Supply Side School Interventions for Girls in India, Effectiveness and Labour Market Outcomes : Evidence from a Natural Experiment

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Abstract

In this paper we analyse the joint impact of two girl specific supply side school interventions (*NPEGEL & KGBV*) in India, aimed at improving girls schooling outcomes at the elementary level, on the probability of primary and upper primary school completion as well as attending educational institution for girls in rural areas. We exploit the regional variation with regard to programme implementation in order to estimate the causal impact of the treatment using a triple diff-in-diff and diff-in-diff framework. Our results suggests that exposure to both the programmes is associated with an increase in the probability of primary as well as upper primary school completion and attending educational institution. Further, different robustness checks confirm the robustness of these results to variation in primary as well upper primary school completion age as well as implementation of the mid day meal programme. Also, we find that the benefits, in terms of greater school participation on account of exposure, have been limited to the targeted age group only and have not persisted much to older age groups. Additionally, we examine the impact of this increase in participation in schooling by girls on labour force participation for rural women (25 to 59 year age group and with less than primary level of education) on account of within household substitution with regard to responsibility of performing domestic tasks. Using programme exposure as an instrumental variable we find a negative effect of a greater participation in school by girls on labour force participation for women, while a positive effect on participation in domestic tasks for the same, heterogeneity analysis confirms that these results varies based on the economic condition of the household. Recent literature analysing the decline in rural female labour force participation in India have found little consensus on the explanations for the observed decline. Contrary to the descriptive explanations presented in the past literature our result on the other hand focuses on causal mechanism instead and presents a different explanation compared to those discussed in the past literature.

Keywords : Supply Side Interventions, Girl Education, Rural Female Labour Force Participation, Difference in Difference, Instrumental Variable

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1. Introduction

The role that women's education play in the context of development has been well recognized within the development literature (Sperling, Winthrop & Kwauk (2015)); Schultz (2002), for instance, notes that the social returns to women's education are higher as compared to the same for men. Similarly, Klasen (2002) argues that the disparities between male and female levels of education attainments has negative implications for the growth process. Despite this understanding, in retrospect what has been observed are disparities between men and women with regard to their educational attainments. Additionally, Jayachandran (2014) notes that the gender gap with regard to educational attainment tends to be higher in poor countries. In India for instance, as per the Census 2001 data, there existed a gap of around 22 percentage points between male and female literacy rates; with around half of the female population being unable to read or write. These gaps in turn arise as a result of multiple barriers that women face at different ends with regard to schooling; at the household side some of these barriers includes preference for boys, involvement in domestic tasks, lower perceived returns to schooling for girls etc. while at the supply side girls schooling attainment is limited by physical distances to school, lack of facilities such as toilets in schools, discrimination by teachers, lack of female teachers etc. (UNICEF 2009). In order to overcome such barriers, a number countries overtime have invested into programmes and policies specifically aimed at promoting girls educational outcomes, few of these programmes includes - Female Stipend Programme in Bangladesh, Girls Scholarship Programme in Kenya and Bicycle Programme in Bihar, India. In addition, reducing gender disparities in education attainment also forms as one of the MDGs as well as one of the goals under the Dakar Framework. In the context of development and policy formulation, the thing that is important is an understanding of the effectiveness of such programmes in raising educational attainment for the targeted group, other medium or long run effects of the same and also to investigate whether these programmes have any unintended effects. The present paper attempts to contribute in the same regard in the context of India.

In order to raise girls participation and attainment at the elementary level [1], Government of India in 2003-04 and 2004-05 implemented two separate programmes (*NPEGEL & KGBV*) [2], alongside its flagship education programme - *Sarva Sikhsha Abhiyan (SSA)*. Unlike the SSA, these programmes have largely been implemented in select blocks only and accordingly blocks identified as Educationally Backward Blocks (EBBs) are provided with additional resources for extending girl friendly school infrastructure within the block. In this study we exploit the regional variation with regard to implementation of the two programmes (*NPEGEL & KGBV*) in order to estimate the causal impact of the same on schooling outcomes for girls at the elementary level and the impact of a greater participation in schooling by girls on labour force participation for (uneducated) women (in the age group 25 to 59) in rural areas.

Using a triple difference in difference methodology we show that programme implementation is associated with a positive and significant impact on the probability of primary

[1] Elementary Education in India refers to eight years of education, combining five years of primary education with three years of elementary education

[2] NPEGEL - National Programme for Education of Girls at Elementary Level; KGBV - Kasturba Gandhi Balika Vidyalaya

and upper primary school completion for girls in the rural areas. We confirm this finding by examining the reported usual principal status [3] for girls in the elementary school going age group. We employ a difference in difference methodology so as to look at the impact on girls participation in educational activities based on their reported usual principal status. We find that programme exposure is indeed associated with a positive and significant impact on the probability of treated girls reporting *Attending Educational Institution* as their usual principal status. We also examine whether the benefits from the programme have persisted for those girls in the 15-18 age group by looking at their participation in educational activities. Using a difference in difference framework, however, we find that the programmes have had no impact on educational participation for those girls in 15-18 year age group. This suggests that the gains from the two programmes have been limited to those in the targeted age group only. Further, we undertake different of robustness checks in order to examine the robustness of our results to - a) variation in the age of primary as well upper primary school completion, b) implementation of the midday meal programme, and c) restricting to a limited sample for districts; we find that our results from the robustness analysis does not change much when compared to the results presented in the main analysis and that these results are quite robust.

Further, we examine the effect of a greater participation in school by girls in the age group 6-14 on labour force participation for rural women in the age group 25 to 59 years and with less than primary level of schooling [4]. Given that younger girls often form substitutes to older women, especially in rural areas of the country, with regard to performing household and related domestic tasks such as cleaning, cooking, collecting fuel etc (see Francavilla, Gianelli & Grilli (2013), Kambhampati & Rajan (2008)), a greater participation in education by younger girls therefore might cause some substitution at the household level with regard to performing household and related domestic tasks and as a result older women might spend greater time within the household towards completing domestic tasks and this in turn might lower their participation in the labour force. We examine this effect by examining the usual principal status for rural females, in the 25 to 59 age group and with less than primary level of schooling, within an instrumental variable framework (with district level fixed effects) wherein we instrument for participation by girls in school by the proportion of rural population in the district that has been exposed to both the programmes. Given our instrument and to ensure its validity we focus only on those females with less primary level of schooling, the same comprise of more than 50 % of women in the 25 to 59 age group. We measure participation in labour force, education and domestic tasks based on the reported usual principal status for individuals. Our results indicate that a greater participation by girls in education in the households is associated with a negative and significant impact on labour force participation for females in the household and a positive and significant impact on participation in domestic tasks for the same, additionally, we observe considerable heterogeneity with regard to both these results and we find that the same holds mainly for those women belonging to the second quantile based on consumption expenditure.

[3] The usual principal status herein refers to the principal activity that the individual has been involved in the past 365 days of the survey. The measure of the same is based on a majority time criteria and the same basically describes the activity in which the individual devoted majority of his/her time in the last 365 days.

[4] Based on the Working Age Group definition used by Census we limit to those who are below 60 years of age (Census 2010 - http://www.censusindia.gov.in/2011-Common/srs.html)

The closest study to ours is a recent work by Meller & Litschig (2015), the same provides some evidence for the effectiveness of the two programmes (*NPEGEL & KGBV*) in raising school enrolment and completion at the block level [5] . Using aggregate block level data from DISE [6] and a fuzzy regression discontinuity framework, Meller & Litchig (2015) have shown that blocks classified as EBBs (eligible for receiving both the programmes) have experienced a greater increase in school enrolment and completion for girls at the upper primary level and an improvement in infrastructure facilities at the school level. They find that the programme exposure is associated with an enrolment gain of about 6-7 percentage points for girls in upper primary school in the year 2007-08. A problem, however, that lies in the above study relates to the use of DISE data for information on school enrolment and completion. School based statistics in India are prone to large scale over reporting of enrolment figures (Rawal 2011). Similarly, NCERT (2012) notes of discrepancies between the reported 2007-08 DISE data and the actual school enrolment figures. Given this, in the present study we instead use individual level data based on household surveys (from two rounds of NSS Employment and Unemployment Survey) in order to revisit the finding by Meller & Listchig (2015) relating to the effectiveness of the two programmes.

The present study aims to contribute to two different strands of literature - first one consisting of studies that have evaluated the impact of extending girl friendly school infrastructure while the second one consisting of studies that have tried to explain the decline in female labour force participation in India. With regard to the first, few past works such as Meller & Litschig (2015), Kazianga et al (2013), De hoop & Rosati (2012) have tried to estimate the impact of extending girl friendly school infrastructure on a range of outcomes such as school enrolment and completion, test scores, child labour, school infrastructure etc. As already discussed before Meller & Litschig (2015) have studied the same in the context of India using the DISE dataset while both Kazianga et al (2013) and De hoop & Rosati (2012) have looked into the impact of BRIGHT programme in Burkina Faso on schooling outcomes and child labour respectively. While the Kazianga et al (2013) does find a positive impact of the BRIGHT programme on outcomes such as school enrolment, attendance and participation, De hoop & Rosati (2012) on the other hand find that the same also increased child's participation in economic activities and chores. With regard to female labour force participation, a number of works [7] in the recent past have analysed the decline in female labour force participation across India with different explanations for the same such as increase in income levels (Abraham (2013)), greater educational attainment (Himanshu (2011))). However little consensus exists for the different explanations that have been discussed in the past literature and additionally the same have largely been based on descriptive analysis. Our result, instead, presents a different and a causal explanation to this decline.

[5] A block is an administrative division in India and it comprises of several different villages within. A block however is a smaller administrative unit as compared to a state or a district. Different blocks combine to form a district.

[6] DISE is an annual Census for schools in India wherein every school in the country is required to provide data on a range of outcomes such as grade wise enrolment and completion, available infrastructure facilities such as classrooms, toilets, electricity etc, number of teachers as well their qualification and experience etc.

[7] Discussed in detail in later sections

The entire study has been divided into different sections. The second section discusses the two programmes in details, their specific provisions and the eligibility criteria based on which the blocks were identified as EBBs. The third and the fourth section discusses the data and the methodology used respectively. The fifth section presents the estimation results and analysis. The sixth section presents the analysis for female labour force participation. The seventh section concludes the paper. Finally, to ensure that our results are not driven by pre programme trends we undertake falsification tests using data from pre programme period. Based upon our falsification tests we show that our results are not affected by any pre programme trends or differences. The falsification tests are presented in appendix.

2. Context

In 2001-02 Indian Government launched the Sarva Sikhsha Abhiyan (SSA) with the objective to universalize elementary education (Primary and Upper Primary Level) in India. SSA is an ongoing programme and has been implemented through out the country. The focus within the same is to provide schooling facilities at the elementary level for habitations that previously lacked the same and additionally it also aims at improving the infrastructural facilities for the existing schools by providing the same with funds so as to build additional class rooms, toilets, provide drinking water facilities, take up electrification etc. Realizing that the SSA lacked specific provisions aimed at promoting girls educational outcomes at the elementary level, Government of India in 2003-04 and 2004-05 launched two separate programmes specifically for raising schooling outcomes for girls, these are - i) National Programme for Education of Girls at Elementary Level (NPEGEL) and ii) Kasturba Gandhi Balika Vidyalaya (KGBV) Scheme. Unlike the SSA both these programmes have been largely implemented in select rural regions identified as Educationally Backward Blocks (EBBs) [8], wherein blocks have been identified as EBBs [9] based on the twin criteria of rural female literacy rate and the gap between male and female literacy rate based on the Census 2001 data [10]. The primary objective within both the programmes has been is to reduce the gap that exists between boys and girls with regard to their educational attainment at the elementary levels of schooling through different interventions aimed at increasing access to primary and upper primary schools, improving the existing school infrastructure as per girls requirement, gender sensitization and creating support for girls education within the local community. The focus within the two programmes is thus on removing barriers at the supply end that prevents girls from attending schools and also on building community support, through gender sensitization campaigns, awareness drives and local community participation, for promoting girls enrolment to elementary school, their retention as well completion. Even though

[8] Only blocks classified as EBBs are eligible for receiving both the programmes simultaneously, however there are certain additional blocks or selected urban areas that have received either of the two programmes but not both. Our focus herein lies on blocks that have been exposed to both the programmes simultaneously, that is, EBBs

[9] Currently out of the total of 6,701 blocks in India 3,453 are identified as EBBs while the rest 3,248 are Non-EBBs.

[10] Even though the classification EBBs have been done based on the above twin criteria, however there are blocks that have classified as EBBs even though they do not meet either or both of the above two criteria. Accordingly in our analysis ahead and in order to identify whether a block has been classified as an EBB or not, we use the list of EBBs provided by the Ministry of Human Resources and Development which details the EBB status for different blocks in the country

these programmes were initially implemented as separate programmes but starting 2007 the same have been subsumed within the larger SSA programme. Following sections discusses the two programmes in detail.

a) National Programme for Education of Girls at Elementary Level (NPEGEL)

NPEGEL has been implemented across all EBBs, in few additional blocks and selected urban slums. The focus within the NPEGEL programme is on overcoming the following two barriers that restricts girls from attending schools - i) lack of infrastructure or facilities as per girls requirement at the school level, and ii) lack of community support for girls schooling as well as gender stereotypes at the community as well as school level. With regard to the first, NPEGEL aims to overcome the same through targeted supply side interventions aimed at adapting the existing school facilities as per the girls requirement. In order to do so, each of selected blocks under the NPEGEL programme is further divided into smaller clusters (around 8-10) consisting of 5-10 village within each and within each such cluster a Model Cluster School (MCS) is set-up and these MCS act as model girl friendly school at the cluster level. MCS are provided with additional funds, which are over and above the usual SSA grants, towards extending electrification, toilets, drinking water facilities and additional classrooms at the school level. Further, MCS are also provided with additional recurring grant towards promotion of girls education within the cluster, hiring of part time teachers, arranging bridge courses, back to school camps for out of school girls and opening of child care centres (Anganwadi) or pre primary school facilities at the cluster level etc.

With regard to the second barrier mentioned above, few of the listed objectives within the NPEGEL programme includes building community support to enable girls participation as well as completion at the elementary level and removing gender stereotypes that exists at the school level by ensuring that the content as well as content delivery process is made sensitive and in accordance to girls need. One such initiative within the same is training teachers within each of the clusters on gender related aspects. While another initiative includes formation of groups comprising of cluster co-ordinators, women workers, volunteers and parents at the cluster level for monitoring of girls enrolment and retention in school from villages within the cluster.

b) Kasturba Gandhi Balika Vidyalaya (KGBV) Scheme

Lack of school facility in the village or in the near by villages along with the risk of harassment or exploitation often force households to choose not to send their daughters to travel longer distance for attending schools (UNICEF 2009). This problem becomes much more stark with higher levels of schooling wherein villages continue to lack adequate facilities for providing education at higher levels. ASER (2014) for instance notes that, for the villages surveyed across India, only about 55 % of the same had a government middle school while only 18 % had a government secondary school. To overcome such supply side constraints, KGBV involves setting up residential schools for girls at the upper primary levels within the selected blocks. KGBV was launched in July 2004 and has been operational in EBBs and select additional urban towns with minority concentration. Within the same priority is given to girls belonging to disadvantaged groups such scheduled castes, scheduled tribes, minority groups and girls from below poverty line families.

The primary objective of the programme is to provide access to upper primary schools for girls in rural areas.

3. Data

In order to estimate the causal impact of the two programmes, we use individual level data from two rounds of NSS Employment and Unemployment Survey. These are administered by the National Sample Survey Organization, Government of India. NSS Employment and Unemployment Surveys captures a range of information for individuals relating to their educational attainment, marital status, usual and current activity status, social background, religion etc. Since the programmes were implemented in the year 2003-04 (NPEGEL) and 2004-05 (KGBV), therefore the 55th Round (1999-00) of NSS serves as the baseline while the 68th Round (2011-12) provides data for the post treatment period. Both the 55th as well as the 68th round of NSS are quinquennial rounds. Quinquennial rounds of NSS are usually large surveys and they differ from the annual NSS surveys in terms of their larger sample size and representativeness. NSS 68th round of survey for instance surveyed a total of around 0.2 million individuals in rural areas of the country. Note that for NSS the individuals surveyed across two different rounds are not necessarily the same and as a result the NSS 55th and the 68th round serve as repeated cross section of individuals such that a panel could be created either at the state or at the district in which they reside. However, a problem that lies in using NSS data in the present context is with regard to identification of individual blocks, within the NSS dataset individual districts can be identified but identification of constituent blocks within a district is not possible [11]. In order to overcome this problem we calculate the proportion of rural population in the district that has been exposed to both the programmes. The same has been discussed in detail in the following section. The data on the total rural population for the district and for the block has been taken up from Census 2011. Additionally, we use the list of Education Backward Blocks (EBBs) published by the Ministry of Human Resource and Development in order to find the EBB status for individual blocks. Our analytical sample consists of around 309 districts across 20 states in the country; appendix, provided at the end, provides reasoning for the construct of this sample. For the purpose of falsification test (presented in appendix) we use data from NSS 51st round (collected in 1994-95) as well as the 55th round. We couldn't use the NSS 50th round (which was a quinquennial round) for the reason that the same does not allow for district identification with in the data.

4. Methodology

Depending upon the specific outcome being studied, we use either a triple difference in difference framework or a difference in difference framework in order to estimate the causal impact of the two programmes. Use of NSS dataset herein, however, poses a problem due to the fact that the constituent blocks in a district cannot be identified within the NSS dataset. Supposing that the same was possible, in that case our estimating equation, for instance in a difference in difference framework, would have been the following -

$$y_{ibt} = \beta_0 + \beta_1 E_b + \beta_2 D_t + \beta_3 (D_t * E_b) + \delta_b + \beta X_{ibt} + e_{ibt} \text{ - } (i)$$

[11] A district in India is a larger administrative unit than a block and is an aggregate of a number of blocks

herein, i identifies an individual female, b identifies a block and t identifies whether in pretreatment or post treatment period. D_t is a dummy for the post treatment period and takes a value 1 for the post treatment round and 0 otherwise, E_b is a dummy for a block being identified as an EBB. β_3 forms the difference in difference estimator of interest in the above equation. However, as already noted, the above equation cannot be implemented using the NSS dataset and to overcome the same we must aggregate at the district level and accordingly we calculate the proportion of individuals in the district that have been exposed to both the programmes. As a variant to the above equation, we estimate the following equation at the district level -

$$y_{idt} = \beta_0 + \beta_1 P_d + \beta_2 D_t + \beta_3 (D_t * P_d) + \delta_d + \beta X_{idt} + e_{idt} \text{ - } (ii)$$

herein, i identifies an individual female, d identifies a district and t identifies whether in pretreatment or post treatment period, D_t is a dummy for the post treatment period and takes a value 1 for the post treatment round and 0 otherwise. In addition we also include district fixed effects given by δ_d and various individual and household level controls X_{idt} as well. While P_d measures the proportion of individuals in the district that have been exposed to both the programmes and have been calculated in the following manner -

$$P_d \ = \ \textstyle\sum_k N_k / \sum_n N_n$$

Assuming that there are n constituent blocks in a district and k of these n blocks have been exposed to both the programmes, $\sum_k N_k$ thereby measures the total rural population in the k blocks that have been exposed to the both the programmes while $\sum_n N_n$ measures the total rural population for the district comprising of a total of n constituent blocks. The variable of interest in the above equation is the interaction term $D_t * P_d$, it identifies the proportion of district that has been exposed to both the programmes and the coefficient β_3 measures the impact of exposure on the specific outcomes being studied.

a. Primary and Upper Primary School Completion

We analyse the impact of the two programmes on primary and upper primary school completion using a triple difference in difference framework. To do so we estimate the following equation -

$$y_{idt} \ = \ \beta_0 + \beta_1 P_d + \beta_2 D_t + \beta_3 A_{idt} + \beta_4 D_t * A_{idt} + \beta_5 D_t * P_d + \beta_7 A_{idt} * P_d + \beta_8 (D_t * P_d * A_{idt}) + \delta_d + \beta X_{idt} + e_{idt}$$

herein, i refers to an individual female, d refers to a district and t identifies whether in pretreatment or post treatment period, D_t takes a value 1 for post treatment while 0 otherwise. P_d measures the proportion of individuals in the district that has been exposed to both the programmes. A_{idt} takes a value 1 if the individual is 18 years of age or below and 0 otherwise when the outcome being studied is primary school completion while it takes a value 1 if the individual is 21 years of age or below and 0 otherwise when the outcome being studied is upper primary school completion. We do this in order to exploit the variation between individuals within the same district with regard to exposure to the two programmes, as those who had completed their schooling prior to the programme

implementation would not have gained anything from the two programmes. In order to illustrate the same, an individual who has already surpassed the primary school going age[12], at the time of the implementation of the two programmes in 2003-04 and 2004-05, would not have gained much or anything from the two programme with regard to primary school completion. Similarly, an individual who has already surpassed the upper primary school going age[13], at the time of the implementation of the two programmes, would not have gained much with regard to upper primary school completion. Given this, for the case when the variable analysed is primary school completion, all those individuals who are 11 years of age or below in 2004-05 would have been 18 years of age or below in 2011-12 and accordingly A_{idt} takes a value 1 for all those individuals who are 18 years of age or below and 0 otherwise. Similarly, for the case when the variable analysed is upper primary school completion, all those individuals who are 14 years of age or below in 2004-05 would have been 21 years of age or below in 2011-12 and accordingly A_{idt} takes a value 1 for all those individuals who are 21 years of age or below and 0 otherwise. The variable of interest in the above equation thus is the interaction term $D_t * P_d * A_{idt}$. In addition, the above equation has been estimated with controls for household characteristics X_{idt} and district fixed effects δ_d.

y_{idt} herein takes a value 1 if the female i has completed primary level (or upper primary level) of schooling and 0 otherwise. For primary completion we consider females who are 11 years of age or above as our sample. Starting typically at the age of 6, primary schooling in India is equivalent to 5 years of schooling and 11 is the age at which children in India usually complete their primary schooling. Similarly, upper primary schooling is equivalent to an additional 3 years of schooling following primary school completion and children usually complete upper primary level of schooling by around 14 years of age and accordingly for the case of upper primary school completion we consider females who are 14 years of age or older as our sample. Ahead, as a robustness check, we further restrict our sample to females who are 14 years of age or above for analysing primary school completion and for the case for upper primary school completion we restrict our sample to those females who are 17 years of age or above. We do this in order to allow for grade repetition as well as delayed entry to school.

b. Child's Participation in Educational Activities

We use equation (ii) in order to analyse the impact of the two programmes on girl's participation in educational activities using the reported usual principal status. Firstly, we start by analysing the participation in educational activities by girls who are in 6 to 14 years of age group, this forms the elementary school going age group and the same have been directly targeted under the two programmes. In order to do so, we limit our sample to those girls who are in 6 to 14 years of age, who are eligible for attending either primary or upper primary levels of school. Accordingly our dependent variable takes a value 1 if the girl reports of attending educational institution based on the reported usual principal status and 0 otherwise. Secondly, we analyse the participation in educational activities by girls who are in 15 to 18 years of age group and accordingly our dependent variable takes a value 1 if the girl reports of attending educational institution based on the reported usual principal status and 0 otherwise. We analyse the same in order to

[12] The primary school going age in India is 6-11 years

[13] The upper primary school going age in India is 11-14 years

see whether the gains from the two programmes, in terms of increased participation in schooling at the elementary level if any, have persisted over to those in the higher age group or to higher levels of schooling or not.

5. Estimation Results and Analysis

a. Primary and Upper Primary School Completion

We start by examining the joint impact of the two programmes on primary and upper primary school completion for girls in rural areas, the same serves as a check for whether the programmes have been successful in meeting their key objective of raising schooling outcomes for girls. Given that public programmes in India often fail to reach their desired objectives on account of corruption and leakages, the following becomes important and also works out as a test for the successful implementation of the two programmes. Table 3 presents the results from triple difference in difference estimation for primary school completion while table 4 presents the same for upper primary school completion. Results presented in column 1 for both the tables are based on a restricted specification comprising only of the following variables - dummy for post treatment period, dummy for age or A_{idt}, proportion of the rural population in the district covered under both the programmes, dual and triple interactions of these variables and district fixed effects. While column 2 allows for household level controls as well which includes control for household head's gender and education level, monthly per capita expenditure for the household, land owned, social group, religion and household type [14]. From our preferred specification in column 2 for table 3 and 4, we find that for the cohort being exposed to both the programmes, greater exposure to the programme is associated with a positive and significant increase in the probability of completing primary or upper primary levels of schooling. We find that a unit increase in the triple interaction term ($D_t * P_d * A_{idt}$) is associated with 0.0020 and 0.0011 increase in the probability of the girl completing primary and upper primary school respectively. Our latter result is similar to that by Miller & Litschig (2015), which finds that the programme did have a positive impact on upper primary completion for girls. The result by Miller & Litschig (2015), however, is based on aggregate block level data, our result on the other hand uses individual level data instead.

b. Effect on Usual Principal Status - Participation in Education for Girls in 6 to 14 Age Group

Our results from the previous section confirms greater participation by girls in school, as reflected by greater probability of primary and upper primary school completion, as a result of the two programmes. In this section we provide a further check to this effect by examining the effect on the reported usual principal status for the same. Given this, we look at whether the increase in schooling is reflected in the reported usual principal status or not. As discussed before in the methodology we limit ourselves to girls living in rural areas only and those who are eligible for attending primary or upper primary levels of schooling (those in 6 to 14 years of age group). Based on a difference in difference methodology we find that exposure to both the programmes is associated with

[14] In NSS data Household Type captures whether the household derives its income from self employment in agriculture or non agriculture, as a casual labour in agriculture or non agriculture or through regular salary

an increase in the probability of a girl reporting *Attending Educational Institution* as her usual principal status. The results for the same are presented in table 5 for the different specifications considered, specification in column 1 has been estimated without any household level controls while for specification in column 2 we include the following household level controls - control for household head's gender and education level, monthly per capita expenditure for the household, land owned, social group, religion and household type. Additionally we also control for the age of the individual for specification in column 2. From our preferred specification in column 2 of table 5 we find that a unit increase in the double interaction term $(D_t * P_d)$ is associated with a 0.0027 increase in the probability of the individual girl reporting *Attending Educational Institution* as her usual principal status.

c. Effect on Usual Principal Status - Participation in Education for Girls in 15 to 18 Age Group

Results from both the previous sections confirms that the programmes have been successful in raising participation in schooling as well school completion for girls who are in elementary school going age group (6-14 years). A natural question that arises is whether this increased participation in schooling has persisted to an increased participation at higher levels of schooling or not and amongst those who are above the elementary age group. Now, there are two ways in which the programmes can affect educational participation for girls in 15 to 18 age group - one is via a direct effect wherein girls in 15 to 18 age group who haven't completed primary or upper primary schooling chooses to benefit from the programmes; while a second being a persistence effect wherein those who entered schooling as a result of the two programmes continues to remain in school even after having completed elementary schooling. Given this, we look at whether the programmes have had any impact on educational participation for girls in 15 to 18 years of age group. In order to do so, again, we use data on the reported usual principal status for the individual girl in 15 to 18 year age group and we analyse the same using a difference in difference framework. The results for the same are presented in table 6. As before, for the results presented in table 6, specification in column 1 has been estimated without any household or individual level controls while specification in column 2 has been estimated with different household level as well as individual level controls as before. Across both the specifications in table 6 we see that the coefficient for the interaction term although positive but is statistically insignificant, thus suggesting that gains from the programmes have been limited more or less to the targeted population only.

6. Robustness Analysis

Restricted Sample

In this section, we check for the robustness of our results to the case wherein we restrict our sample to only those districts that have been either fully covered under the two programmes and to those that haven't been covered at all under the same. We do this in order to check for the sensitivity of our results to our analytical sample above and also to the values of P_d. Accordingly, we refer the same as the restricted sample and the variable P_d in such case takes only two values either 0 or 100, 0 for districts that haven't been exposed to both the programmes and 100 for those districts that have been fully covered

under the two programmes. We have 93 districts that haven't been covered under the two programmes while around 90 districts that have been fully covered under the two programmes. Our restricted sample, in effect, consists of a total of 183 districts across India. Given this, in the analysis below, we again estimate each of the triple difference in difference as well as the difference in difference specification considered before but with the restricted sample. Also, for each of the specification considered the dependent as well as the independent variables considered are the same as before. Table 7 and 8 presents the results based on the triple difference in difference estimation using the restricted sample for primary and upper primary completion respectively while table 9 and 10 presents the results based on the difference in difference estimation using the restricted sample for participation in education activities by girls in 6-14 and 15-18 age group respectively. From table 7 we see that exposure to both the programmes (that is, when $P_d = 100$ or equivalently $D_t * P_d * A_{idt} = 100$) is associated with a 0.22 increase in the probability of primary school completion for the treated cohorts while a 0.12 increase in the probability of upper primary school completion for the same from table 8. Comparing the same with our previous results, we see that our results for primary and upper primary school completion does not vary much across the complete analytical sample considered before and the restricted sample considered herein. From our previous results we see that a unit increase in programme exposure (that is, $D_t * P_d * A_{idt}$) is associated with a 0.0020 increase in the probability of primary school completion while a 0.0011 increase in the probability of upper primary school completion. For the case of participation in educational activities by girls in age group 6-14, as well, we find that the results does not vary much across the complete and the restricted analytical sample. For the restricted sample we find that the exposure to both the programmes is associated with a 0.31 increase in the probability of a girl in 6-14 year age group reporting *Attending Educational Institution* as her usual principal status, the same is closer to the estimate that we got from our analysis before wherein we found that a unit increase in programme exposure (that is, $D_t * P_d$) is associated with a 0.0027 increase in the probability of a girl in 6-14 year age group reporting *Attending Educational Institution* as her usual principal status. Similar result holds for those in 15-18 year age group as well, as before the programmes does not seem to have any effect on the educational participation for those in 15-18 year age group.

Primary and Upper Primary School Completion Age

For our analysis above, we considered 11 and 14 as the respective age of primary and upper primary school completion, the same implies making an implicit assumption that there isn't any grade repetition or late entry into schooling. This, however, might not be true as it is quite common for children to start late into schooling or to repeat a grade. The same, for instance, implies that a child who started schooling later than the prescribed age of 6 would not be able to complete primary eduction by the age of 11 and similarly upper primary education by the age of 14. Given this, previous authors such as Bhalotra et al. (2014) and Hnatkovska et al. (2013) have usually taken 14 as the age of primary school completion for children in India in order to allow for grade repetition as well as late entry into schooling. In this section we consider the robustness of our results to the choice of primary as well as upper primary school completion age. Following Bhalotra et al. (2014) and Hnatkovska et al. (2013), for the purpose of our analysis below we consider 14 as the age of primary school completion. Similarly, we consider 17 as the age of upper primary school completion. Thus implying that a person below 14

(or 17) cannot be expected to have completed primary school (or upper primary school). Given this, we again estimate the triple difference in difference specification considered before for the case of primary as well as upper primary school completion. Now, however, for the case of primary school completion we consider only those females who are 14 and above as our sample while for the case of upper primary completion we consider only those females who are 17 and above as our sample; the results for primary and upper primary school completion based on these limited samples are presented in table 11 and table 12 respectively. From table 11 and table 12 we see that a unit increase in exposure to both the programmes is associated with a 0.0022 and 0.0014 increase in the probability of primary and upper primary school completion respectively. In terms of robustness, these estimates are very much similar to ones that we got from our main analysis before wherein we took 11 and 14 as the age of primary and upper primary school completion respectively.

Mid Day Meal Programme

Following the Supreme Court directive in the year 2001, regarding the provision of warm school lunches to children at government primary schools, the midday meal programme has been implemented across different states in India based on a staggered implementation pattern (Jayaraman, Simroth & Vericoth (2011). Table 24 provides the details regarding the implementation for the same across different states in the country. Although, both the programmes discussed above (NPEGEL & KGBV) were implemented at the block level and above we have utilised district variation in order to examine the causal impact for the same, a concern however that still remains is that the above estimates might be affected by the implementation of the midday meal programme between 2000 and 2005, as the same coincides with the implementation of the NPEGEL and KGBV programmes between 2003 and 2005. Now, in this section we basically analyse the sensitivity of our results for primary as well as upper primary school completion for girls to the implementation of the midday deal programme. In order to do the same, firstly we define a variable called *Midday Meal* for each of the female in our sample. Now this variable *Midday Meal* takes a value 1 for those females who have not yet surpassed the usual age of primary school completion, which is 11 years, at the time when the Midday Meal programme was implemented in their respective state. For instance, for the case of Bihar the midday meal programme was implemented in the year 2005 and as a result for all those females residing in Bihar and who are below 11 years of age in 2005, as per the 2011-12 round of data, the variable *Midday Meal* would take a value 1 for the same and 0 otherwise. The basic intuition behind the same being that those who have already surpassed the primary school going age, at the time when the mid do meal programme was implemented in their state, would not have gained much from the mid day meal programme and accordingly the variable midday meal takes a value 0 for such females. Similarly for all those females belonging to the pretreatment round, the variable *Midday Meal* would always take a value 0 as non of the individuals in 1999-00 was exposed to the mid day meal programme. Given this, we again estimate the triple difference in difference specification for primary as well as upper primary school completion as before but with an additional independent variable, which is, *Midday Meal*. This is done in order to control for the effect of the implementation of the midday meal programme. However, we had to drop the states of West Bengal as well Jharkhand for our following analysis, for the reason that the exact year for the implementation of the midday meal programme in the same could not

be ascertained. In the analysis below we compare the results from the triple difference in difference estimation for both primary as well as upper primary school completion across the following two specification - a) first without controlling for exposure to midday meal facility, and b) second with control for midday meal facility. Again, the sample considered however does not include the states of West Bengal and Jharkhand. Table 13 and table 14 presents the results wherein our dependent variable is primary school completion and for table 13 we assume 11 as the age of primary school completion while for table 14 we assume the same to be 14. Similarly, table 15 and table 16 presents the results wherein our dependent variable is upper primary school completion and for table 15 we assume 14 as the age of upper primary school completion while for table 16 we assume the same to be 17. Across all the tables 13, 14, 15 and 16, the first column presents the results for the specification wherein we do not control for exposure to the midday meal facility while for the specification in the second column we do include control for exposure to the midday meal facility. For the results presented in table 13, 14, 15 and 16, we see that the results does not vary much across the two specifications considered in each of these tables and that our results are robust and are not affected by the simultaneous implementation of the midday meal programme. The reason for the same lies in the fact that the midday meal programme was rolled out more or less at same time for all the districts in a given state, whereas our identification strategy above instead relies on using district level variation, with respect to exposure to the two programmes, within a state.

6. Labour Force Participation for Rural Females (25-59 year age group and below primary level of schooling)

In comparison to other countries, female labour force participation in India remains low across both the rural and the urban sectors. Additionally,the same has been declining over time. Abraham (2013), for instance, has described the long term decline in female labour force participation in India as the *de-feminization of labour force* in the country. In 1993-94, for instance, female labour force participation rate for the 15-59 age group in India was around 45.5% and the same declined to 41.6% in 1999-00, between 1999-00 and 2004-05 the same did increase by around 3.8 percentage points but it further declined to 34.5% in 2009-10 (Neff, Sen & Kling (2012)). Kannan & Raveendran (2012) and Rangarajan et al (2011) has described this recent fall, ahead of 2004-05, as the case of a *missing labour force*. What has been rather puzzling is the fact that this recent decline has been observed in the wake of a growing economy. Despite of a number of papers, based largely on descriptive analysis, trying to explain these trends, a little consensus exists on the exact reasons for the fall. We discuss these explanations in the following section. Our focus below, therefore, lies in trying to explain the above observed fall in female labour force participation in rural areas. Our hypothesis is that the observed fall in female labour force participation for older women in rural areas could be due to within household substitution of domestic work as a result of greater participation in schooling by younger girls. Our analysis below provides evidence for a fall in female labour force participation [15] due to a greater participation in schooling by younger girls on account of exposure to the above discussed school related programmes in rural parts of the country. Additionally, we find that the greater participation in schooling by younger girls is indeed associated with an increase in participation by older women in domestic tasks. Mehro-

[15] Measured using the usual principal status. Note that, usual principal status only identifies the activity within which the individual has been involved in for a majority of time in the last 365 days.

tra et al (2014), also, points out a similar reason for a fall in rural female labour force participation in India but fails to provide any evidence for the same, our analysis based on the complete sample does support this argument by Mehrotra et al (2014). However, our results from heterogeneity analysis using sub-samples based on economic condition of the household suggests that the above results are driven by those belonging to better off households.

Different authors, in the recent past, have tried to explain the above trends in female labour force participation in India[16]. Neff, Sen & Kling (2012) have summarized the various different explanations into four different categories - education effect, income effect, decline in employment opportunities and cultural factors. Firstly, with regard to the education effect, Himanshu (2011) argues that the observed decline might be a result of greater participation by girls in educational attainment. The same might seem as a plausible explanation for the decline in labour force participation by younger women, however, it fails to explain the decline for older women, as the decline in female labour force participation has been observed across all age groups (Chowdhury (2011)). Secondly, as per the income effect explanation, the fall in female labour force participation has been seen as a response to the rising household incomes in country. In this regard, Abraham (2013) argues that the increasing household levels of income allows women to withdraw from labour force and thereby escape from the double burden of unpaid household work and paid market activity. Mapping female labour force participation against household level of incomes, Abraham (2013) finds that a rising level of income is associated with a falling female labour force participation and argues that a rising level of income overtime therefore might explain the observed fall. Similarly, Rangarajan et al (2011) supports that the observed fall can be attributed to an increase in household's level of income, it argues that an increase in household's level of incomes have allowed households to escape poverty and females to withdraw from the labour force in order to attend to domestic duties. In this regard Neff, Sen & Kling (2012) finds that the average level of male wages in the rural areas has indeed risen between 2004-05 and 2009-10 and thereby leading to a possible income effect on female labour force participation. Kannan & Raveendran (2012), however, argues that rise in income might not explain the fall in female labour force participation as the major fall has been seen amongst those who are in the lower deciles of consumption expenditure. Thirdly, with regard to declining employment opportunities as an explanation to falling female labour force participation, there are mixed views regarding the same. At one end, Neff, Sen & Kling (2012) argues that the decline in employment opportunities cannot be seen as an explanation to the fall in female labour force participation while Chatterji, Murgai & Rama (2015) attributes the same to falling labour market opportunities for women. Neff, Sen & Kling (2012) argues that female in rural areas tends to be concentrated (around 80%) in the agricultural sector and agricultural output has experienced an annual growth of around 3.2 percentage points between 2004-05 and 2009-10 while the fall in female labour force participation between the same period can be seen across all household types and not just for those households engaged in agriculture. Finally, with regard to cultural factors as an explanation, Abraham (2013) notes that the decline could be due to conformity to patriarchal norms in the Indian society while Chowdhury (2011) argues that social customs might not explain the recent decline as these customs have remained the same

[16] Given our focus on rural female labour force participation, we restrict to explanations that have been offered for the rural sector only.

overtime.

Given the above discussion, in our analysis below we focus on a different explanation to falling female labour force participation in rural India. And compared to the descriptive explanations presented in the past literature, as discussed above, our analysis below builds upon causal mechanisms. We hypothesize that the fall in rural female labour force participation could be a result of a greater participation by younger girls in educational attainment. Given that younger girls often form substitutes for older women with regard to performance of domestic tasks and duties (Shah & Steinberg (2015), Francavilla, Gianelli & Grilli (2012), Kambahmpati & Rajan (2008)), therefore a greater participation by younger girls in education might thereby cause older women to withdraw from labour force in order to pursue domestic tasks and household duties. We analyse this inverse relationship using data on labour force participation by women in rural areas who are in the age group 25 or above and are below 60 years of age [17]. Lack of time use data, however, prevent us from analysing the above relationship in terms of the time spent either in schooling, performing domestic tasks or in labour force. As an alternative to this, we analyse the relationship between female labour force participation and the proportion of girls (in elementary school going age) in the household who are active in educational activities (based on their reported usual principal status). Firstly, we start by analysing the above discussed inverse relationship between girl's schooling and labour market outcomes for older women using our complete sample while in the second part we divide our sample into four different sub-samples, based on the reported monthly per capita expenditure [18], in order to look for the heterogeneity in the relationship based on economic condition of the household and as discussed above. We expect this substitution effect to be weaker amongst those households belonging to the lower income group. The reason being that for those households belonging to the lower income group credit constraints and the need for subsistence level of income might force women to continue in labour force even as greater proportion of girls from the household enters in schooling. Alternatively, it might be much more easier for women belonging to relatively better off households to exit out of the labour force in order to pursue domestic work compared to those belonging to households at the lower end of the income distribution and as a result the substitution effect therefore might be much stronger amongst who are relatively better off.

Given that the relationship between labour force participation by women and school attendance by girls in the household might hold either ways [19] and as a result an OLS estimation of the same might result in inconsistent estimates. In order to solve for the same we use an instrumental variable framework wherein we instrument for the proportion of girls in 6-14 years of age in the household, who report of attending education

[17] The reason behind the lower limit being, assuming that a women was married at around 18 years of age and that she conceived a baby by the time she was 19, then by the time she turns 25 her child would be old enough to start attending primary school; while upper limit has been chosen based on the working age group definition used by Census in India

[18] We take monthly per capita expenditure as a proxy for household level of income, the reason for the same being that the NSS dataset does not collect data on household level of income.

[19] At one end, a greater labour force participation by women in the household might allow for greater levels of income for the household and the same could be used for children's education while a lower participation in schooling by children could allow older women in the respective household to enter labour force through substitution of responsibility of performing domestic tasks between the older women and the child.

institution on their usual principal status, by the proportion of the rural population in the district that has been exposed to both the programmes. We do this by using data from both the rounds with district fixed effects. Given that the instrument is defined at the district level, using data from two different time period creates variation in the instrument within each district and the same in turn also allows us to control for district fixed effects as well. Further, in order to make sure that our instrument is valid, we limit ourselves to only those women who have lower than primary levels of schooling, the same comprises of around 73 % of women in the age group 25-59 for the entire rural sample in India in 1999-00 while for 2011-12 the same comprises of around 52 % of women in the age group 25-59 for the entire rural sample in India. Accordingly our first stage consists of the following equation -

$$Proportion_{hdt}^{Girls} = \beta_0 + \beta_1 P_{dt} + \beta_2 D_t + \delta_d + \beta X_{hdt} + e_{hdt}$$

herein, h identifies a household, i identifies an individual, d identifies a district and t identifies whether in pretreatment or post treatment period, D_t is a dummy for the post treatment period and takes a value 1 for the post treatment round and 0 otherwise. In addition we also include district fixed effects given by δ_d and controls X_{ihdt} as well. While P_{dt} serves as the instrument and it measures the proportion of individuals in rural parts of the district that have been exposed to both the programmes in time period t. $Proportion_{hdt}^{Girls}$ herein measures the proportion of girls in 6-14 years of age in the household who report of attending educational institution on their usual principal status. We limit ourselves to girls in 6-14 year age group, for the reason that the two programmes which form the basis for our instrument (and as demonstrated above) were directed towards raising school outcomes for girls in elementary school age (6-14 year) only. While in the second stage we estimate the following equation -

$$y_{ihdt} = \beta_0 + \beta_1 Proportion_{hdt}^{Girls} + \beta_2 D_t + \delta_d + \beta X_{ihdt} + e_{ihdt}$$

y_{ihdt} herein measures takes a value 1 if the women reports of being involved in labour force based on the usual principal status and 0 otherwise. Note that, if a person reports of being in the labour force as per the usual principal status, the same implies that the person spent majority of her time in labour force in the last 365 days and also there can be other activities that the person can simultaneously pursue. Similarly, if a person reports of being involved in performing domestic tasks as per the usual principal status, the same does not imply that the person can't be active in the labour force, it only signifies that the majority of her time in the last 365 days was spent in performing domestic tasks. Further, $Proportion_{hdt}^{Girls}$ is instrumented by P_{dt}. D_t is a dummy for the post treatment period and takes a value 1 for the post treatment round and 0 otherwise, we also include district fixed effects given by δ_d and controls X_{ihdt} as well. Different controls herein includes household size, monthly per capita expenditure, land ownership, social group, religion, household type, number of children, age, marital status, characteristics of the household head (education and gender). Additionally, we also control for the number of women in age group 25-59 in the household who have completed primary education and are involved in labour force based on their reported usual principal status in order to control for substitution with regard to completion of domestic tasks between women who are in the same age group. Finally, the data used for the estimation is the same as used for the above analysis, however, now the sample is restricted to those females

in rural areas who are in 25-59 year age group, with lower than primary education and have atleast one girl in 6-14 age group in the household. As already noted before, in order to examine the heterogeneity in the relationship based on economic condition of the household, we follow up the same by dividing our sample into four quantiles based on the monthly per capita expenditure.

Instrument Validity

For P_{dt} to be a valid instrument for girls participation in schooling, it must satisfy the following two conditions - a) programme exposure must affect school participation for girls and b) programme exposure should be exogenous to labour force participation by women. The second condition requires some discussion herein. By creating additional school infrastructure, through setting up of residential schools under the KGBV programme and pre primary schools under the NPEGEL programme, these programmes not only increased access to schools for girls but also generated requirement for additional teachers and support staff at the local level, which implies of a direct impact of the programmes on labour force participation. However, the majority of jobs being generated requires school completion as the basic eligibility; even for the lowest most position of a peon or cook in KGBV eight years of schooling is required as a basic eligibility [20]. Given this, we restrict our attention to the sample of women with lower than primary levels of schooling in our analysis. There remains a concern that the above changes, in the labour market induced by the programmes, might still generate an indirect impact on labour force participation for the set of illiterate women as a result of switching of jobs done by those who opted for the new jobs created above. The same effect however might not be substantial in the present context given the magnitude of jobs generated as a result of the two programmes. To understand the same we tried calculating the number of jobs created in a district wherein every block has been covered under the two programmes. As per Government norms, a KGBV school consisting of around 100 students is provided with total staff of around 15 people (7 being full time and part time teachers and the rest being support staff consisting of accountants, peons and cooks). On an average there are around 10 blocks [21] in a district in India, now for a district that has been entirely covered under the two programmes this amounts to around 10 KGBV schools being established in the district on an average and the same amounts to around 150 new jobs being generated as a result of the same for the entire district. Further, assuming that the same number of jobs were created out as a result of the NPEGEL [22] programme, both combined therefore created 0.00027 jobs [23] per individual on average since the programmes have been implemented back in 2003-04 and 2004-05. This shows that the magnitude of new (direct) jobs created are minuscule compared to the total population for a district on average, given this we do not expect the same to have a significant indirect impact on labour force participation decisions for women who have lower levels of education or are illiterate.

[20] Information based on different recruitment notices for KGBV Schools

[21] There were a total of around 6612 blocks across 651 districts in India in 2011

[22] The focus under the NPEGEL Programme has been on facilitating improvements in the existing school infrastructure (such as provision of toilets, classrooms and electrification) and not on creation of new schooling infrastructure.

[23] The same has been calculated in the following manner - Total rural population (above 6 years of age) in India as per Census 2011 was 712177686 while the number of districts in India were 651, dividing the two we got the average rural population across each district as 1093974.94. Finally, job created per individual equals 300 divided by 1093974.94

Estimation Results and Discussion

The results from above analysis are presented in table 19 and 20. Table 19 presents the results for the first stage from two stage least squares estimation while table 20 presents the results from the second stage for the same. For both table 19 and 20, in addition to the variable of interest, specification in column 1 has been estimated with control for time dummy only, specification in column 2 in addition includes different controls for household characteristics such as household size, monthly per capita expenditure, land ownership, religion, social group, number of children and household type. While specification in column 3 additionally includes controls for individual characteristics - age, marital status and household head characteristics - education and gender. In addition, in column 2 and 3 we also control for the number of women in age group 25-59 in the household who have completed primary education and are involved in labour force based on their reported usual principal status. Results from the first stage in table 10 does suggest that the programme exposure is indeed associated with a positive and significant impact on school participation for girls in 6-14 years of age group. Additionally, the value for F statistic on the excluded instrument, across all specifications, dispels any concerns with regard to the explanatory power of the instrument for all the three specifications considered. Finally results from table 20 do suggest of a significant and negative relationship between the labour force participation for the sample of women under consideration and the proportion of girls (aged 6-14) in the household attending education institution based on the reported usual principal status, from our preferred specification in column 3 for table 20 we find that a unit increase in the proportion of girls (aged 6-14) in the household attending education institution is associated with a 0.0025 fall in the probability of the women being involved in labour force. Additionally, in table 21 we also present results wherein the dependent variable is instead participation in domestic task based on the reported usual principal status. Results from table 21 provides evidence for a positive and significant impact of girls participation in schooling on participation in domestic tasks for the sample of women considered above, we find that a unit increase in the proportion of girls (aged 6-14) in the household attending education institution is associated with a 0.0028 rise in the probability of the women being involved in performing domestic tasks.

Table 22 describes the second stage results for the sub sample based on the four quantiles of the monthly per capita expenditure, the same also describes the average proportion of girls in 5-16 age group who report of attending educational institution in the household, average labour force participation for women in 25-59 age group and the results for the estimated coefficient for the instrument from the first stage for each of the sub-sample considered in the analysis. Column 1 in table 22 presents the results for consumption expenditure quantile 1, column 2 presents the same for quantile 2, column 3 and 4 for quantile 3 and 4 respectively. For all the specification considered, the dependent variable takes a value 1 if the woman (in 25-59 year age group and with less than primary education) reports of being involved in performing domestic tasks as per the usual principal status and 0 otherwise. The specification used for the estimation in each column is similar to the specification used for the results presented in column 3 of table 20. From table 22 we observe that the average proportion of girls in the household, for the sample of women considered, who are participating in education is increasing over the consumption expenditure quantiles across both the 55th and 68th round. Also, the estimated coefficient

for instrument from the first stage is statistically significant across all the sub-samples, however, contrary to our expectation, we find that the programme take up is highest amongst those who are in the second quantile and the same is reflected by the value for the estimated coefficient for the instrument from first stage. On the other hand, the value of the estimated coefficient for the instrument is falling for those in quantile 3 and 4; the same is as expected as the relatively better households could already have afforded better schooling facilities from private market as well. Also, for all the sub-samples, except for the 4th quantile, the value for the F statistic for the excluded instrument is greater than 10; thus suggesting that the chosen instrument is not weak. Table 22 also describes the average labour force participation for women in 25-59 age group and with less than primary level of education, across each of the sub-sample considered. From the same we see that overtime, except for the fourth quantile, there has been a fall in female labour force participation across all the other three quantile groups. Further, the decline has been the largest amongst those in the lowest consumption expenditure group while the top most consumption expenditure quantile on the other hand has experienced a positive change between the two rounds. Given this, our main interest herein lies in the estimated coefficient from the second stage of the 2sls regression for the variable $Proportion_{hidt}^{Girls}$. We see that estimated coefficient for $Proportion_{hidt}^{Girls}$ is statistically insignificant for the lowest quantile group and as discussed before the same is as expected, for the reason that the economic condition of the household as well as the need for subsistence level of income might therefore force the women to continue in the labour market even after increased participation in schooling by the younger girls and as a result the substitution effect might be much lower compared to the relatively better off households. Additionally, the size of the estimated coefficient for the same is also low in comparison to the same for the second and third quantile group. While for the case of those women in the second quantile group we do see that estimated coefficient for the second stage is both negative as well as statistically significant, thus suggesting that the increased participation in schooling by younger girls in the household is associated with a fall in labour force participation for older women in the households. The estimated coefficient for those in second quantile group, however, herein is much larger as compared to the same for complete sample considered above. Coming over to women in the third quantile group, although the estimated coefficient is negative but the same is statistically insignificant. A reason for the same could be that the instrumental variable technique is inefficient. Finally, for the top most quantile group we observe that the estimated coefficient is statistically insignificant. With regard to the top most quantile, the chosen instrument, however, is a weak one [24] and as a result we remain doubtful about the result for the top most quantile group. Given this analysis, our results, therefore, suggests that the substitution effect between girls education and women participation is heterogeneous across households depending upon the economic condition of the household and also that the above observed negative effect for the complete sample considered above is largely driven by those in the second quantile group as well as those in the third quantile group. In addition, we also provide sub-sample wise results in table 23 for the case wherein the dependent variable is participation in domestic tasks by women. Similar to the sub-sample wise results for labour force participation, the results for participation in domestic tasks are also heterogeneous across different households based on their economic condition and again only for the second quantile we find that the results are statistically significant for the case of

[24] Note that the value of the F Statistic for the excluded instrument for the case of the same group is less than 10.

participation in domestic tasks.

Our above result contributes to the ongoing discussion on the declining rural female labour force participation in India. Contrary to the suggestion by Mehrotra et al (2014), our results indicate that a greater participation in schooling by younger girls is indeed associated with a lower labour force participation by older women but the same is restricted to a select group women only, these are those in the second quantile group in the present context. Given the heterogeneous nature of the effect as demonstrated, what remains to be explored ahead are the reasons for the fall in labour force participation amongst women belonging to the lowest most income groups, as the same is also the group that has observed the largest fall in female labour force participation. Finally, compared to the descriptive nature of past studies, we herein provide a causal evidence for the same effect, which is the expansion of educational facilities at the elementary level and a greater take-up for the same by the relevant population. The same leading to substitution at the intra household level with regard to performing of domestic tasks. However, our result should not be confused with the 'education effect' reasoning provided by Rangarajan et al. (2011) and as summarized by Neff, Sen & Kling (2012). 'Education Effect' as an explanation to declining rural female labour force participation and as described by Neff, Sen & Kling (2012) refers to the fall in labour force participation (for those who are below 25) owing to greater take up of education by themselves. Our result instead focuses on the impact of greater education participation by one group of females (those in the elementary school age group) on a different group of females (those who are 25 and above), possibly due to the reallocation of domestic tasks and duties between the above two groups on account of greater participation in education by the former group.

7. Conclusion

The above analysis presents evidence for the effectiveness of girl specific supply side school interventions on schooling outcomes for girls at the elementary level in the context of rural India. Similar to Miller & Litschig (2015), our results suggests of a greater participation in schooling by girls on account of exposure to the two programmes. Contrary to Miller & Litschig (2015), which uses aggregate data at the block level, our results instead are based on individual level data from two rounds of NSS Employment and Unemployment survey. Using a triple difference in difference methodology we find that a greater programme exposure is associated with a greater probability of primary and upper primary school completion for girls in rural areas and this increased participation in education is again confirmed by our results based on difference in difference using the reported usual principal status for girls in the elementary school age group. In terms of policy implications, even though these results suggests of effectiveness of girl specific supply side school interventions in raising schooling outcomes, however, the question that arises is whether similar interventions would be of use at, say, higher levels of education. Besides these, in the context of development, what is needed to be understood are the medium and the long term gains from the two programmes for those who have been treated under the same. The same could be explored as and when latest data is available.

The second part of our analysis looks at the impact of a greater participation in schooling by young girls (6-14 years) on labour force participation for females in rural India. We instrument participation in schooling by young girls by the proportion of rural individu-

als in the district exposed to both the programmes. We find a negative relation between school participation by younger girls and labour force participation by older women, thus suggesting of withdrawal from labour force on account of intra household substitution between younger girls and older women with regard to participation in domestic tasks and as discussed in the past literature. Additionally, greater participation in domestic tasks, on account of an increase in the proportion of girls (6-14) participating in schooling, confirms the same. Heterogeneity analysis confirms that the result is being driven by women belonging to relatively better off households and as a result what remains as a task ahead is explaining the reason for the fall in female labour force participation for those belonging to the lowest most consumption quantile. Further, compared to the descriptive analysis in past literature, our results presents a causal evidence for the decline labour force participation for women in rural India, although limited to the set of women in the 25-59 age group and with lower than primary levels of schooling only. Past literature attributes the same to different factors such as growth in income, fallout in agriculture, greater participation in education etc. Further, our results also points to significant inter linkages that exists between educational choices and labour market outcomes; the understanding of such inter linkages is crucial from the point of view of policy formation as well their implementation.

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Appendix

1. Falsification Test

In order to make sure that our results are not driven by pre existing trends, we undertake falsification tests, for each of the outcome variable studied before, using data from the 51st (1994-95) and 55th (1999-00) round of NSS . We assume that the two programmes were instead implemented in the year 1995 and accordingly the 51st round serves as the pretreatment round while the 55th round now serves as the post treatment round. Our analytical sample (districts covered) is the same as one considered in the main analysis and same as before we restrict our sample to females in the rural areas only. The methodology used is the same as before, we use a triple difference in difference methodology for primary and upper primary completion while a difference in difference methodology for the rest of the outcome variables. Following explains the methodology used in detail -

Primary and Upper Primary Completion

We use a triple difference in difference methodology and accordingly we estimate the following equation -

$$y_{idt} = \beta_0 + \beta_1 P_d + \beta_2 D_t + \beta_3 A_{idt} + \beta_4 D_t * A_{idt} + \beta_5 D_t * P_d + \beta_7 A_{idt} * P_d + \beta_8 (D_t * P_d * A_{idt}) + \delta_d + \beta X_{idt} + e_{idt}$$

y_{idt} here takes a value 1 if the individual has completed primary level of schooling and 0 otherwise for the case of analysing primary school completion while it takes a value 1 if the individual has completed upper primary level of schooling and 0 otherwise for the case of upper primary completion. D_t is a dummy for post treatment period and it takes a value 1 if the individual belongs to the post treatment round and 0 otherwise. A_{idt} identifies whether the female has been exposed to the fake treatment or not, it takes a value 1 if the individual is below 16 years of age and 0 otherwise in the case of analysing primary school completion while it takes a value 1 if the individual is below 19 years of age and 0 otherwise in the case of analysing upper primary school completion. The reason for the same being that an individual who is 16 or above (19 or above) in 1999-00 [25] would would not have gained much from the treatment with regard to primary (upper primary) school completion [26]. As before, P_d denotes the proportion of rural population in the district that have been exposed to both the programmes [27]. Given this, $D_t * P_d * A_{idt}$ is the variable of interest, it is the triple interaction of D_t, A_{idt} and P_d. As before we also include district fixed effects and controls for household head's level of education, gender, household monthly per capita expenditure, religion and household type. Our sample consists of females in rural areas only. Also, for analysing primary school completion, as before, we include only those who are 11 or above while for analysing upper

[25] The same being the year in which the 55th Round of survey was done

[26] As already stated before we the age of primary (upper primary) school completion in India is 11 (14) and accordingly a person who has already surpassed this age at the time of the implementation of the programme would have gained very less from the same.

[27] These have been calculated in the same manner as before, using data from Census 2011 data on population. We are assuming that the same proportion of rural population was exposed to the programmes

primary completion we consider only those who are 14 or above. Further, we also present results for the case wherein we further limit our sample to only those females who are 14 or above and 17 or above for the case of primary and upper primary school completion respectively. The results for the falsification tests are presented in table 17, wherein for primary and upper primary completion we present the coefficient for $D_t * P_d * A_{idt}$. For both primary and upper primary completion we see that the coefficient is insignificant, thus suggesting that the exposure to our fake programmes, assumed to be implemented in 1995, did not have any impact on the probability of primary or upper primary completion.

Girl's Participation in Educational Activities

We use a difference in difference methodology in order to analyse the impact of our fake programmes (assumed to be implemented in 1995) on girl's participation in educational activities for both the 6-14 as well as the 15-18 year age group. Following is the equation that we estimate -

$$y_{idt} = \beta_0 + \beta_1 P_d + \beta_2 D_t + \beta_3 (D_t * P_d) + \delta_d + \beta X_{idt} + e_{idt}$$

Herein, y_{idt} takes a value 1 if the girl reports of attending educational institution and 0 otherwise. D_t is a dummy for post treatment period and it takes a value 1 if the individual belongs to the post treatment round and 0 otherwise. P_d denotes the proportion of rural population in the district that have been exposed to both the programmes. Our variable of interest here is the interaction term $P_d * D_t$. Finally, as before we also include district fixed effects δ_d and controls for household head's level of education, gender, household monthly per capita expenditure, religion and household type. For analysing participation in education for the 6-14 year age group, our sample consists of girls in the age group of 6 to 14, who might be attending primary or upper primary school and are living in rural areas; while for the case of 15-18 year age group our sample accordingly consists of girls in 15 to 18 year age group. The results for the falsification tests are presented in table 17, wherein we present the coefficient for the interaction term $(D_t * P_d)$ only. For both the outcomes considered, we see that the coefficient is insignificant.

2. Data and Analytical Sample

Our results above are based on a limited sample of around 309 districts in India, in this section we explain the reason for our limited analytical sample. We do this because of the following two reasons - a) Changes in district boundaries overtime and b) Changes to block boundaries overtime. Firstly, of the 508 districts that were surveyed under the 55th NSS round (pretreatment period) 114 districts got divided between the pretreatment and post treatment round to form new districts and as a result such districts had to be dropped from our analytical sample. Secondly, for calculating proportions of the district that have been exposed to the two programmes we had to match the constituent blocks for each district across two different datasets - Census 2011 and the list for EBB status of each block provided on website of Ministry of Human Resources and Development. The list provided, however, is based on the names for blocks that existed across different states as per the Secondary Education Management Information System (SEMIS) for year 2007-2008. Again due to differences between the list of blocks provided by the Census 2011 and EBB list provided by the Ministry, on account of changes in geographic

boundaries over time, we had to further drop certain districts from our analysis; the majority of these districts included those from the north eastern states of India and from the state of Jammu and Kashmir (consisting of 14 districts). For the north eastern states, the same included a total of 63 districts, out of which 14 got divided while for 24 districts the blocks could not be exactly matched. For the remaining 25 districts for which we could match the blocks correctly - 19 remained unexposed to the programmes and of the 6 that were exposed to both the programmes, while only for two such districts the proportion of rural population exposed to the two programmes exceeded 50 %. Additionally we also drop districts that belong to the 7 union territories in the country and non of the 12 such districts have been covered under both the programmes. Finally, our analytical sample consists of 309 districts from India that remain undivided across the two NSS rounds and for which the different constituent blocks could be correctly matched across the Census 2011 and the EBB list from the Ministry.

Table 1: Summary Statistic for Outcome Variables (Restricted Sample)

	(1) Average
Pre-treatment Round	
Prop. of District covered by both the Prog.	0.00
Primary Completion (Girls in 11-18 age)	0.52
Primary Completion (Girls in 14-18 age)	0.55
Upper Primary Completion (Girls in 14-21 age)	0.35
Upper Primary Completion (Girls in 17-21 age)	0.36
Participation in Education (Girls in 6-14 age)	0.65
Participation in Education (Girls in 15-18 age)	0.28
Post-treatment Round	
Prop. of District covered by both the Prog.	0.52
Primary Completion (Girls in 11-18 age)	0.80
Primary Completion (Girls in 14-18 age)	0.84
Upper Primary Completion (Girls in 14-21 age)	0.62
Upper Primary Completion (Girls in 17-21 age)	0.62
Participation in Education (Girls in 6-14 age)	0.90
Participation in Education (Girls in 15-18 age)	0.59

For each of the outcome variable above, we present the proportions out of 1, for instance Primary Completion equal to 0.29 represents that 29% of the sample under consideration has completed primary education

Table 2: Summary Statistic for Outcome Variables (Restricted Sample)

	(1) Average for District Exposed to Both Programmes	(2) Average for District Not Exposed to Both Programmes
Pre-treatment Round		
Primary Completion (Girls in 11-18 age)	0.29	0.77
Primary Completion (Girls in 14-18 age)	0.32	0.80
Upper Primary Completion (Girls in 14-21 age)	0.19	0.58
Upper Primary Completion (Girls in 17-21 age)	0.18	0.60
Participation in Education (Girls in 6-14 age)	0.46	0.84
Participation in Education (Girls in 15-18 age)	0.16	0.44
Post-treatment Round		
Primary Completion (Girls in 11-18 age)	0.68	0.92
Primary Completion (Girls in 14-18 age)	0.74	0.95
Upper Primary Completion (Girls in 14-21 age)	0.46	0.80
Upper Primary Completion (Girls in 17-21 age)	0.44	0.80
Participation in Education (Girls in 6-14 age)	0.85	0.95
Participation in Education (Girls in 15-18 age)	0.49	0.71

Herein, we provide summary statistics for our restricted sample only, which includes districts that have been either fully exposed to both the programmes or those that have been left unexposed to the programmes
For each of the outcome variable above, we present the proportions out of 1, for instance Primary Completion equal to 0.29 represents that 29% of the sample under consideration has completed primary education

Table 3: Primary School Completion for Girls

	(1) Completed Primary School	(2) Completed Primary School
$(D_t * P_d * A_{idt})$	0.0022***	0.0020***
	(0.0002)	(0.0002)
Controls	-	HH Level
District F.E.	Yes	Yes
Observations	135454	133292
R^2	0.218	0.323

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents results for the variable of interest only, i.e. triple interaction between post treatment dummy, age dummy (whether below 19 or not) and the proportion of rural individuals in the district exposed to both the programmes. The dependent Variable, herein, takes a value 1 if the individual has completed primary school and 0 otherwise. We drop all those females who are below 11 years of age as the same cannot be expected to have completed primary schooling. Specification in Column 1 above includes dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dummy identifying whether the person is 19 or below (A_{idt}), dual as well as the triple interactions of all these variables and district fixed effects. Specification in Column 2, in addition to specification in Column 1, includes control for household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household).

Table 4: Upper Primary School Completion for Girls

	(1) Completed Upper Primary School	(2) Completed Upper Primary School
$(D_t * P_d * A_{idt})$	0.0012***	0.0011***
	(0.0002)	(0.0002)
Controls	-	HH Level
District F.E.	Yes	Yes
Observations	124445	122442
R^2	0.190	0.286

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents results for the variable of interest only, i.e. triple interaction between post treatment dummy, age dummy (whether below 21 or not) and the proportion of rural individuals in the district exposed to both the programmes. The dependent variable, herein, takes a value 1 if the individual has completed upper primary school and 0 otherwise. We drop all those females who are below 14 years of age as the same cannot be expected to have completed upper primary schooling. Specification in Column 1 above includes dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dummy identifying whether the person is 21 or below (A_{idt}), dual as well as the triple interactions of all these variables and district fixed effects. Specification in Column 2, in addition to specification in Column 1, includes control for household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household).

Table 5: Participation in Education by Girls in 6-14 Age Group (Usual Principal Status)

	Attending Educational Institution	Attending Educational Institution
$(D_t * P_d)$	0.0025^{***}	0.0027^{***}
	(0.0002)	(0.0002)
Controls	-	HH Level
District F.E.	Yes	Yes
Observations	35565	35029
R^2	0.159	0.255

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents results for the variable of interest only, i.e. interaction between post treatment dummy and the proportion exposed to both the programmes. The dependent variable herein takes a value 1 if the individual reports of attending an educational institution based on the usual principal status and 0 otherwise. We consider only those girls in rural areas who are in the age group 6-14 years of age, elementary school going age group. Specification in Column 1 above includes dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dual interactions of these variables and district fixed effects. Specification in Column 2, in addition to specification in Column 1, includes control for individual's age, household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household).

Table 6: Participation in Education by Girls in 15-18 Age Group (Usual Principal Status)

	Attending Educational Institution	Attending Educational Institution
$(D_t * P_d)$	0.0005	0.0007
	(0.0004)	(0.0004)
Controls	-	HH Level
District F.E.	Yes	Yes
Observations	13783	13580
R^2	0.183	0.333

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents results for the variable of interest only, i.e. interaction between post treatment dummy and the proportion exposed to both the programmes. The dependent variable herein takes a value 1 if the individual reports of attending an educational institution based on the usual principal status and 0 otherwise. We consider only those girls in rural areas who are in the age group 15-18 years of age, elementary school going age group. Specification in Column 1 above includes dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dual interactions of these variables and district fixed effects. Specification in Column 2, in addition to specification in Column 1, includes control for individual's age, household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household).

Table 7: Primary School Completion for Girls (Restricted Sample)

	(1) Completed Primary School	(2) Completed Primary School
$(D_t * P_d * A_{idt})$	0.0026^{***}	0.0022^{***}
	(0.0003)	(0.0003)
Controls	-	HH Level
District F.E.	Yes	Yes
Observations	77507	76240
R^2	0.262	0.357

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Sample is restricted to districts that have been either fully exposed or haven't been exposed to the two programmes. Proportion Exposed takes a value 100 if the entire district has been exposed to the two programmes and 0 is non of the blocks in the districts have been exposed to the programmes. The table above presents results for the variable of interest only, i.e. triple interaction between post treatment dummy, age dummy (whether below 19 or not) and the proportion of rural individuals in the district exposed to both the programmes. The dependent Variable, herein, takes a value 1 if the individual has completed primary school and 0 otherwise. We drop all those females who are below 11 years of age as the same cannot be expected to have completed primary schooling. Specification in Column 1 above includes dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dummy identifying whether the person is 19 or below (A_{idt}), dual as well as the triple interactions of all these variables and district fixed effects. Specification in Column 2, in addition to specification in Column 1, includes control for household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household).

Table 8: Upper Primary School Completion for Girls (Restricted Sample)

	(1) Completed Upper Primary School	(2) Completed Upper Primary School
$(D_t * P_d * A_{idt})$	0.0013***	0.0012***
	(0.0003)	(0.0003)
Controls	-	HH Level
District F.E.	Yes	Yes
Observations	71341	70160
R^2	0.231	0.317

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Sample is restricted to districts that have been either fully exposed or haven't been exposed to the two programmes. Proportion Exposed takes a value 100 if the entire district has been exposed to the two programmes and 0 is non of the blocks in the districts have been exposed to the programmes. The table above presents results for the variable of interest only, i.e. triple interaction between post treatment dummy, age dummy (whether below 21 or not) and the proportion of rural individuals in the district exposed to both the programmes. The dependent variable, herein, takes a value 1 if the individual has completed upper primary school and 0 otherwise. We drop all those females who are below 14 years of age as the same cannot be expected to have completed upper primary schooling. Specification in Column 1 above includes dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dummy identifying whether the person is 21 or below (A_{idt}), dual as well as the triple interactions of all these variables and district fixed effects. Specification in Column 2, in addition to specification in Column 1, includes control for household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household).

Table 9: Participation in Education by Girls in 6-14 Age Group (Usual Principal Status) (Restricted Sample)

	Attending Educational Institution	Attending Educational Institution
$(D_t * P_d)$	0.0027^{***}	0.0031^{***}
	(0.0002)	(0.0002)
Controls	-	HH Level
District F.E.	Yes	Yes
Observations	19923	19618
R^2	0.210	0.310

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Sample is restricted to districts that have been either fully exposed or haven't been exposed to the two programmes. Proportion Exposed takes a value 100 if the entire district has been exposed to the two programmes and 0 is non of the blocks in the districts have been exposed to the programmes. The table above presents results for the variable of interest only, i.e. interaction between post treatment dummy and the proportion exposed to both the programmes. The dependent variable herein takes a value 1 if the individual reports of attending an educational institution based on the usual principal status and 0 otherwise. We consider only those girls in rural areas who are in the age group 6-14 years of age, elementary school going age group. Specification in Column 1 above includes dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dual interactions of these variables and district fixed effects. Specification in Column 2, in addition to specification in Column 1, includes control for individual's age, household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household).

Table 10: Participation in Education by Girls in 15-18 Age Group (Usual Principal Status) (Restricted Sample)

	Attending Educational Institution	Attending Educational Institution
$(D_t * P_d)$	0.0004	0.0007
	(0.0004)	(0.0004)
Controls	-	HH Level
District F.E.	Yes	Yes
Observations	7628	7511
R^2	0.221	0.368

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Sample is restricted to districts that have been either fully exposed or haven't been exposed to the two programmes. Proportion Exposed takes a value 100 if the entire district has been exposed to the two programmes and 0 is non of the blocks in the districts have been exposed to the programmes. The table above presents results for the variable of interest only, i.e. interaction between post treatment dummy and the proportion exposed to both the programmes. The dependent variable herein takes a value 1 if the individual reports of attending an educational institution based on the usual principal status and 0 otherwise. We consider only those girls in rural areas who are in the age group 15-18 years of age, elementary school going age group. Specification in Column 1 above includes dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dual interactions of these variables and district fixed effects. Specification in Column 2, in addition to specification in Column 1, includes control for individual's age, household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household).

Table 11: Primary School Completion for Girls (Robustness Test)

	(1) Completed Primary School	(2) Completed Primary School
$(D_t * P_d * A_{idt})$	0.0025^{***}	0.0022^{***}
	(0.0003)	(0.0003)
Controls	-	HH Level
District F.E.	Yes	Yes
Observations	124445	122442
R^2	0.211	0.321

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents results for the variable of interest only, i.e. triple interaction between post treatment dummy, age dummy (whether below 19 or not) and the proportion of rural individuals in the district exposed to both the programmes. The dependent Variable, herein, takes a value 1 if the individual has completed primary school and 0 otherwise. Following Bhalotra et al (2012) we drop all those who are below 14 years of age. Specification in Column 1 above includes dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dummy identifying whether the person is 19 or below (A_{idt}), dual as well as the triple interactions of all these variables and district fixed effects. Specification in Column 2, in addition to specification in Column 1, includes control for household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household).

Table 12: Upper Primary School Completion for Girls (Robustness Test)

	(1) Completed Upper Primary School	(2) Completed Upper Primary School
$(D_t * P_d * A_{idt})$	0.0014^{***}	0.0014^{***}
	(0.0003)	(0.0003)
Controls	-	HH Level
District F.E.	Yes	Yes
Observations	113685	111846
R^2	0.171	0.271

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents results for the variable of interest only, i.e. triple interaction between post treatment dummy, age dummy (whether below 21 or not) and the proportion of rural individuals in the district exposed to both the programmes. The dependent variable, herein, takes a value 1 if the individual has completed upper primary school and 0 otherwise. We drop all those females who are below 17 years of age. Specification in Column 1 above includes dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dummy identifying whether the person is 21 or below (A_{idt}), dual as well as the triple interactions of all these variables and district fixed effects. Specification in Column 2, in addition to specification in Column 1, includes control for household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household).

Table 13: Primary School Completion for Girls (Age 11) (Robustness Test for Mid Day Meal)

	(1) Completed Primary School	(2) Completed Primary School
$(D_t * P_d * A_{idt})$	0.0023***	0.0022***
	(0.0002)	(0.0002)
Control for Exposure to Midday Meal	No	Yes
Observations	119206	119206
R^2	0.392	0.392

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents results for the variable of interest only, i.e. triple interaction between post treatment dummy, age dummy (whether below 19 or not) and the proportion of rural individuals in the district exposed to both the programmes. The dependent Variable, herein, takes a value 1 if the individual has completed primary school and 0 otherwise. We drop all those females who are below 11 years of age as the same cannot be expected to have completed primary schooling. Specification in both the columns include dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dummy identifying whether the person is 19 or below (A_{idt}), dual as well as the triple interactions of all these variables, district fixed effects, control for household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household) and individual's age. In addition to these specification in column 2 includes control for whether the person has been exposed to the mid day facility or not. Finally both the specifications have been estimated with a limited sample which excludes data for states of West Bengal and Jharkhand.

Table 14: Primary School Completion for Girls (Age 14) (Robustness Test for Mid Day Meal)

	(1) Completed Primary School	(2) Completed Primary School
$(D_t * P_d * A_{idt})$	0.0025***	0.0024***
	(0.0003)	(0.0003)
Control for Exposure to Midday Meal	No	Yes
Observations	109595	109595
R^2	0.400	0.400

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents results for the variable of interest only, i.e. triple interaction between post treatment dummy, age dummy (whether below 19 or not) and the proportion of rural individuals in the district exposed to both the programmes. The dependent Variable, herein, takes a value 1 if the individual has completed primary school and 0 otherwise. Following Bhalotra et al (2012) we drop all those who are below 14 years of age. Specification in both the columns include dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dummy identifying whether the person is 19 or below (A_{idt}), dual as well as the triple interactions of all these variables, district fixed effects, control for household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household) and individual's age. In addition to these specification in column 2 includes control for whether the person has been exposed to the mid day facility or not. Finally both the specifications have been estimated with a limited sample which excludes data for states of West Bengal and Jharkhand.

Table 15: Upper Primary School Completion for Girls (Age 14) (Robustness Test for Mid Day Meal)

	(1) Completed Upper Primary School	(2) Completed Upper Primary School
$(D_t * P_d * A_{idt})$	0.0011^{***}	0.0011^{***}
	(0.0003)	(0.0003)
Control for Exposure to Midday Meal	No	Yes
Observations	109595	109595
R^2	0.339	0.339

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents results for the variable of interest only, i.e. triple interaction between post treatment dummy, age dummy (whether below 21 or not) and the proportion of rural individuals in the district exposed to both the programmes. The dependent variable, herein, takes a value 1 if the individual has completed upper primary school and 0 otherwise. We drop all those females who are below 14 years of age as the same cannot be expected to have completed upper primary schooling. Specification in both the columns include dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dummy identifying whether the person is 19 or below (A_{idt}), dual as well as the triple interactions of all these variables, district fixed effects, control for household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household) and individual's age. In addition to these specification in column 2 includes control for whether the person has been exposed to the mid day facility or not. Finally both the specifications have been estimated with a limited sample which excludes data for states of West Bengal and Jharkhand.

Table 16: Upper Primary School Completion for Girls (Age 17) (Robustness Test for Mid Day Meal)

	(1) Completed Upper Primary School	(2) Completed Upper Primary School
$(D_t * P_d * A_{idt})$	0.0012^{***}	0.0013^{***}
	(0.0003)	(0.0003)
Control for Exposure to Midday Meal	No	Yes
Observations	100109	100109
R^2	0.330	0.330

Standard errors clustered at the district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents results for the variable of interest only, i.e. triple interaction between post treatment dummy, age dummy (whether below 21 or not) and the proportion of rural individuals in the district exposed to both the programmes. The dependent variable, herein, takes a value 1 if the individual has completed upper primary school and 0 otherwise. We drop all those females who are below 17 years of age in order to allow for grade repetition as well late entry into schooling. Specification in both the columns include dummy for post treatment period (D_t), proportion of the rural population in the district exposed to both the programmes (P_d), dummy identifying whether the person is 19 or below (A_{idt}), dual as well as the triple interactions of all these variables, district fixed effects, control for household head's level of education and gender, household size, Monthly Per Capita Expenditure, Qty. of Land Owned, Social Group, Religion, Household Type (Whether self employed in agriculture or non agriculture, casual labour agriculture or non agriculture or salaried household) and individual's age. In addition to these specification in column 2 includes control for whether the person has been exposed to the mid day facility or not. Finally both the specifications have been estimated with a limited sample which excludes data for states of West Bengal and Jharkhand.

Table 17: Results for Falsification Tests

Variables	(1) Treatment
Primary School Completion	0.0002
(Completion Age as 11)	(0.0005)
Primary School Completion	-0.0001
(Completion Age as 14)	(0.0005)
Upper Primary School Completion	0.0005
(Completion Age as 14)	(0.0004)
Upper Primary School Completion	0.0011
(Completion Age as 17)	(0.0006)
Attending Educational Institution (UPS)	0.0004
(6-14 Year Age Group)	(0.0003)
Attending Educational Institution (UPS)	-0.0007
(15-18 Year Age Group)	(0.0005)

Standard errors clustered at district level in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents coefficient for the main variable of interest only for each of the outcome variable considered in the main analysis. For the case of primary and upper primary school completion the above table presents the estimated coefficient for $(D_t * P_d * A_{idt})$ while for the case of participation in schooling the same refers to the coefficient for $(D_t * P_d)$. We undertake the falsification tests by assuming different ages for completion of primary and upper primary school in order to allow for late entry into school as well grade repetition. For the all the variables presented above we see that the estimated coefficient, for the variable measuring the impact of the treatment, is statistically insignificant.

Table 18: Summary Statistics

	Pre-treatment Period (1999-00) Averages	Post-treatment Period (2011-12) Averages
Labour Force Participation for Women in 25-59 age and less than primary education	0.44	0.30
Proportion of Girls (6-14) attending educ. institute	61.54	88.09
No. of Working Women in HH (with primary educ. & above)	0.01	0.02
No. of Children in HH	2.37	2.26
Proportion of District Covered by the Programmes	0.00	52.17
HH Size	6.93	6.41
Monthly Per Capita Exp. (in Rs.)	380.30	946.35
Land Owned (in Hectares)	99.19	67.19
HH Head Educ. (Illiterate)	0.59	0.53
HH Head Educ. (Below High Sec.)	0.39	0.44
HH Head Educ. (High Sec. & above)	0.03	0.03
HH Head Male	0.92	0.91
Number of Obs.	13,674	6,321

The sample is restricted to households with girl children in the age group 6-14. The proportion of district covered under the programmes equals 0 for the pre treatment period 1999-00

Table 19: First Stage Results for Women Labour Force Participation (25-59 Years)

	(1) $Proportion_{hidt}^{Girls}$	(2) $Proportion_{hidt}^{Girls}$	(3) $Proportion_{hidt}^{Girls}$
P_d	0.2355***	0.2539***	0.2339***
	(0.0213)	(0.0276)	(0.02584)
District F.E.	Yes	Yes	Yes
Observations	19745	19573	19528
F Stat for Excl. Instrument	122.12	84.29	81.94

Robust Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents the first stage results from 2sls estimation for Women Labour Force Participation. For all the specification considered above, the dependent variable measures the proportion of girls in household who report of attending educational institute based on the reported usual principal status. Specification in column 1 includes time dummy D_t as well while specification in column 2 in addition includes controls for different household level characteristics - HH Size, Monthly Per Capita Expenditure, Land Ownership, Social Group, Religion, HH Type, No. of Children. Finally the specification in column 3, in addition to the controls considered in column 2, includes control for age, marital status for the individual and characteristics for the HH Head - education and gender. Column 2 and 3 also controls for the number of women in age group 25-59 in the household who have completed primary education and are involved in labour force based on their reported usual principal status.

Table 20: Second Stage Results for Women Labour Force Participation (25-59 Years)

	(1) Labour Force Participation	(2) Labour Force Participation	(3) Labour Force Participation
$Proportion_{hidt}^{Girls}$	-0.0022*	-0.0026**	-0.0025*
	(0.0010)	(0.0009)	(0.0010)
District F.E.	Yes	Yes	Yes
Observations	19745	19573	19528
R^2	-0.004	0.013	0.032

Robust Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents the second stage results from 2sls estimation for Women Labour Force Participation. For all the specification considered above, the dependent variable takes a value 1 if the woman reports of being involved in the labour force as per the usual principal status and 0 otherwise. Specification in column 1 includes time dummy D_t as well while specification in column 2 in addition includes controls for different household level characteristics - HH Size, Monthly Per Capita Expenditure, Land Ownership, Social Group, Religion, HH Type, No. of Children. Finally the specification in column 3, in addition to the controls considered in column 2, includes control for age, marital status for the individual and characteristics for the HH Head - education and gender. Column 2 and 3 also controls for the number of women in age group 25-59 in the household who have completed primary education and are involved in labour force based on their reported usual principal status.

Table 21: Second Stage Results for Women Participation in Domestic Tasks (25-59 Years)

	(1) Involved in Domestic Tasks	(2) Involved in Domestic Tasks	(3) Involved in Domestic Tasks
$Proportion_{hidt}^{Girls}$	0.0026*	0.0030**	0.0028**
	(0.0011)	(0.0010)	(0.0011)
District F.E.	Yes	Yes	Yes
Observations	19745	19573	19528
R^2	-0.019	-0.010	0.021

Robust Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents the second stage results from 2sls estimation for women participation in performing domestic tasks based on the reported usual principal status. For all the specification considered above, the dependent variable takes a value 1 if the woman reports of being involved in performing domestic tasks as per the usual principal status and 0 otherwise. Specification in column 1 includes time dummy D_t as well while specification in column 2 in addition includes controls for different household level characteristics - HH Size, Monthly Per Capita Expenditure, Land Ownership, Social Group, Religion, HH Type, No. of Children. Finally the specification in column 3, in addition to the controls considered in column 2, includes control for age, marital status for the individual and characteristics for the HH Head - education and gender. Column 2 and 3 also controls for the number of women in age group 25-59 in the household who have completed primary education and are involved in labour force based on their reported usual principal status.

Table 22: Second Stage Results for Women Labour Force Participation (25-59 Years) (Sub Sample Analysis)

	(1) Labour Force Participation	(2) Labour Force Participation	(3) Labour Force Participation	(4) Labour Force Participation
$Proportion_{hidt}^{Girls}$	0.0005	-0.0065**	-0.0024	-0.00001
	(0.0023)	(0.0022)	(0.0026)	(0.0036)
Observations	4893	4889	4856	4832
R^2	0.052	-0.343	0.067	0.023
First Stage Est. Coeff. for Instrument	0.2349***	0.2521***	0.2133***	0.1580**
F Statistic on Excl. Instrument	22.68	28.49	22.12	8.40
Average Prop. Girls (6-14) attending educ. institution in HH				
55th NSS Round	45.75	59.97	66.16	75.00
68th NSS Round	84.41	88.90	88.31	92.57
Average Female Labour Force Participation for 25-59 age and less than Primary Education				
55th NSS Round	0.50	0.45	0.42	0.36
68th NSS Round	0.27	0.25	0.32	0.39

Robust Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The table above presents the second stage results from the 2sls estimation for female participation in labour force based on the reported usual principal status, however, herein we have divided the entire sample into four quantiles based on the monthly per capita expenditure. The table above therefore presents the results sub sample wise based on the four quantiles generated, column 1 presents the same for quantile 1, column 2 for quantile 2, column 3 and 4 for quantile 3 and 4 respectively. For all the specification considered above, the dependent variable takes a value 1 if the woman reports of being involved in performing domestic tasks as per the usual principal status and 0 otherwise. The specification used for the above estimation is similar to the specification used for column 3 for previous analysis with full sample. Besides, for each of the sub sample considered above, the table also presents the following results as well - i) Estimated Coefficient for the instrument from the first stage, ii) Value for the F Statistic on the Excluded Instrument, iii) Average Proportion of Girls in 6-14 year age group who report of attending educational institution based on the reported usual principal status for both the 55th as well the 68th round data, and iv) Average Female Labour Force Participation for those in 25-59 age group and with less than primary education.

Table 23: Second Stage Results for Women Labour Force Participation (25-59 Years) (Sub Sample Analysis)

	(1) Involved in Domestic Tasks	(2) Involved in Domestic Tasks	(3) Involved in Domestic Tasks	(4) Involved in Domestic Tasks
$Proportion_{hidt}^{Girls}$	-0.0004	0.0066**	0.0031	0.00006
	(0.0023)	(0.0023)	(0.0026)	(0.0037)
Observations	4893	4889	4856	4832
R^2	0.0570	-0.3444	-0.0169	0.0605

The table above presents the second stage results from the 2sls estimation for women participation in performing domestic tasks based on the reported usual principal status, however, herein we have divided the entire sample into four quantiles based on the monthly per capita expenditure. The table above therefore presents the results sub sample wise based on the four quantiles generated, column 1 presents the same for quantile 1, column 2 for quantile 2, column 3 and 4 for quantile 3 and 4 respectively. For all the specification considered above, the dependent variable takes a value 1 if the woman reports of being involved in performing domestic tasks as per the usual principal status and 0 otherwise. The specification used for the above estimation is similar to the specification used for column 3 for previous analysis with full sample.

Table 24: Implementation of Midday Meal Programme

	Year
Andhra Pradesh	2003
Assam	2005
Bihar	2005
Chhattisgarh	2002
Gujarat	1986
Haryana	2004
Himachal Pradesh	2004
Karnataka	2003
Madhya Pradesh	2003
Maharashtra	2003
Orissa	2004
Rajasthan	2002
Tamil Nadu	1982
Uttar Pradesh	2004
Uttaranchal	2003-04
Punjab	2004
Uttarakhand	2004
Kerala	1984
Goa	2005-06

Source - Jayaraman, Simroth & Vericoth (2011), Source for Uttaranchal, Source for Punjab, Source for Kerala, Source for Goa