.138)	(0.138)	(0.191)	(0.184)	(0.186)	(0.176)	(0.172)	(0.175)
Main occupation of household head is casual labor	-0.166	-0.166	-0.172	-0.228	-0.184	-0.173	-0.099	-0.067	-0.047
	(0.146)	(0.146)	(0.147)	(0.215)	(0.214)	(0.213)	(0.183)	(0.180)	(0.189)
Household owns livestock	-0.238	-0.237	-0.202	0.171	0.176	0.208	-0.700**	-0.689**	-0.634**
	(0.198)	(0.199)	(0.198)	(0.269)	(0.265)	(0.269)	(0.282)	(0.277)	(0.279)
Dependency-ratio	-0.141	-0.144	-0.169*	-0.143	-0.152	-0.149	-0.031	0.001	-0.041
	(0.099)	(0.098)	(0.099)	(0.183)	(0.174)	(0.179)	(0.120)	(0.122)	(0.125)
ST head of household	-0.342**	-0.346**	-0.369**	-0.433**	-0.446**	-0.469**	-0.333*	-0.292	-0.370**
	(0.138)	(0.141)	(0.145)	(0.190)	(0.183)	(0.198)	(0.176)	(0.181)	(0.186)
Parental attitude	0.350***	0.348***	0.351***	0.444**	0.433**	0.449**	0.352**	0.395**	0.401**
	(0.132)	(0.135)	(0.134)	(0.185)	(0.183)	(0.190)	(0.169)	(0.175)	(0.179)
Arable land ownership	-0.016*	-0.016*	-0.016*	-0.031***	-0.026**	-0.022*	-0.003	-0.003	-0.002
	(0.008)	(0.009)	(0.008)*	(0.011)	(0.013)	(0.012)	(0.011)	(0.010)	(0.011)
Household has below/on poverty line ration card	-0.193	-0.191	-0.184	-0.005	-0.010	0.064	-0.288*	-0.321*	-0.329*
	(0.133)	(0.137)	(0.137)	(0.191)	(0.183)	(0.194)	(0.169)	(0.174)	(0.172)
Distance to									

nearest public secondary school	-0.080**	-0.084*	-0.095*	-0.014	-0.053	-0.088	-0.114**	-0.070	-0.063
	(0.038)	(0.046)	(0.049)	(0.056)	(0.063	(0.068)	(0.047)	(0.064)	(0.072)
Male daily wage	0.022	0.025	0.030	0.040	0.069*	0.056	-0.009	-0.026	-0.005
	(0.028)	(0.031)	(0.032)	(0.038)	(0.040)	(0.043)	(0.038)	(0.040)	(0.041)
Female daily wage	-0.027	-0.029	-0.035	-0.044	-0.075*	-0.063	0.003	0.022	0.002
	(0.027)	(0.031)	(0.032)	(0.038)	(0.040)	(0.043)	(0.037)	(0.040)	(0.042)
Pupil-teacher ratio			-0.002			0.000			-0.005**
			(0.001)			(0.002)			(0.002)
Proportion of primary school teachers residing in village			-0.179			-0.185			-0.170
			(0.153)			(0.228)			(0.193)
Number of classrooms per grade			0.126			0.225			-0.129
			(0.464)			(0.620)			(0.611)
Proportion of classrooms which leak			-0.014			-0.461			0.231
			(0.203)			(0.303)			(0.242)
Constant	-6.440***	-6.361***	-6.082***	-8.570***	-7.032***	-7.292***	-5.73***	-6.097***	-5.971***
	(0.937)	(1.096)	(1.099)	(1.509)	(1.988)	(1.907)	(1.249)	(1.241)	(1.352)
Observations	1039	1039	1039	529	529	529	510	510	510
Log-Likelihood	-282.02	-789.90	-758.44	-157.10	-405.31	-386.69	-113.75	-362.51	-344.53
Pseudo R-square	0.25			0.26			0.30		

Note: Standard error in parentheses. The sample consists of 5-12 year olds. Standard errors corrected for clustering on the household.
[+]Endogenous variables. In models 2 and 3 cooked meal program is instrumented by sex of GP president.
* Significant at 10%, ** 5% and ***1%

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