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Vardaan CHAWLA

Tomoki FUJII

Arpita KHANNA

Rohan RAY

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Do Government Benefit Programs Reduce Child Labor? Causal Evidence from the Midday Meal Scheme in India

Vardaan Chawla*

Tomoki Fujii†

Arpita Khanna‡

Rohan Ray§

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Abstract

This study evaluates the impact of the midday meal program in India on the prevalence of child labor for upper primary school going children. The staggered implementation of the largest school feeding program in the world across states provides exogenous variation in exposure. Using the nationally representative National Sample Survey Office (NSSO) data, we find that exposure to the program reduced prevalence of child labor by 47 percent relative to children in never-treated states, with no significant difference in impact between boys and girls. The effects were primarily driven by a decline in household labor supply, especially performance of household chores. These findings are further corroborated by an increase in school attendance for both genders. Our findings are robust to a battery of sensitivity analyses and placebo tests, and shed important insights on unintended consequences of a school feeding program.

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Keywords: child labor, midday meal, gender, school enrollment

JEL: D10, I38, J01, O12

*School of Economics, Singapore Management University

†School of Economics, Singapore Management University

‡Asia Competitiveness Institute, Lee Kuan Yew School of Public Policy, National University of Singapore

§Oxford Policy Management

1 Introduction

Around 160 million children—approximately 40 percent being girls—are subject to child labor (ILO, 2024). This accounts for roughly 1 in 10 children worldwide. There is well documented evidence on the adverse effects of child labor on education (Beegle et al., 2009; Emerson et al., 2017; Gunnarsson et al., 2006; Zabaleta, 2011) and health outcomes (Aransiola et al., 2018; Ibrahim et al., 2019; Posso, 2019). Though there have been concerted efforts to reduce the prevalence of child labor, for example, Target 8.7 of the Sustainable Development Goals that aims to eradicate forced child labor by 2025 (Vision, 2022), it remains a serious concern in the developing and less developed world, especially in economies where people rely on agriculture or livestock for their livelihood (Edmonds, 2007). According to the 2011 Census in India, around 10 million children in the country (4 percent of the total child population in the age group of 5-14 years) were working as laborers (UNICEF, 2021). While government welfare schemes such as the midday meal program have primarily been targeted at improving nutritional status and increasing school enrollment, there may be unintended consequences of such programs on prevalence of child labor. In this study, we exploit the arguably exogenous staggered implementation of the world's largest school feeding initiative—the midday meal program in India—to study its impact on prevalence of child labor.

The existing body of literature unequivocally indicates a significant positive impact of school feeding programs on child enrollment rates and attendance (Afridi, 2011; Alderman and Bundy, 2012; Chakraborty and Jayaraman, 2019; Jayaraman and Simroth, 2015a).[1] One may argue that school attendance and child labor are intrinsically linked and represent different facets of the same issue. Thus, if midday meal initiatives increase school attendance, a corresponding decrease in the prevalence of child labor is potentially an expected outcome. However, this anticipated outcome may not always be apparent. For example, while school attendance may increase with the introduction of the midday meal scheme, children may redistribute time and work at different hours in the day. It

[1]The one exception to the existing evidence is a study by McEwan (2013) that does not find any significant impact of Chile's school feeding program on enrollment or attendance.

is also plausible that with better nourishment as a result of the midday meal program, children are healthier, and therefore more able to engage in labor market activities. Finally, increased rates of school enrollment or attendance may force parents to send their children to labor market in order to alleviate the financial strain imposed by additional educational expenditures.

To the best of our knowledge, this is the first study that examines the impact of a school feeding program on child labor—a plausible downstream outcome—in a causal framework. In particular, the program in question is the midday meal scheme in India, which was implemented in a staggered manner in upper primary grades of government schools from the year 2007 until 2009 across different states.[2] We use the 64^{th} round of the National Sample Survey Office (NSSO) [2007-08] data that provides rich information on daily activities, school attendance, and demographic attributes of children in upper primary school going age. Given the high prevalence of school dropout in upper primary grades (Glewwe and Kassouf, 2012), our study looks at the impact of the midday meal scheme on child labor for children aged between 10 and 15 years. Not only is child labor more common across students in upper primary grades, a study by UNICEF (2021) shows that more than one-third of children aged 12 to 14 years who are in child labour are out of school. Thus, our sample comprises of individuals who are particularly vulnerable to child labor.

Besides this, our research makes the following contributions to the existing literature. First, our study adds to the existing evidence on the impact of childhood interventions on adolescent outcomes (Abufhele et al., 2017; Bharadwaj et al., 2013; Francesconi and Heckman, 2016; Haire-Joshu and Tabak, 2016; McEwen, 2003; Yeung et al., 2002). Exposure to educational and health interventions in early life may not only accrue benefits in the short run but is also plausibly associated with favorable long-term impacts on health, labor market outcomes, and overall quality of life (Johnson and Schoeni, 2011; Lawson, 2012). For example, a reduction in the number of hours worked during early life can potentially benefit children later through increased educational attainment.

[2]In India, upper primary school includes grades 6, 7, and 8. The midday meal program was rolled out for primary grades as well in a staggered manner from the years 2002 until 2006.

Second, we study impact heterogeneity by the kind of labor—household versus non-household. In agrarian economies, children may primarily be involved in household agricultural activities. For example, during harvesting periods, labor supply among children from agricultural households increases as they are required to work in the field (Devereux et al., 2013). Child labor may also be prevalent in the non-household sector such as small businesses and factories, for example, in brick kilns or at construction sites, that may even involve hazardous work. Excessive household chores or working long hours for the household in a family business are also forms of child labor that may have detrimental effects on human capital accumulation (Kane, 2004). Our rich data allows us to examine impact heterogeneity by the type of labor, which may assist in more targeted policymaking.

Additionally, there may be significant differences in prevalence of child labor by gender—while boys are more likely to be in agricultural work (Rahman et al., 2013), girls are more likely to be engaged in domestic work, often without pay and for friends and relatives (ILO, 2006). For example, in Ethiopia, the probability of school enrollment among boys declines more rapidly relative to girls with rainfall (Mani et al., 2009). Therefore, from a policy perspective, it is important to study whether such welfare schemes are more impactful for boys than girls. Our study thus elucidates the differential responses of boys and girls to the same intervention (Keenan et al., 1999; Keenan and Shaw, 1997).

Finally, given the staggered implementation of the program, the conventional two-way fixed effects specification may yield biased estimates (Roth et al., 2023). The traditional two-way fixed effects model assumes that all units receive treatment simultaneously. On the other hand, Wooldridge (2021)'s two way staggered difference-in-difference specification provides more consistent estimates of the treatment effects. We therefore use Wooldridge (2021) to account for the variation in timing of treatment across multiple periods.

We have a number of interesting findings from the study. The traditional two way fixed effects model underestimates the impact of the midday meal scheme on prevalence of child labor. Accounting for the heterogeneity in the average treatment effect due to the staggered implementation of the program, the Wooldridge (2021) estimates reveal that

the program reduces the prevalence of child labor by 3.4 percentage points. Given that the baseline prevalence of child labor is relatively low (7%), this reduction represents a 47% decrease. However, the results are not statistically different between boys and girls. The effects are primarily driven by a decrease in household labor supply for girls, and a fall in unpaid household enterprise work for boys. Analyzing impact heterogeneity by age and household head's occupation, we observe that the effects are most salient for older children and agricultural households, respectively. Our results remain robust to a battery of sensitivity analyses, including placebo tests with non-intervention years and untreated cohorts.

The rest of the paper is organized as follows. Section 2 provides a brief overview of the midday meal scheme. Section 3 is a discourse on the data and Section 4 describes the identification strategy. Section 5 presents the main findings, results from heterogeneity analyses, and a series of robustness checks. Finally, Section 6 concludes, and provides recommendations for future research.

2 The Program

The midday meal program in India, the largest school-feeding initiative globally, provides meals to approximately 115 million children each school day (Tibrewala, 2021). The primary goal of the program was to improve nutritional status of children, especially for those from economically disadvantaged backgrounds. Through the National Program of Nutritional Support to Primary Education in 1995, the central government mandated that all public primary schools should offer free meals to the students. In 2001, severe droughts in seven districts resulted in a crisis, leading to numerous deaths from starvation. In response, the People's Union for Civil Liberties (PUCL) filed a lawsuit against the Government of India, contending that the national stock of food grains exceeded storage capacities and that there was an urgent need to enhance statutory food and nutrition programs, including the midday meal scheme in schools. Finally, the Supreme Court of India issued an interim order on November 28, 2001 stating that "Every child in every

government and government-assisted school should be given a prepared midday meal."[3]

By mid-2006, all students in primary government and government-aided schools nationwide were covered by the scheme. Starting in June 2007, the program began to be extended to upper primary grades, with Maharashtra being the first state to implement this expansion.[4]. Program guidelines mandated that each student receive daily 100 grams of wheat or rice, 20 grams of pulses, 50 grams of vegetables, and 5 grams of fat, amounting to a total caloric intake of 300 kilocalories (MHRD, 2016). In 2009, the cost of providing each meal was Rs 2.90 (approximately USD 0.032) per child per day, covering cooking, labor, and management expenses. Of this total cost, approximately 75 percent was funded by the central government, with the remaining 25 percent covered by the state governments. While boosting school enrollment and attendance was another key objective of provision of free meals, reducing child labor was never identified as a targeted outcome.

3 Data

Our primary source of data is the National Sample Survey Office (NSSO)—one of the oldest continuing household surveys in India. The first wave was conducted in 1950 and there have been 79 waves since with detailed information on age, gender, educational attainment, and other basic household level socioeconomic indicators being collected in each wave.[5] In addition to these, each round collects information on employment, working status, household consumption, schooling etc. through additional modules. These additional schedules differ from round to round and a single round can consist of multiple schedules, all of them being representative both at the national and sub-national levels.[6]

In our study, we use the Employment and Unemployment (EUS) schedule from the

[3]Supreme Court Order of November 28, 2001, Record of Proceedings Writ Petition (Civil No). 196 of 2001

[4]Karnataka and Meghalaya had midday meal provision for upper primary school going children since 2004.

[5]The National Sample Survey Office (NSSO) was merged into the National Statistical Office (NSO) in 2019, streamlining India's statistical system. The Employment and Unemployment Survey (EUS) was replaced by the Periodic Labour Force Survey (PLFS) in 2017-18.

[6]Within the same wave, different schedules often have different sets of respondents

64^{th} round of the NSSO. It was conducted between July 2007 and June 2008, coinciding with the roll-out of the midday meal program for upper primary grades. The EUS schedule collects information on the major principal activity status for each member of a surveyed household.[7] The EUS thus provides us with the main activity an individual was engaged in during the past seven days before the date of the survey, as well as a daily breakdown of the activity status for each of the seven days of the reference week.

Our final study sample consists of individuals who were 10-15 years old at the time of the survey and had completed primary education. Around 40% of all children aged 10-15 fall in this category, with another 35% being either still in primary grades or with no formal education. We impose these restrictions because the EUS only contains information on educational attainment, and not the exact completed grade/years of education or whether an individual was attending a private or government school[8]. Moreover, despite the program only being rolled out for government and government aided schools, the program could have spillover effects for private schools as well, particularly for enrollment. For example, availability of midday meals can have a strong influence on parents' decision to send their children to a government school (Afridi, 2011). In addition, we exclude individuals who were residing in states which already had the midday meal program in upper primary grades before July 2007 from our final sample. Please refer to Footnote 4 for more details.

After imposing all the restrictions described above, the final sample consists of almost 19,000 individuals aged 10-15 with an educational attainment of primary level and belonging to states which rolled out the midday meal program for upper primary grades after July 2007. Table A1 provides some summary statistics. The average age of individuals in our sample is around 12 years and around 45% of them are female. Most of the individuals are Hindu, with 30% belonging to the minority castes and backward classes. We also see that majority of the individuals reside in rural areas with the average house-

[7]The EUS defines the major principal activity as the activity which a person is primarily engaged in during a specified reference period. The survey uses 365 days, 7 days and each day of the reference week as reference periods, which give us the yearly, weekly and daily activity statuses for each individual.

[8]Children usually enter school aged 5-6 years, with primary grades being up till grade 5 and upper primary up till grade 8

hold size in our sample being around 6. Above 80% of the individuals in our sample are children of the household head. Moreover, amongst household heads, more than one-half of them have only completed primary education or lower, and 15% have completed upper primary education.

Using the weekly activity status of an individual, we define an individual to be engaged in household activities if he/she spent most of his/her time working in a household enterprise, attending domestic duties or collecting goods for the household during the reference week. Similarly, an individual is defined to be engaged in non-household activities if he/she spent the majority of his/her time working for a wage in the past one week from the date of interview. From Table A1 we can see that in our sample, close to 8% of individuals had a primary activity during the reference week which was other than attending school. Moreover, conditional on not attending school, almost 81% of the individuals were engaged in household activities or free collection of goods.

Information on roll-out of the midday meal program comes from individual states' midday meal program websites as well as program audit and budget reports. We drop states for which we could not find information on implementation dates from the analysis. We record both the year and the month of implementation of the program. Our final sample consists of 17 states. Table A2 provides more details on the implementation of the program. Using the implementation dates, we can see that within our sample period, the midday meal program was rolled out in a staggered manner in two waves. Rajasthan, Jharkhand and Chhattisgarh implemented the program in October 2007 whereas Uttarakhand, Haryana, Uttar Pradesh, Bihar, Assam and Odisha implemented the program in February 2008. We call the first set of states, which implemented the program in October 2007 "Treated Cohort A" and the second set of states, which implemented the program in February 2008 as "Treated Cohort B". The remaining states form the "Never Treated" control group. We consider states like Himachal Pradesh and Tripura, which rolled the program out in July 2008, to be a part of the control group, although our results are robust to dropping them. Figure A1 depicts the program implementation pictorially. We compare some basic covariates across the treated and control states

in Table A3—we control for the attributes which are statistically different among these states in the regression specification.

In addition to NSSO data, we use Demographic and Health Surveys (DHS) data to study the impact of mid day meal on child labor at the primary school level. DHS datasets provide extensive information on a household's demographic profile, detailed education status of children as well as their involvement in labor in and outside home. We use the DHS-V round of the survey administered in India in 2005-06. In this round, a child labor module was administered that included a set of questions asking the household respondent about work done in the last week by a randomly selected household member aged 5 to 17 years. Unlike the NSSO data, in this analysis, the children are currently in school and their engagement in labor activities is done in addition to going to school. So, unlike NSSO data, going to school and engaging in child labor are not mutually exclusive activities in DHS data.

We use variables that measure whether a child was involved in work for someone outside the household, work for the household farm, business, selling goods and work within the household such as shopping, collecting firewood, cleaning, fetching water, or caring for children. We then categorize these types of child labor into household and non-household labor to maintain uniformity with the NSSO data analysis. Given that by 2005 when DHS surveys were administered, mid day meal program had only been rolled out for primary school children, we are able to use DHS data to study only primary school children and not upper-primary children. Therefore, considering the sample of primary school children, we estimate the child labor impacts of having been exposed to the mid day meal for at least a year. Since grade 1 children could have been exposed for less than a year at the time of the survey, we dropped them from the analysis and included children currently in standards 2 to 5 with a total sample of 36,049 children.

We use Chakraborty and Jayaraman (2019) to obtain information on the state-wise implementation of mid day meal in primary schools. Using this information on the state wise implementation of the program and the current standard of a child, we create a dummy variable called "Treated" which takes value one if the child has at least one year

of exposure to the mid day meal. Table A2 provides details on the implementation dates of the program in primary and upper primary schools.

4 Empirical Strategy

To estimate dynamic treatment effects of exposure to the midday meal program on prevalence of child labor we use the staggered difference-in-differences (DID) method proposed by Wooldridge (2021). The canonical DID estimator involves two time periods,"pre" and "post", and two groups "control" and "treatment". The "treatment" group receives the treatment of interest at the beginning of the second period and the "control" group doesn't. Then, comparing the difference in outcomes between the two groups in the "post" period with the identical difference in the "pre" period gives us the average treatment effect on the treated (ATT). There are two key identifying assumptions involved here. First being that in the absence of the treatment, the difference in the outcome of interest between the "control" and "treatment" groups would have remained unchanged (parallel trends). Secondly, we also assume that the treatment does not affect the outcome in the "pre" period (no anticipation). Furthermore, assuming that all the "treatment" groups receive treatment at the same time and that the treatment is an absorbing state, the canonical DID model can easily be extended to multiple groups and time periods. The standard TWFE specification can then be written as:

$$Y_{i,t} = \alpha_i + \phi_t + \beta \times D_i \times Post_t + \epsilon_{i,t} \tag{1}$$

Here, $Y_{i,t}$ is the outcome of interest for group i measured at time t with α_i and ϕ_t being the group and time period fixed effects respectively. We also add an interaction of a post-period indicator and an indicator for the treatment. β here measures the ATT. Then, under the added assumption of random sampling, the ordinary least squares (OLS) estimate of $\hat{\beta}$ from Equation 1 provides us asymptotically valid confidence intervals for the ATT (Roth et al., 2023)

If there is no heterogeneity in the treatment effect over time or across different treat-

ment units, i.e. in a "static" setting, $\hat{\beta}$ in Equation 1 still estimates the ATT even in case staggered treatment timing i.e. when different units in the treatment group get treated at different times. However, recent developments in the DID literature have highlighted various potential challenges to estimating dynamic treatment effects using two-way fixed effects (TWFE) specifications when the treatment timing is staggered Borusyak et al. (2024); de Chaisemartin and D'Haultfœuille (2020); Goodman-Bacon (2021); Sun and Abraham (2021). Several papers have proposed alternative estimators to get around these limitations of the standard TWFE model (Borusyak et al., 2024; Callaway and Sant'Anna, 2021; de Chaisemartin and D'Haultfœuille, 2020; Sun and Abraham, 2021). In this paper, we use the Wooldridge (2021) estimator, which is an extension of the standard TWFE model. It is also called the Extended TWFE (ETWFE) or TWFE-Mundlak regression estimator. It maintains the basic structure of the TWFE estimator but allows for heterogeneous treatment effects by introducing suitable time and group interactions. Being built on the standard TWFE model, it is transparent (easily estimable using OLS), applicable for repeated cross-sectional data, and is more suited for binary outcome variables (Wooldridge, 2023). We thus use Equation 2 as our main specification.

$$Y_{ict} = \alpha_c + \phi_t + \gamma \mathbf{X_i} + \beta \times \alpha_c \times \mathbf{X_i} + \eta \times \phi_t \times \mathbf{X_i} + \tau_{ct} \times MDM_{ict} \times \phi_t \times \alpha_c + \rho_{ct} \times MDM_{ict} \times \phi_t \times \alpha_c \times \dot{\mathbf{X}}_{\mathbf{ic}} + \epsilon_{ict}, \quad (2)$$

where Y_{ict} takes a value of 1 if an individual i in cohort c at time t was found to be working in the past seven days prior to the date of interview, and 0 otherwise. We define this using the weekly principal activity status, as discussed in Section 3. MDM_{ict} is an indicator variable that takes a value of 1 if an individual from cohort c was exposed to the midday meal program at time t, and 0 otherwise. ϕ_r and ϕ_t denote cohort and time fixed effects respectively. $\mathbf{X_i}$ is a vector of time-invariant individual level covariates with $\dot{\mathbf{X}}_{\mathbf{ic}}$ being their cohort-specific average. We control for basic time-invariant covariates like gender, religion and caste of the household, educational attainment and gender of the

household head etc. Our main coefficients of interest are τ_{ct} which denote heterogeneous group-time treatment effects which can be aggregated across groups and time periods using appropriate weights. We report these aggregated τ_{ct} in our analysis tables.

To study the impact of the program on primary school children, we use standard two-way fixed effects specification:

$$Y_{isg} = \alpha + \beta MDM_{isg} + \gamma_s + \tau_g + \phi \mathbf{X_i} + \epsilon_{isg} \tag{3}$$

where, Y_{isg} takes a value of 1 if the individual i, currently enrolled in grade g, residing in state s is involved in labor activities in the past week. MDM_{isg} takes the value 1 if individual i has been exposed to the mid-day meal program for at least a year. In addition, γ_s and τ_g include state and standard fixed effects respectively. $\mathbf{X_i}$ includes controls such as dummies for gender, urban area, household head's child, low caste, number of household members, religion fixed effects and wealth index categories fixed effects. In this specification, we utilize the variation in standard and state level variation to estimate the impact on concurrent child labor in and outside the household.

5 Results

In this section, we discuss the main findings of our study. First, we look at the integrity of the program rollout, that is, whether individuals in treated states were actually recipients of the school feeding program. Next, we look at the impact of the program on household and non-household labor supply for the overall sample, and also disaggregated by gender. We present estimates from both the traditional two way fixed effects model (Equation 1) and (Wooldridge, 2021)'s staggered difference-in-difference (Equation 2). We additionally assess the impact of the program on the older and younger siblings of treated children. Finally, we examine school attendance as a plausible mechanism to explain the treatment effects, and study impact heterogeneity by age of the recipient child, household consumption, and household occupation. We conclude by conducting some robustness checks.

Implementation

First, we test for the compliance rate of the program, that is, whether targeted age cohorts in the treated states were recipients of the midday meal program or not. For this, we use the Household Consumption Expenditure Survey (HCES), also from the NSS 64^{th} round, collected during the same period as the EUS. This survey contains information on the number of free school meals taken in the past 30 days from the date of interview. We create an indicator variable that takes the value of 1 if an individual reported to have taken a free school meal during this reference period, and 0 otherwise. We then use this as the outcome variable in Equation 2. Table A4 shows that the midday meal program in treated states led to an 11% increase in individuals reporting eating a free school meal. This effect is both statistically significant at the 10% level and also very large compared to the never-treated states' average prior to program roll-out.

Main Results

Table 1 reports our main results, as estimated from Equation 2). Using (Wooldridge, 2021)'s methodology, we find that the midday meal program reduced the overall prevalence of child labor by 3.4 percentage points, and these results are statistically significant at the 1% level.[9] This represents a substantial decline in child labor for the treated sample and translates to a nearly 47% reduction in prevalence among treated children, given the control group mean of 7.2%, . While the reduction for girls was 2.9 percentage points, the impact on boys was 3.4 percentage points. However, the prevalence of labor supply was 5.9% for boys whereas it was 8.5% for girls for the never-treated sample. Therefore,

[9]We used the traditional two-way fixed effects model to study the impact of the program on child labor (Table A5). We use a specification similar to Equation 3 with the set of controls including state and age fixed effects, household size, income percentile, religion, and household head's education, and dummies for gender of child, household head, urban/rural household, and whether the treated individual was child of the household head. Overall, the program reduced child labor by 2.6 percentage points, with the effects being primarily driven by boys and there being no perceptible impact on girls. When examining household labor specifically, the program led to a reduction of 2.2 percentage points for both boys and girls. However, the impact on non-household labor supply is not statistically significant. We also look at the impact of the program by incorporating the 66^{th} round of the NSSO which took place in 2009-10 (Table A6). Most states had implemented the program for upper secondary school children by then. Restricting the sample to children who had attained primary education and using a traditional two way fixed effects specification, we find that exposure to the midday meal program significantly reduced prevalence of child labor.

the percentage reduction in labor supply relative to the never-treated sample was 57.63% for boys as compared to 34.11% for girls. Nevertheless, both genders benefitted substantially from the provision of the midday meal. We then disaggregate the results by type of labor supply—household versus non-household—and gender. Comparing the estimates in Table 1 and Table A5, we can also see that while the standard TWFE estimator underestimates the effect of the program in reducing child labour, they are qualitatively similar to the estimates using Wooldridge (2021).

In terms of the kind of labor supply, the program's most pronounced impact is observed in reducing household labor. Overall, the program led to a 3.4 percentage point reduction in household labor supply representing a nearly 64% decrease from the control group mean of 5.3%. For girls, the reduction is marginally larger at 3.7 percentage points, but not statistically different from boys. Our results thus highlight the program's potential in alleviating domestic labor burdens that fall disproportionately on girls. For boys, the reduction in household labor is slightly smaller at 2.9 percentage points. The estimates for non-household labor are, however, close to zero and statistically insignificant for the overall sample, and for boys and girls. This suggests that the midday meal program primarily impacts household labor supply rather than labor performed elsewhere.

In an alternative way of measuring the treatment effect, we use individuals aged 16-18 as the control group. We restrict our sample to Treated Cohorts A & B and define the treatment group to be individuals aged 11-14, with the control group being individuals aged 16-18. We again use Equation 2 as our specification, where cohort c in Equation 2 is now defined at the state-age level. We find negative effects of the program, again being driven by a reduction in domestic child labour. We also find larger effects when we restrict the treatment group to only include individuals who have completed primary education (Table A12).

Thus, our results demonstrate that the traditional two-way fixed effects specification underestimates the impact of the midday meal program on child labor. Using the staggered difference-in-difference that accounts for heterogeneous treatment effects, we find that the school feeding program significantly reduced child labor, with the most pro-

nounced effects being observed in household labor. This finding is particularly critical in settings where children, particularly girls, disproportionately bear the burden of domestic tasks that hinder their educational attainment and personal development. In contrast, the absence of significant impacts on non-household labor suggests that external labor markets may exhibit lower elasticity to such interventions or that participation in non-household labor is influenced by factors beyond the scope of the midday meal program.

Heterogeneity Analyses

Examining the effects of the midday meal program on the overall sample may mask important differences in impact heterogeneity by observable attributes. While our main results show impact heterogeneity by gender and work type, we additionally examine whether there are differences by age, household occupation, and per capita household consumption. Therefore, we conduct sub-sample analyses to evaluate whether certain sections of the population benefited more from the program.

Table V shows that the results are primarily driven by children from older cohorts. This is not surprising given that prevalence of child labor increases with age (Edmonds, 2005). Among children aged 13 and above, the program reduced overall child labor by 6.9 percentage points, representing a substantial decline from the control group mean of 14%. These effects are primarily driven by a large and significant reduction of 6.7 percentage points in household labor. These effects suggest that older children, who are more likely to face competing demands on their time for household chores, benefit significantly from the program. In contrast, for children under the age of 13, the effects are much smaller and statistically insignificant across all types of labor, likely reflecting their already lower baseline levels of engagement in both household and non-household labor. These findings underline the program's particular effectiveness in alleviating labor burdens among older children, who may be at greater risk of labor market participation.

Comparing the effects of the program across different types of households, we see a reduction in child labour for both agricultural and non-agricultural households (Table A7). The negative coefficient for agricultural is marginally statistically insignificant at the 10%

level (p-value = 0.101). The reduction in domestic child labour is more pronounced in agricultural households. This is consistent with existing literature that finds prevalence of child labor is the highest in agricultural households, especially in resource-constrained settings. For example, Ito and Shonchoy (2020) find that in Bangladesh, when there was an overlap between harvesting and exam schedule, school dropout rate increased by almost one-third. The program significantly reduced child labor in agricultural households, by 4.4 percentage points, representing a considerable reduction from the control group mean of 7.6%. These results indicate that the program effectively alleviated the labor demands placed on children in agricultural settings. In contrast, the program had no statistically significant impact on domestic child labor in non-agricultural households. This divergence likely reflects the higher reliance on domestic child labor in agricultural households e.g. working on the household farm, where economic pressures and flexible labor needs are more pronounced, and underscores the importance of tailoring policy interventions to account for household occupational characteristics.

Finally, we evaluate impact heterogeneity by household socioeconomic status—we use per capita household consumption expenditure as a proxy (Table A8) to see if there are any differential effects of the program for households either side of the median with monthly per capita consumption expenditure. Our results indicate that the program was effective in reducing child labour for both poorer and richer households. The effects for domestic child labour were more pronounced for poorer households, particularly in reducing child labor in household chores. For poorer households, the program led to a 4 percentage point reduction in household labor, representing a meaningful decline from the control group mean of 8.3%. In richer households as well, the program effects were large and statistically significant.

Household Labor Supply

Since the impact of the midday meal program is primarily observed in household labor supply, we next examine whether provision of free meals in schools reduced two different kinds of household activities—household chores and unpaid work in household enterprise

(Table II). Our analysis reveals that the midday meal program significantly reduced child participation in household chores, with notable differences between genders. For girls, the reduction in household chores is substantial and statistically significant—this result underscores the role of the program in addressing a critical barrier to educational participation for girls, as household chores often compete with school attendance and study time. However, we do not observe any significant impact of the midday meal program on the propensity of being engaged in household chores for boys. This suggests that the program may disproportionately benefit girls due to their higher baseline burden of household chores.

The results for unpaid work in household enterprises, however, present a contrasting pattern. The midday meal program significantly reduced boys' involvement in household enterprises, suggesting that the program may shift household labor allocation by easing economic pressures on families to employ boys in such roles. For girls, however, the reduction in unpaid work in household enterprises is not statistically significant. This divergence in the gendered impacts may be attributed to the traditional gender norms that dictate different roles within household enterprises, with boys more likely to be engaged in economically productive tasks. Our findings therefore indicate that while the program was effective in reducing overall labor burdens, its influence on gender-specific labor roles within household activities was less uniform.

Impact on Siblings

Since exposure to the midday meal program brings about a change in the household labour supply for treated individuals, it might also lead to spillovers to other members of the household. To explore this, we look at the impact of the midday meal program on household labor supply of siblings. Siblings here are individuals aged either 5-9 or 16-30, who are also children of the household head. Thus, they themselves are unlikely to be directly affected by the program. Results in Table III indicate a substitution of work towards siblings. We see an that the program led to a statistically significant 2.2 percentage point increase in participation in household chores for siblings of individuals

exposed to the program. This represents a large increase of around 50% relative to the control group. The order of magnitude is similar to the reduction is household chores as seen in Table 1. This suggests a reallocation of domestic responsibilities within households, where siblings take on additional chores to compensate for the reduced labor contributions of treated children.

With regards to unpaid work in household enterprises for siblings, we don't see a statistically significant effect of the the midday meal program. These findings suggest that while the midday meal program effectively reduced labor burdens for treated individuals, it might have led to an unintended corresponding increase in the labor burden for siblings, particularly for household chores.

Household Fixed-effects Estimation

To explore whether the gender composition of the individual who might be potentially exposed to the program (aged 10-15 with exactly primary level attainment) and their sibling matters, we estimate a household fixed effects model as specified in Equation 4. Here D_{mm} is a dummy which takes the value 1 if both the sibling and the potentially exposed individual are male, and 0 otherwise. Similarly, D_{ff} takes the value 1 if both the sibling and the potentially exposed individual are female. MDM_h is a dummy for if the potentially exposed individual is residing one of two states in Treated Cohorts A and B, and is *actually* exposed to the program for more than one month and γ_h denotes household fixed-effects. Individual level covariates $\mathbf{X_i}$ include age, educational attainment and gender of the older sibling. Thus, β_1 then tells us how the outcome of interest is different for the male older sibling, compared to the female older sibling within the same household, when the potentially exposed individual is male,

$$Y_{ih} = \alpha + \beta_1 MDM_h \times D_{mm} + \beta_2 MDM_{ih} \times D_{ff} + \gamma_h + \phi \mathbf{X_i} + \epsilon_{ih} \tag{4}$$

We estimate this specification only for older siblings, using NSS-EUS Round 64, limiting the sample to households who have exactly one potentially exposed individual and more than two older siblings. This way, we are able to see how the program affects

household and non-household workloads for older siblings based on their gender *within* the same household. Table VI reports the results of this estimation. We see that male older siblings are much less likely to do household chores as compared to female older siblings within the same household. This seems to suggest that female older siblings disproportionately face the increased burden of household chores due to their younger siblings being exposed to the program.

School Attendance

Next, we examine whether increase in school attendance as a result of the program may be a plausible channel through which prevalence of child labor decreased (Table IV). We observe a significant increase in school attendance for both boys and girls. However, the point estimates are higher in magnitude for boys as compared to girls. This is consistent with our main findings that demonstrate that the impact of the midday meal program on child labor is also higher for boys as compared to girls. These results also align with existing literature indicating that the midday meal program significantly increased both school attendance and enrollment (Kaur, 2021; Nikiema, 2019).

While not many studies examine the impact of the midday meal program on school attendance in India, Afridi (2011) finds that the midday meal program increased the average monthly attendance rate of girls in grade 1 by 10 percentage points. Existing studies also find a positive impact of school feeding programs on school enrolment—an increase of primary school enrolment by 13 percent in India (Jayaraman and Simroth, 2015b) and 14 percent in Bangladesh (Ahmed, 2005). The larger impact of school feeding programs on primary school attendance may likely reflect the stronger influence of short-term incentives on younger children's school participation. In contrast, secondary school children may be more engaged in non-household and household work, which school meals alone may not offset. Nevertheless, we do observe a positive impact of the midday meal program on school attendance for secondary school going children in treated states.

Robustness Checks

We check for the robustness of our results using the following placebo tests. First, we estimate whether the program had any effect on the working status of individuals aged between 18 and 30 with primary school attainment. In essence, these individuals were not enrolled in school during the program roll-out and were thus never exposed to it. We find that the working status of these individuals in treatment and control states remained unaffected by the midday meal program (Table A9). Moreover, the coefficients are also not meaningfully large. Next, we look at the 62^{nd} round of the NSS survey (July 2005-June 2006), which was conducted before implementation of the midday meal scheme. We assume that the program rolled out during the 62^{nd} round of NSS in place of the 64^{th} round. We then compare individuals aged 10-15 with primary level attainment in "treated" states to "comparison" states. Consistent with our prior, we do not see any effect of the "intervention" on the "treated" cohort (Table A10). Moreover, we also don't see any spillover effects on siblings, with the effects of the ''program" being small and not statistically significant (Table A11)

We then conduct a placebo test using the 61^{st} and 62^{nd} rounds of the NSSO administered in the years 2004-05 and 2005-06 respectively (Table A13). The midday meal program was first implemented in upper secondary school in the year 2007, and therefore no state received the intervention when the above survey rounds took place. We advance "treatment" by two years and consider individuals in treated states (as of 2007-08) to have received the midday meal program in 2005-06, and study the impact on child labor. We look at the entire universe of children aged between 10 and 15 years old, and also restrict the sample to children who had attained at least primary education. We do not observe any impact on overall child labor or non-household and domestic work.

In the following placebo test, we augment our sample by including individuals aged above 15 years and below 30 years (Table A14). Thus, individuals who are not in upper primary school going age but are in treated states and belong to the above age bracket are considered as treated. We restrict our sample to children who had attained at least primary education. As expected, we observe null effect of the midday meal program on

prevalence of child labor when defining the older cohorts (who were never exposed to the program) as treated.

Finally, Figure A2 also plots an event-study graph, comparing the prevalence of child labour in the two groups of treated states with the "never treated" states. We do not observe any statistically significant differences between the treated groups of states and the "never treated" states, controlling for the covariates in Equation 2. We can therefore conclude that conditional on covariates, prevalence of child labour indeed followed parallel trends in the treated and control states.

Impact on primary school children

We now explore the impact of the midday meal program on primary school children. The results are presented in Table A15 and show that at least one year of exposure to the midday meal is associated with a decrease in the concurrent labor of primary school children by 4.4 percentage points. Columns (4) and (7) show that there is a decline in both household and non-household child labor. Moreover, the decline in labor is driven by boys and not girls for both household and non-household labor. The results provide evidence that exposure to the midday meal can lead to a decline in simultaneous engagement in child labor in primary schools.

We also estimate the impact of the program on primary school children using the 55th and 60th NSSO survey rounds. Since these data define child labor in terms of the primary activity, the outcome variable is different from the outcome measure in DHS and more in line with the upper primary definition. Using these data as well, we find that exposure to the program is associated with a decline in overall child labor. The results appear to be driven by a decline in household child labor by girls.

While the DHS outcome measures child labor as conducted simultaneously and the NSS outcome measures child labor conducted as principal activity, it is encouraging to note that both of these results show that there is a decline in child labor of primary school children with exposure to the midday meal.

6 Conclusion

We exploit the staggered implementation of the midday meal program in India—the largest school feeding program in the world—across different states to evaluate its impact on prevalence of child labor. To the best of our knowledge, our study is the first to study the impact of a school feeding program on a relatively downstream outcome of child labor.

We find that the traditional two-way fixed effects model underestimates the true impact of the midday meal scheme on the prevalence of child labor. Accounting for heterogeneity in the average treatment effect arising from the program's staggered implementation, (Wooldridge, 2023)'s estimates indicate that the scheme reduced child labor by 3.4 percentage points. With a baseline prevalence of child labor at 7%, this reduction constitutes a substantial 47% decline. The results do not exhibit statistically significant differences between boys and girls; however, the reductions are primarily driven by a decrease in household labor supply among girls and a decline in unpaid household enterprise work among boys. An analysis of impact heterogeneity reveals that the effects are most pronounced for older cohorts and households engaged in agricultural activities. These findings are robust to sensitivity checks, including placebo tests using non-intervention years and untreated cohorts, and underscores the reliability of the impact estimates. Further, we provide evidence that the program lead to a decline in concurrent child labor among primary school children as well.

Future research can examine the general equilibrium effects of such welfare schemes. For example, the reduction in household child labor due to the midday meal program may cause excess demand for labor, resulting in higher wages. This will, in turn, increase the opportunity cost of attending school. This may further result in an increase in labor supply, and attenuate the impacts of the program (Chaudhuri, 2010). While evaluation of such general equilibrium effects is beyond the scope in this context, our study still provides important policy insights on how government welfare schemes can have unintended beneficial consequences beyond the targeted objectives of the program.

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Table I. Impact on Child Labor

	Child Labor								
	All			Household			Non-Household		
	All	Girls	Boys	All	Girls	Boys	All	Girls	Boys
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treated	-0.034***	-0.029*	-0.034**	-0.034***	-0.037**	-0.029**	-0.000	0.007	-0.005
	(0.009)	(0.016)	(0.013)	(0.009)	(0.014)	(0.013)	(0.003)	(0.006)	(0.009)
Observations	18,647	8,414	10,233	18,647	8,414	10,233	18,647	8,414	10,233
Control Mean	0.072	0.085	0.059	0.053	0.072	0.034	0.018	0.013	0.024

Note: Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is Hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll out information for upper-primary level was only available for 17 states.

Table II. Impact on Household Child Labor

	Child Labor					
	Household Chores			Household Enterprise Unpaid Work		
	All	Girls	Boys	All	Girls	Boys
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-0.018**	-0.029**	-0.006	-0.015	-0.010	-0.021*
	(0.008)	(0.010)	(0.008)	(0.009)	(0.011)	(0.010)
Observations	18,647	8,414	10,233	18,647	8,414	10,233
Control Mean	0.030	0.056	0.005	0.018	0.013	0.023

Note: Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is Hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll out information for upper-primary level was only available for 17 states.

Table III. Impact on Household work for Siblings

	Household work	
	Household Chores	Unpaid worker (Household enterprise)
	(1)	(2)
Treated	0.022*	-0.025
	(0.011)	(0.015)
Observations	18,058	18,058
Control Mean	0.048	0.095

Note: Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is Hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll out information for upper-primary level was only available for 17 states.

Table IV. Impact on Regular School Attendance

	Attended School Regularly		
	All	Girls	Boys
	(1)	(2)	(3)
Treated	0.048***	0.039***	0.062***
	(0.012)	(0.013)	(0.021)
Observations	18,647	8,414	10,233
Control Mean	0.900	0.894	0.907

Notes: The outcome variable takes a value of 1 if the child attended school all five days in a week, and 0 otherwise. Standard errors are clustered at the state level. Individual level controls include age fixed effects, education level, number of siblings, dummies for gender, if the household is hindu, secondary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, gender and age of the ''treated" individual and if the individual is the child of the household head. Control group mean is the mean of the outcome variable for never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll-out information for upper-primary level was only available for 17 states. ***, **, and * indicate statistical significance at 1, 5, and 10 percent levels, respectively.

Table V. Impact Heterogeneity by Age

	Child Labor					
	All		Household		Non-Household	
	>= 13	< 13	>= 13	< 13	>= 13	< 13
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-0.069***	-0.004	-0.067***	-0.002	-0.002	-0.001
	(0.016)	(0.006)	(0.101)	(0.016)	(0.012)	(0.004)
Observations	8,184	10,463	8,184	10,463	8,184	10,463
Control Mean	0.140	0.021	0.101	0.016	0.039	0.004

Note: Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is Hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll out information for upper-primary level was only available for 17 states.

Table VI. Household Fixed-effects Estimation

	Chores	Unpaid worker (Household enterprise)	Non-domestic work
	(1)	(2)	(3)
$MDM \times D_{mm}$	-0.203***	-0.031	0.081
	(0.067)	(0.056)	(0.064)
$MDM \times D_{ff}$	0.115	0.019	-0.056
	(0.089)	(0.047)	(0.050)
Observations	5,560	5,560	5,560

Note: Standard errors are clustered at the state level. Individual level controls include educational attainment fixed effects, age and gender. Midday meal roll out information for upper-primary level was only available for 17 states.

Online Appendix

Table A1. Summary Statistics

Variable	Mean	Standard Deviation
Individual works in non-household activities	0.015	0.120
Individual works in household activities	0.063	0.242
Child is female	0.451	0.498
Age of child	12.399	1.467
Household head is female	0.142	0.349
Household head has never attended school	0.359	0.478
Household head has completed primary education	0.148	0.355
Household head has completed upper primary education	0.155	0.361
Household head has completed secondary	0.105	0.306
Household is in urban area	0.278	0.448
Is child of the household head	0.819	0.384
Number of household members	6.288	2.615
Household is scheduled caste/scheduled tribe/other backward class	0.304	0.467
Household is Hindu	0.790	0.407
Monthly per capita consumption expenditure	773.561	599.903
Observations	18,655	

Table A2. State wise Implementation of Mid Day Meal Program in Upper Primary Grades

State	Implementation			
	Upper Primary		Primary	
	Month	Year	Month	Year
Andhra Pradesh	October	2008	January	2003
Arunachal Pradesh	July	2007	July	2004
Assam	April	2008	January	2005
Bihar	April	2008	January	2005
Chandigarh	–	–	–	–
Chhattisgarh	October	2007	April	2002
Dadra & Nagar Haveli	–	–	–	–
Daman & Diu	–	–	June	2003
Goa	June	2009	–	–
Haryana	April	2008	August	2004
Himachal Pradesh	July	2008	September	2004
Jammu & Kashmir	September	2008	April	2005
Jharkhand	October	2007	–	–
Karnataka	October	2004	July	2003
Madhya Pradesh	July	2008	January	2004
Maharashtra	June	2007	January	2003
Manipur	April	2009	November	2004
Meghalaya	February	2004	January	2003
Mizoram	August	2009	February	2006
Odisha	April	2008	September	2004
Punjab	April	2009	September	2004
Rajasthan	October	2007	July	2002
Sikkim	February	2008	October	2002
Telengana	October	2008	–	–
Tripura	July	2008	April	2003
Uttar Pradesh	April	2008	September	2004
Uttarakhand	April	2008	July	2003
West Bengal	–	–	March	2005

Note: The upper primary implementation dates have been sourced from the respective state ministry websites on the midday meal program. The primary school implementation dates have been sources from Chakraborty and Jayaraman (2019). As noted in Chakraborty and Jayaraman (2019), Jharkhand and Nagaland were excluded because of lack of information about when the program was implemented and Kerala, Gujarat, Puducherry and Tamil Nadu were excluded from the main sample due to program implementation being done prior to the study.

Table A3. Descriptive Statistics

	Never Treated	Treated Cohort A	Treated Cohort B	Overall	p-value
HHH has primary or higher education	0.564	0.476	0.530	0.534	0.000
Household head is female	0.143	0.151	0.140	0.143	0.360
Hindu	0.698	0.880	0.844	0.796	0.000
SC/ST or OBC	0.364	0.368	0.235	0.304	0.000
HH size	5.611	6.253	6.416	6.092	0.000
Rural	0.407	0.447	0.478	0.447	0.000
Above median land holdings	0.487	0.582	0.461	0.490	0.000
Individual is HHH's child	0.832	0.818	0.822	0.825	0.211
Female individual	0.513	0.476	0.487	0.495	0.001
N	5712	2470	7262	15444	

Table A4. Program Implementation

	Had At Least One Free School Meal in Past One Month
Treated	0.109*
	(0.058)
Observations	8,394
Control Mean	0.063

Note: The outcome variable takes a value of 1 if the individual reported to have had free school meal in the past one month, and 0 otherwise. Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll-out information for upper-primary level was only available for 17 states. ***, **, and * indicate statistical significance at 1, 5, and 10 percent levels, respectively.

Table A5. Impact on Child Labor: Traditional Two Way Fixed Effects Estimates

	Child Labor								
	All			Household			Non-Household		
	All	Girls	Boys	All	Girls	Boys	All	Girls	Boys
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treated	-0.026***	-0.020	-0.030**	-0.022**	-0.023**	-0.022**	-0.003	0.003	-0.008
	(0.008)	(0.012)	(0.011)	(0.008)	(0.010)	(0.009)	(0.003)	(0.005)	(0.006)
Observations	18,647	8,414	10,233	18,647	8,414	10,233	18,647	8,414	10,233
Control Mean	0.072	0.085	0.059	0.053	0.072	0.034	0.018	0.011	0.024

Note: Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is Hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll out information for upper-primary level was only available for 17 states.

Table A6. Impact on Child Labor using 66th Round of NSSO: Two Way Fixed Effects Estimates

	Child Labor		
	All	Household	Non-Household
	(1)	(2)	(3)
Treated	-0.028***	-0.014***	-0.014***
	(0.006)	(0.004)	(0.003)
Observations	36,191	36,191	36,191
Control Mean	0.069	0.049	0.019

Note: The above sample is restricted to individuals who completed primary education. Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is Hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll out information for upper-primary level was only available for 17 states.

Table A7. Impact Heterogeneity by Household Type

	Child Labor					
	All		Household		Non-Household	
	Agricultural	Non-Agricultural	Agricultural	Non-Agricultural	Agricultural	Non-Agricultural
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-0.035	-0.027*	-0.044***	-0.014	0.009	-0.012
	(0.020)	(0.014)	(0.012)	(0.015)	(0.013)	(0.10)
Observations	8,418	10,229	8,418	10,229	8,418	10,229
Control Mean	0.104	0.049	0.076	0.036	0.028	0.012

Note: Standard errors are clustered at the state level. The set of controls includes dummies for gender of child, child of household head, gender of household head, rural/urban household and household size, fixed effects for age, social group, income decile, religion, household head's education, and state and month-year fixed effects. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll out information for upper-primary level was only available for 17 states.

Table A8. Impact Heterogeneity by Household Consumption

	Child Labor					
	All		Household		Non-Household	
	Rich	Poor	Rich	Poor	Rich	Poor
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-0.031*	-0.027	-0.023	-0.040***	-0.008	0.012
	(0.015)	(0.016)	(0.015)	(0.012)	(0.006)	(0.010)
Observations	9,916	8,731	9,916	8,731	9,916	8,731
Control Mean	0.044	0.115	0.033	0.083	0.011	0.030

Note: Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is Hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll out information for upper-primary level was only available for 17 states.

Table A9. Placebo Analysis: Older Cohorts

	Child Labor		
	All	Non-household	Household
	(1)	(2)	(3)
Treated	-0.008	-0.003	0.015
	(0.012)	(0.024)	(0.028)
Observations	11,399	11,399	11,399
Control Mean	0.936	0.284	0.650

Notes: Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is Hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll-out information for upper-primary level was only available for 17 states. ***, **, and * indicate statistical significance at 1, 5, and 10 percent levels, respectively.

Table A10. Placebo Analysis: Rollout of the Program in 2005

	Child Labor		
	All	Household	Non-Household
	(1)	(2)	(3)
Treated	-0.013	-0.015	0.002
	(0.022)	(0.021)	(0.007)
Observations	12,605	12,605	12,605
Control Mean	0.066	0.017	0.049

Notes: Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll-out information for upper-primary level was only available for 17 states. ***, **, and * indicate statistical significance at 1, 5, and 10 percent levels, respectively..

Table A11. Placebo rollout in 2005: Impact on Household work for Siblings

	Household work	
	Household Chores	Unpaid worker (Household enterprise)
	(1)	(2)
Treated	-0.003	-0.002
	(0.019)	(0.020)
Observations	13,157	13,157
Control Mean	0.062	0.092

Note: Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is Hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll out information for upper-primary level was only available for 17 states.

Table A12. Alternative control group

Treatment group educational attainment	Child Labor					
	All		Household		Non-Household	
	All	Primary only	All	Primary only	All	Primary only
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-0.018	-0.039*	-0.025*	-0.044*	0.007	0.004
	(0.013)	(0.020)	(0.013)	(0.022)	(0.009)	(0.016)
Observations	35,413	24,493	35,413	24,493	35,413	24,493
Control Mean	0.478	0.478	0.368	0.368	0.109	0.109

Note: Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is Hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of individuals aged 16-18, before the earliest treated group of states gets treated. Midday meal roll out information for upper-primary level was only available for 17 states.

Table A13. Placebo test: Using 61st and 62nd of Survey Rounds

	Child Labor					
	All	Household	Non-Household	All	Household	Non-Household
	(1)	(2)	(3)	(4)	(5)	(6)
Treated	-0.004	-0.006	0.002	-0.015	-0.017	0.002
	(0.011)	(0.011)	(0.004)	(0.020)	(0.017)	(0.007)
Observations	96,602	96,602	96,602	24,834	24,834	24,834
Control Mean	0.103	0.075	0.028	0.069	0.049	0.020
Sample	All	All	All	Primary Completed	Primary Completed	Primary Completed

Note: Standard errors are clustered at the state level. The set of controls includes dummies for gender of child, child of household head, gender of household head, rural/urban household and household size, fixed effects for age, social group, income decile, religion, household head's education, and state and month-year fixed effects.

Table A14. Placebo test: Using 61st and 62nd of Survey Rounds and Older Cohorts

	Child Labor		
	All	Household	Non-Household
	(1)	(2)	(3)
Treated	-0.003	-0.013	0.009
	(0.008)	(0.013)	(0.017)
Observations	24,676	24,676	24,676
Control Mean	0.870	0.595	0.275

Note: The above sample is restricted to individuals who completed primary education. Standard errors are clustered at the state level. The set of controls includes dummies for gender of child, child of household head, gender of household head, rural/urban household and household size, fixed effects for age, social group, income decile, religion, household head's education, and state and month-year fixed effects.

Table A15. Impact on primary school child labour: Using Demographic and Health Surveys

	Child Labor								
	All			Household			Non-Household		
	All	Girls	Boys	All	Girls	Boys	All	Girls	Boys
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treated	-0.044***	-0.010	-0.075***	-0.046***	-0.015	-0.075***	-0.028***	0.003	-0.054***
	(0.009)	(0.014)	(0.006)	(0.009)	(0.014)	(0.006)	(0.003)	(0.004)	(0.005)
Observations	36,049	17,147	18,902	36,059	17,150	18,909	36,059	17,150	18,909
Mean of dep var	0.58	0.66	0.52	0.58	0.65	0.51	0.04	0.04	0.05
R-Squared	0.148	0.158	0.116	0.149	0.159	0.117	0.030	0.025	0.037

Note: The above sample is restricted to individuals who are in standards 2 to 5. State and standard fixed effects are included in all regressions in this table. Standard errors clustered at the level of state are reported in parentheses. Controls include dummies for gender of child, urban area, household head's child, religion, wealth index, low caste, and number of household members.

Table A16. Impact on primary school child labour: Using 55th and 60th NSSO survey rounds

	Child Labor								
	All			Household			Non-Household		
	All	Girls	Boys	All	Girls	Boys	All	Girls	Boys
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treated	-0.008*	-0.011**	-0.004	-0.006*	-0.009**	-0.003	-0.002	0.002	-0.002
	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)	(0.003)	(0.002)	(0.002)	(0.002)
Observations	85,145	40,433	44,712	85,145	40,433	44,712	85,145	40,433	44,712
Mean of dep var	0.005	0.006	0.004	0.004	0.005	0.003	0.001	0.001	0.001
R-Squared	0.031	0.042	0.020	0.028	0.039	0.016	0.008	0.010	0.008

Note: The above sample is restricted to individuals who have not completed primary education. Standard errors are clustered at the state level. The set of controls includes dummies for gender of child, child of household head, gender of household head, rural/urban household and household size, fixed effects for age, educational attainment, social group, income decile, religion, household head's education, and state and quarter-year fixed effects.

Table A17. Impact on Household work for Siblings - Disaggregated by age

	Household Chores		Unpaid worker (Household enterprise)	
	Older	Younger	Older	Younger
	(1)	(2)	(3)	(4)
Treated	0.037**	0.008**	-0.052*	-0.004
	(0.016)	(0.004)	(0.028)	(0.003)
Observations	9,911	8,147	9,911	8,147
Control Mean	0.084	0.000	0.166	0.000

Note: Standard errors are clustered at the state level. Individual level controls include dummies for gender, if the household is Hindu, belongs to minority caste, primary or above education attainment of household head, above-median land holdings, gender of the household head, place of residence, if the individual is the child of the household head and household size. Control group mean is the mean of the never-treated group of states, before the earliest treated group of states gets treated. Midday meal roll out information for upper-primary level was only available for 17 states.

Figure A1. Timeline of the Midday Meal Program

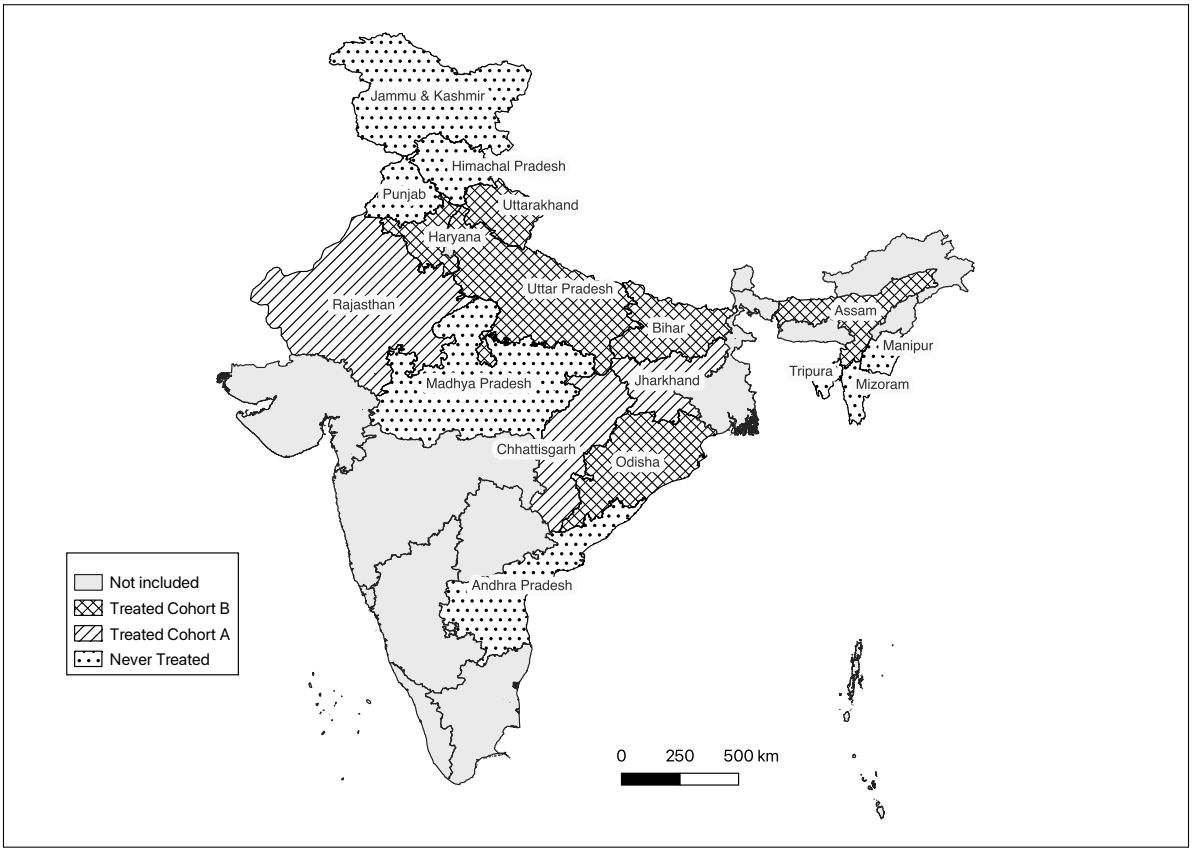
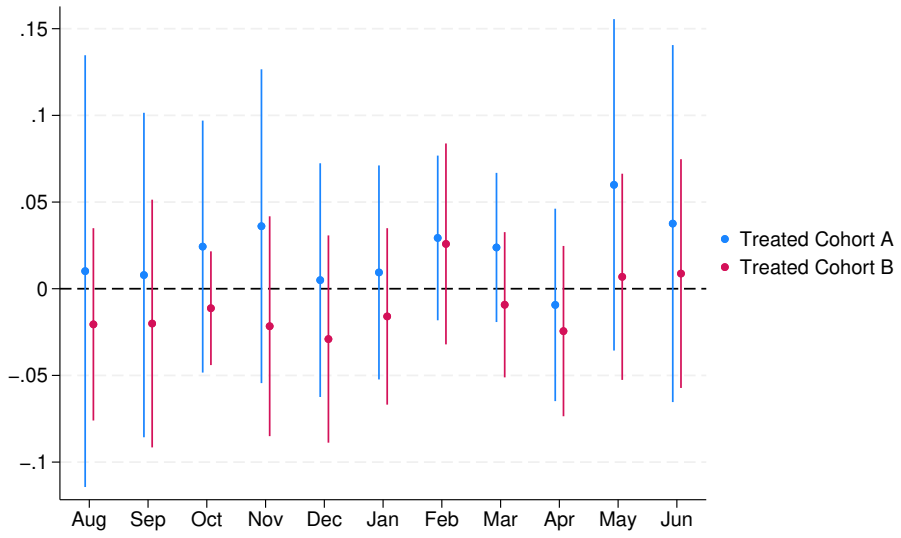


Figure A2. Pre-Trends Analyses



Notes: The figure plots an event-study graph of the incidence of child labour for the two treatment cohorts in NSS 62^{nd} round. We control for basic household characteristics like gender, religion, education of household head, caste, gender of household head and land holdings. The comparison group are the "never treated" states