

Children's welfare and short term migration from rural India

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Few papers in the literature provide quantitative analysis of the difficult circumstances faced by children of short-term labour migrants. This paper uses new survey data from rural northwest India to study both children who migrate and those left behind. It finds that, unlike in other contexts, children who migrate rarely work when they accompany adult migrants. Additionally, this paper reports a robust, previously unquantified negative relationship between children's migration and educational outcomes and investments. It calls for further research about externalities of migration for children and suggests that expansion of a large public employment program might help these children.

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1. Introduction

Many scholars have noted the importance of short term migration to the livelihoods of rural households in India (Breman, 1996; Mosse et al., 2002; Banerjee and Duflo, 2007). In some places, migration is exclusively undertaken by adult males, while in others, women, and sometimes children, also migrate (Haberfeld, 1999; Mosse et al., 2002; Rogaly, 1998). The circumstances of children at migrant work sites, experiencing the same difficult living conditions that their parents endure, and those of children left behind in villages when their parents migrate for work, have both raised concern among policy makers and those who study short term labour migration.

Despite this concern, quantitative analysis about the children of migrants is rare—many studies of short term migration in India are qualitative, and quantitative work tends to focus on the migration of adults. This paper uses a new data set collected in 70 villages in rural northwestern India to explore children's experiences in a population of short term migrants. The data were collected along the borders of Rajasthan, Madhya Pradesh and Gujarat, in a very poor, tribal region that has high rates of short term migration. The survey included questions about children in the households, which permitted the construction of a data set of 1,980 children aged 0 to 13 years old.

The literature has established that short term labour migrants and their children are a vulnerable group in need of public policy attention. However, there has been little quantitative analysis to shed light on the particular ways in which the children of migrant workers are vulnerable. To this end, this paper makes two primary contributions. First, although we might expect the children of migrant workers to be engaged in work alongside their parents, the data from this survey show surprisingly little paid or unpaid labour among children who accompany

adults. Second, descriptive statistics and regression analysis show that children who migrate with their parents face important educational disadvantages compared to children who do not migrate. The results of this analysis suggest that expanded implementation of a government employment program may help mitigate this effect.

The paper proceeds as follows: section 2 is a brief review of literature from sociology, anthropology, and economics about migration and children. Section 3 describes the survey and presents background information about the households in the study population. Section 4 presents descriptive statistics about children in the dataset to provide context for the two main findings of the paper. Section 5 presents estimates of the prevalence of child labour among migrating children, which are far lower than qualitative work about other migrating populations would lead us to expect. Section 6 presents analysis which shows that child migration is robustly associated with poor educational outcomes. In particular, children who migrate are less likely to ever have gone to school, and have completed fewer years of education for their age group than children who do not migrate. Section 7 concludes by interpreting the findings about child migration and education and considering the possible role of a large public employment program in reducing children's migration and improving education.

2. Literature review

The phenomenon of short term, largely seasonal, migration from the border area of Rajasthan, Gujarat and Madhya Pradesh is well documented. Haberfeld (1999) and Breman (1996) describe similar patterns of labour migration from regions similar to the one where our survey was carried out. The type of migration that they describe, and the type that is discussed in this paper, is not permanent migration, but rather "short term migration which takes the form of

seasonal circulation” (Breman, 1996, 16). Mosse et al. (2002) collected ethnographic and survey data about migration in the region that we study in 1995-6. They find that a large fraction of households relied on earnings from migrant labour, and that migration was concentrated in the summer season, when rain fed agriculture is unproductive.

Several authors have made reference to the difficult circumstances faced by the children of short term labour migrants in India. Mosse et al. (2002) and Breman (1978) highlight the poverty of families that rely on short term migration. Breman (1994) discusses the emergence of “nakas,” informal meeting points that serve as markets for casual labour and states that “women and children are clearly the most vulnerable” participants in these markets (119). Rogaly (1998) writes about how children of migrants experience family disruption and must bear additional responsibilities.

Many authors have suggested that children of migrant labourers sometimes work alongside their parents. Child labour is particularly well documented at brick kilns, where children help their parents move and dry bricks (Breman, 1996; Gupta, 2003). Mosse et al. (2002) also suggest that working alongside their parents is an important activity for many of the children who accompany their parents on a migration trip. They write, “children spend an increasing amount of their childhood in the unfamiliar and insecure migrant work-sites. From seven years or younger they begin to work on construction or brick work-sites, and are deprived of play, leisure and schooling” (78).

Finally, studies from within and outside India discuss relationships between migration events and children's educational outcomes. For instance, Antman (2011) finds that the male children left behind by their migrant fathers in Mexico reduce time spent on schooling, possibly to help their families financially. Liang and Chen (2007) present a quantitative analysis of the

relationship between education and temporary migration among children from rural China. Using data from the mid 1990s from Guangdong province, they find that children who temporarily migrate with their parents are 8 percentage points less likely to be enrolled in school than the children of permanent residents of the city and 6 percentage points less likely to be enrolled in school than children living in rural areas of the province.

Scholars of Indian migration have expressed concern for poor educational outcomes among the children of migrants. Breman (1996) discusses the difficulties that children of migrating groups faced in attaining education compared to their wealthier counterparts (112-3). Both Rogaly (1998) and Smita (2008) use qualitative evidence to suggest that migration prevents children from going to, and staying in, school. This paper provides quantitative evidence that further confirms the validity of these concerns.

3. Data and context

The data for this study were collected during the summer of 2010 as part of a study of rural employment in a region that borders three states in India: Rajasthan, Gujarat, and Madhya Pradesh. The survey covered 70 villages in five districts: Banswara and Dungarpur in Rajasthan, Jhabua and Ratlam in Madhya Pradesh, and Dahod in Gujarat. Figure 1 shows the survey villages and their locations on the borders of the three states. 32 villages in the western part of the study region had to be dropped from 102 villages initially selected due to time and budget constraints.

This region was chosen for the survey for two reasons. First, previous research has shown it to be a region with high levels of deprivation and seasonal migration (Mosse et al., 2002; Haberfeld, 1999). Second, it is a geographically contiguous area in which levels of implementation of the National Rural Employment Guarantee Scheme (NREGS), a federally

sponsored public employment program, differ by state. We will not discuss the survey's findings about NREGS in great detail in this paper, except insofar as they relate to children's welfare.¹

Respondent households were chosen randomly from voter lists; the household head was asked to complete a household survey, and each adult from the ages of 14 to 69 was asked to complete an individual adult survey about his/her work and migration experiences. The response rate for the household survey was 93.6 per cent, and the response rate for the adult surveys was 81.6 per cent. Most of the non-response in the adult survey was due to absence from the village for migrant work. In those cases, we obtained shorter work histories about the individual from the household head. Most of the data about children analyzed here comes from mothers' adult surveys, but some data are taken from the household survey. For more detailed descriptions of the design and implementation of the survey, see Coffey et al. (2011).

Since most of the work that has been done in other parts of India on short term migration has been qualitative in nature, it is not possible to quantitatively compare this region to other regions of the country with high rates of short term migration. However, several articles in the literature point out that short term migration from poor tribal villages is common in many parts of the country. In our sample, 63 per cent of household heads self-identify as Scheduled Tribe (ST),² a group which qualifies for certain affirmative action programs under the Indian Constitution. Shah (2006) writes about poor ST people from Jharkhand migrating to work in brick kilns; Rogaly and Rafique (2003) write of ST people from West Bengal migrating for agricultural work; and Deshingkar et al. (2008) write about migration from Mandla, a predominately ST district in southern Madhya Pradesh. Thus, what this article contributes to knowledge of children's welfare in this high migration region may apply to similar regions that have been important to other researchers.

3.1 Household characteristics

Households in our sample are extremely poor, even by Indian standards. 93 per cent of households have a dirt floor, 71.3 per cent do not have electricity, and only 1.4 per cent have a television set. Household size is large: the median household has seven people, three of whom are children under 14. Sixty percent of women 45 years and older have had a child who was born alive and later died.³ Adult women in the region have completed less than a year of schooling, on average. Additional summary statistics about the adults and households in the sample are presented in the web appendix A; this appendix also compares the sample to the rural populations of Gujarat, Rajasthan and Madhya Pradesh.

3.2 Livelihoods

This section discusses the three main sources of income among households in the sample—agricultural income, income from migrant work, and wages from the National Rural Employment Guarantee Scheme (NREGS), a government sponsored public employment program. Local labour work in private markets, while sometimes available, is not a primary source of income for most households.

Almost all households own and farm small plots of land. There are three main agricultural seasons in this region: monsoon (July-October), winter (November-February) and summer (March-June). Agriculture is predominantly rain fed; the main growing season is during the monsoon. Corn is planted during the monsoon for home consumption, and the fodder from the corn is saved for feeding animals. Approximately half of households have irrigation, which allows them to plant crops, mainly wheat, during the winter. Crops are rarely grown during the summer. Approximately three quarters of households reported that the 2009 growing season had

particularly poor crop yields compared to other years, probably due to drought, to which the area is prone.

Migration is an important livelihood strategy, particularly in the summer season, when agriculture is unproductive. Coffey et al. (2011) find that among those who migrated in the four seasons before the survey, 81.6 percent initiated a trip in the summer of 2010. They also find that 35 per cent of the 2224 adults who completed the adult survey lived outside of their village for work at some point during the summer season of 2010.⁴ The median trip length is 30 days; adults often take more than one short trip in a year. Coffey et al. (2011) find that almost 80 per cent of households sent a migrant in the past year. Figure 2 plots the fraction of people of different ages who migrated in the study population. There is a strong age and sex pattern to migration; adult males are more likely to migrate than adult females, and migration is most common among adults between the ages of 18 and 35 and infants.

There is very little permanent migration from this region. In only 3 per cent of households did household heads report that someone had left the household for a reason other than marriage in the 5 years before the survey. Since it is very uncommon for people to establish permanent homes at migration destinations, it is not the case that our sample of village households represents families that have experienced failed permanent migration relative to their neighbors.

Data collected about trips in the four seasons prior to the survey help describe the nature of migration. Eighty-three percent of trips were to urban destinations. Although large cities in Gujarat, like Surat, Baroda, and Ahmedabad, are popular destinations, the adults in the sample reported working in over 140 different urban destinations in the four seasons prior to the survey. On over 60 per cent of adult trips recorded by the adult survey, migrants performed unskilled

construction work; other trips were for agricultural labour, brick making and quarry work, road work, and other unskilled manual jobs. Most were paid on a daily basis; the median daily wage is 116 rupees. The most common way of finding work is through “nakas,” or urban meet-up points and spot markets for casual labour.

In 2010, NREGS work was an important source of income for many of the households in our sample. The NREGS is a federal Indian government program that is intended to provide up to 100 days of employment per year to rural households which seek manual work. In practice, the program is implemented differently in different states and districts, though work is most commonly provided during the hot or lean season, when there is little agricultural work. Reducing the need for short term migration in the lean season is a stated goal of the NREGS (Government of India, 2008).

More days of work were provided per person in Rajasthan than the other two states. In the summer of 2009, in Rajasthan, almost 50 per cent of adults surveyed did some work for NREGS; the comparable figures are 39 percent in Madhya Pradesh and 10 per cent in Gujarat. Very little NREGS work was done in the monsoon and winter seasons. Rather than being provided upon a labourer's demand, work was more commonly offered by village officials and provided to villagers. Wages from NREGS work are generally lower than wages for migrant labour; the daily average wage from NREGS work was 63 rupees, while the average daily wage from migrant work was 123 rupees. Papp (2012) finds a strong demand for NREGS work, even among migrants, despite this wage differential. Papp (2012) also presents evidence that the availability of NREGS work reduced migration in Rajasthan relative to Madhya Pradesh and Gujarat, where the scheme was less well implemented.

4. Summary indicators of children's welfare

This section presents descriptive statistics about the education and health of children in the study villages and quantifies their experiences with migration, either as migrants themselves, or as children left behind when parents migrate.

4.1 Education & health

Education is low among both parents and children. 87.4 per cent of children aged 0-13 had a mother who never attended school and 53.9 per cent had a father who had never been to school.⁵ Children in the sample will attain more education, on average, than their parents. In spite of this, attainment is quite low. Among children six years and older, 17.1 per cent had never been school, and a larger fraction were not studying at the time of the survey. Table 2 of web appendix A provides a state-wise comparison of the fraction of children aged 6-14 in our sample who were not studying at the time of the survey to the fraction of out-of-school children aged 6-14 reported by Pratham in the 2011 Annual State of Education (ASER) report. Since our survey asked about whether a child was studying, not whether she was enrolled, the two figures are not directly comparable. However, this table does suggest that the children in this sample are especially disadvantaged, even within their poor districts. In our sample, among those 13 year old children who had ever been to school, the average child had completed 5.9 years of schooling.^{6 7}

This survey did not collect data on the type (public or private) or quality of schools available to the children in the study region. During village visits associated with the data collection, we often found government primary schools closed on school days, and some schools looked as if they had not been opened for some time. This is consistent with trends reported by

Kremer et al. (2005), who report on a nationally representative survey of government primary schools. They find that 25 per cent of teachers are absent on unannounced visits. Absence rates are higher in schools that lack access via a paved road, as do many of the schools in our study. Given the across-village differences in quality of education, controlling for village fixed effects will be an important strategy in identifying the relationship between children's migration and education in section 6.

Basic indicators reveal that children's health is poor, and corroborate the findings of other researchers who stress the poverty and disadvantage faced by children in many tribal regions where short term migration is prevalent.⁸ Mothers who were in the village at the time of the survey reported on their children's health in the week before the survey.⁹ 34.6 per cent of children aged 0-3 suffered from diarrhea the week before the survey, and 35.6 per cent of children aged 0-3 in suffered from an illness other than diarrhea in the week prior to the survey.¹⁰

4.3 Children who migrate and those left behind

While several scholars have noted the presence of children at migrant work sites, few studies have quantified child migration in the sending population. Of the 1,980 children¹¹ about whom we collected data, 586, or 29.6 per cent, migrated with one or more adult family members in the year before the survey. Thus, while not as common as adult migration, child migration is a quantitatively important phenomenon in this population. Migration is most common for young children, with almost half of zero to two year old children migrating in the year before the survey. About 30 per cent of five year old children migrated, and just under 20 per cent of 10 year old children migrated.¹²

The factor that best explains whether or not a given child migrated in the past year is whether or not her mother migrated. Among children who migrated in the past year, 85 per cent

had a mother who also migrated. Put differently, among children whose mother migrated in the past year, about 45 per cent migrated, whereas among children whose mothers did not migrate, only 7 per cent of children migrated. Given the likely burden placed on relatives caring for young children and assuming that parents prefer to be with their children than not, it makes sense that mothers who are away from the village longer would be more likely to take their children with them. Figure 3 plots the probability that a 3 to 13 year old child migrated last year against number of days that her mother migrated for work in the past year. The kernel density of mother's days outside the village for work is plotted on the same figure.¹³ A simple OLS linear probability model that regresses the number of days a mother spent out of the village in the last year on whether or not her child migrated finds that the association depicted in figure 3 is statistically significant.¹⁴ The coefficient on the duration of mother's migration is significant and of similar magnitude after controlling for a variety of factors including the child's age, sex, village, parents' education, whether or not there is a grandparent in the household, household size, and indicators of household wealth.¹⁵

About half of children whose mothers migrated were left behind in the village in the year before the survey. Of the 1760 children for whom the relevant data exist, 26 per cent were left behind in the village in the year before the survey, meaning that their mother migrated, by they did not. Mothers' reports of childcare arrangements revealed that 65 per cent of children 0 to 13 who had been left in the village were left with their grandparents, but the remaining children were left with other relatives, including their fathers, aunts and uncles, older siblings, and the husband's other wife. 5 per cent of children whose mothers migrated stayed alone in the village.¹⁶

5. Child labour and activities of children who accompany migrants

Although the review of the literature suggests that child labour often goes hand in hand with child migration, our data present a more complex picture. Child labour is actually quite uncommon in this sample, and is performed only by children over the age of 10.

Our analysis of child labour is based on adults' reports of what children do when they migrate. When asked during piloting what their children do when they migrate, most adults reported that they do "nothing." Of course, it is not possible that most children were literally doing "nothing." This was offered, however, as an option in the survey because it was a phrase that parents who took children on migration trips used to refer to children who are playing or doing something else that they did not consider to be productive.¹⁷

There were 262 children aged 0 to 13 outside of their villages at the time when their households were surveyed. For children who were away from the village at the time of the survey because they had accompanied a family member on a migration trip, the head of household reported the child's main activity while away. For 67 per cent of children who were away at the time of the survey, the main activity reported was doing "nothing." For 20 per cent of children, "going to school" was listed as the main activity, and 16 per cent were "taking care of younger siblings." Only 2.3 per cent were listed as "working for pay" and only 2.7 per cent were listed as "working, but not for pay," possibly to facilitate the work their parents were doing.

Data were also collected about 513 child migrants from adults who were in the village at the time of the survey. Adults who had migrated with children were asked: "On the most recent trip that this child came with you, what did he/she do?" Multiple responses were allowed for this question.¹⁸ 20.5 per cent of children did domestic work (for their own households) on their last

trip; 5.7 per cent worked for pay; 3.3 per cent helped adults work, but were unpaid; 2.1 per cent went to school; and 79.5 per cent did nothing.¹⁹

Among this latter group of children, work (other than domestic work for their own household), was performed only by children age 10 and above. 20 per cent of 10 year olds, 22 per cent of 11 year olds, 50 per cent of 12 year olds and 58 per cent of 13 year olds were reported to have worked. Since the median adult trip lasted only 30 days, it is unlikely that these children were doing long term work, such as domestic work in another family's house, or work in tea stalls or restaurants. Instead, they likely worked alongside their parents in construction or agriculture.

Are these low figures for child labour plausible? We think they are for three reasons. First of all, relatively few older children migrate; only about 18 per cent of children 10 to 13 years old migrated in the year before the survey. If children were very productive at migrant worksites, more would likely have been brought along. Second, most parents work at construction sites for which they are paid a pre-determined daily wage, rather than a piece rate. Employers may not want to risk hiring an unproductive worker, or getting in trouble with the law, as most construction work is done in the open. It is common to see children at the work sites, but uncommon to see them working. Third, respondents in this sample report child marriage, a practice which, like child labour, might go unreported if respondents are afraid their answers will get them in trouble or bring about the disapproval of the surveyor. Respondents report marriages of girls under 18, which are, like some forms of child labour, illegal according to Indian law. 15 per cent of girls 14 to 17 are reported to be married, and 25 per cent of 16 and 17 year old girls are reported to be married.

That the fraction of children working in our data is low compared to what we might have expected from reading studies of Indian migrants in other contexts underscores the importance of Rogaly (1998)'s call for research to dispel "one size fits all" approaches to thinking about short term migration.²⁰

6. Educational consequences of migration for children

Are there, as the literature suggests, educational disadvantages associated with child migration? Figure 4 shows the grade in school completed by children of each age, separately for children who migrated in the past year and for those who did not. There is a clear divergence in the educational trends of non-migrating and migrating children, with the children who migrate getting less education for each year of age than the group that does not migrate.

6.1 Empirical strategy

Is the relationship between education and migration shown in figure 4 statistically significant? Is migration related only to grade completed, or is it also related to other aspects of education? Are these relationships spuriously driven by some third factor? In cross-sectional data such as these, it is always difficult to establish causal relationships. However, this section presents a variety of specifications and robustness checks, which, taken together, suggest that a causal effect is plausible.

Our main strategy empirical involves regressing three different educational outcomes on child migration status in the last year. Controls for possible omitted factors are used. Table 1 presents summary statistics for the dependent and independent variables used the regression analysis. It also summarises some of the other descriptive statistics that have been used to

contextualise the main results. Information about missing data is discussed in section B of the web appendix.

The regression equations use OLS estimation; the equations for the regressions in table 2 are of the following form:

$$\begin{aligned} outcome_{iv} = & \beta_0 + \beta_1 migrate_{iv} + \beta_2 female_{iv} + A_{iv}\theta + \beta_3 asset\ index_{iv} + \beta_4 household\ size_{iv} + \\ & \beta_5 irrigation_{iv} + \beta_6 salary_{iv} + \beta_7 grade\ mom\ completed_{iv} + \\ & \beta_8 grade\ dad\ completed_{iv} + \beta_9 grade\ mom\ completed\ imputed_{iv} + \\ & \beta_{10} grade\ dad\ completed\ imputed_{iv} + \alpha_v + \varepsilon_{iv}. \end{aligned}$$

$outcome_{iv}$ is one of the following three educational outcomes for child i in village v : whether the child has ever been to school, whether the child went to school the day of the survey,²¹ and the grade the child had completed. $migrate_{iv}$ is an indicator for whether the child migrated in the year before the survey; $female_{iv}$ is an indicator that is one if the child is female; and A_{iv} is a series of dummy variables for the children's ages. $asset\ index_{iv}$ is a measure of the child's household's asset wealth constructed by taking the first principal component of indicators for the ownership of 23 assets; $household\ size_{iv}$ is the number of members in the household; $irrigation_{iv}$ an indicator that is one if the household has irrigation; $salary_{iv}$ is an indicator that is one if someone in the household has salaried job. $grade\ mom\ completed_{iv}$ and $grade\ dad\ completed_{iv}$ indicate the grade in school completed by the child's mother and father, respectively²²; $grade\ mom\ completed\ imputed_{iv}$ is an indicator for whether the value for mother's grade completed was imputed and $grade\ dad\ completed\ imputed_{iv}$ is an indicator for whether the value of father's grade completed was imputed. α_v is a village fixed effect. Standard errors were clustered at the village level.

6.2 Results using the full sample

Using the estimation strategy described above, and looking only at children aged 3 to 13 years, panel A of table 2 regresses all three education outcomes on child migration in the last year for the full sample of children. The results show that children who migrate are disadvantaged for each of these educational outcomes. They are 7 percentage points less likely to have ever been to school, 9 percentage points less likely to have been to school the day before the survey, and have completed more than a third of a year of education less, on average, than children their age who have not migrated. However, this deficit is averaged over children aged 3 to 13.²³ As shown in figure 4, the deficit is greater for older children than for younger children. Thirteen year old children who migrated last year had completed about two years less schooling, on average, than those who did not migrate.

Robustness checks of these main results are presented in web appendix C and web appendix D. Web appendix C uses propensity score matching to show that for each of the three educational outcomes presented in panel A of table 2, five nearest neighbor matching, as well as kernel density matching, yield statistically significant differences between the educational outcomes of migrant and non-migrant children. Web appendix D describes the procedure to assess selection bias recommended by Altonji et al (2005). This procedure was implemented for the regression reported in column 3 of panel A of table 2 of grade completed on migration status. We find that selection on unobservables would have to be more than half the size of selection on observables in order for the true effect of migration on education to be zero. This is unlikely because among the observed variables is a full set of age dummies, a key predictor of migration, and measures of household wealth, which predict mothers' migration.²⁴

As an additional robustness check, we did a placebo test to assess whether wealth is properly controlled for in the main regressions. When we regress indicators for having diarrhea or another illness in the week before the survey on whether the child migrated in the year before the survey, we find no statistically significant relationship between morbidity and migration.²⁵ The fact that migration does not predict morbidity, which prior research has shown to be predicted by wealth (Deaton et al., 2004 and Nandy et al., 2005), suggests that migration is not simply acting as a proxy for wealth.

6.3 Children whose mothers migrated

This analysis has compared children who do migrate with children who do not. Section 4 found, however, that there is a clearly defined group who are “at risk” for migration: those whose mother migrated. The effect found in panel A may simply reflect differences between the group of children at risk of migration and those who are not. Panel B of table 2 explores this possibility by replicating the regressions in panel A using only children whose mothers migrated in the past year.

Patterns similar to the ones found in panel A emerge: among the group of children whose mothers migrated in the last year, the children who migrated, rather than staying behind in the village, were less likely to have ever gone to school or to have gone to school the day before the survey. Additionally, the gap in grade completed between children who migrated and those who stayed behind is statistically significant.

6.4 Mother fixed effects

Table 3 shows the results of regressing educational outcomes on child migration in the last year, using mother fixed effects. This empirical strategy estimates a separate intercept for

each mother, thereby controlling for characteristics such as mother's education, father's education, family wealth and income, etc. that are common across children belonging to the same mother. This specification isolates differences in the educational outcomes of children who migrated from those of their siblings who did not. A regression with mother fixed effects might be informative if we believe that there are family level omitted variables, even among the group of families in which the women migrate, that lead families to both take children on migration trips and not send them to school.

In table 3, there are no statistically significant relationships between whether the child had ever been to school, or whether she went to school today and her migration status. This suggests that when children are in the village, such as during the monsoon season when the interviews were conducted, children who migrate are as likely to attend school as their siblings who do not. There is a statistically significant relationship, however, between child migration and grade completed, and the magnitude of the coefficient is similar to the other estimates. This finding suggests that time of way from the village on migration trips may be contributing to the education gap between children who migrated and those who did not.

Considering how few families brought only some of their 3 to 13 year old children on migration trips and not others, the regressions with mother fixed effects should be interpreted only as a robustness check. In addition, it could be that some determinants of mother's migration are, in fact, important sources of variation in children's migration, in which case, using mother fixed effects would produce a misleading estimate of the effect of child migration on education.

6.5 Children who have ever been to school

Could the effect children's migration on grade completed be driven entirely by children who have never attended school? If so, it would rule out certain causal mechanisms for migrant

children's educational disadvantage, such as those having to do with falling behind in school due to lack of sustained attendance. It would support other kinds of explanations, such as those having to do with what kind of families migrant children come from. In order to determine whether the effect of children's migration on grade completed is driven entirely by children who never attended school, we restrict the regression in column 4 of panel A of table 2 only to children over five who had ever been to school. Even among children over five who had ever been to school, we find a statistically significant relationship between migration in the last year and grade completed. Indeed, conditional on every having gone to school, 13 year old children who migrated last year are 1.3 years further behind in school than those who did not migrate last year. Therefore, it is not the case that the relationship between child migration and grade completed is driven entirely by children who never attended school.

The results in tables 2 and 3, and the finding that the educational disadvantage of migrants is not isolated among children who never started school, seem to suggest that the mechanism behind the relationship may have something to do with the migration process, rather than with the "type of families" that send women migrants.

7. Discussion

This paper provides a quantitative description of the lives of the children of short term labour migrants living in a very poor, predominately tribal region of rural northwest India. Although the population of this region has different social, economic and educational characteristics from the states and districts of which is it a part, qualitative descriptions suggest that it may be more like predominately tribal regions in other parts of the country which are also highly dependent on labour migration.

This paper finds that migration is common among the children in this region, and associated with the duration of mother's migration. Children who migrate engage in less paid and unpaid work than has been suggested by previous studies from other places. Compared to children who did not migrate, child migrants have worse educational outcomes.

The negative relationship between child migration and education is robust to a variety of specifications and controls. If parents do not know about this disadvantage, or at least do not consider it when deciding whether or not to take their children when they migrate, then it constitutes a negative externality of migration. Section 7.1 explores this possible negative externality in further detail. Section 7.2 suggests that continued and improved implementation of the National Rural Employment Guarantee Scheme (NREGS) might improve the education levels of children.

7.1 Children's migration and education

The analysis in section 6 suggests a causal relationship leading from children's migration to poor educational outcomes, for which there are several plausible mechanisms. Migration may lead students to forget what they have learned in school, or prevent them from developing relationships with teachers and classmates that help them progress through school. It may simply break the habit of going to school.

This analysis does not fully rule out the possibility of reverse causality; that is, that some children migrate because they are doing poorly in school. It is possible that parents take children who perform poorly in school on migration trips, but leave their more academically inclined children in the village. If children can decide whether or not they migrate, it may be the ones who do not like school who chose to accompany their parents on migration.

Even without certainty about the direction of causality, it may make sense to implement policies that encourage children to be left behind in villages. If causality does run from migration to education then children left behind will get more schooling. Even if reverse causality plays a role, poor students who stay in the village would at least be able to attend school should their interest or performance improve; the same cannot be said for children who are away from the village. A sound recommendation depends on further research, which should explore relative conditions for children in villages and at migration destinations,²⁶ and the quality of care received by children left behind.

7.2 Women's migration, NREGS work and children's education

Section 4.3 showed that the duration of mother's migration is a strong predictor of children's migration. Thus, reducing mothers' migration could help bridge the gap in the education of migrant and non-migrant children while leaving them in the care of parents. But, is it feasible or desirable to reduce mothers' migration? In the past, programs by international development organizations have tried to curb migration from the area under study through projects promoting agriculture, without much success (Mosse et al., 2002). As Mosse et al. (2002) point out, wage income from migration is an essential part of the livelihoods of many families.

The provision of government-sponsored work under the NREGS, particularly during the summer season, may be able to help provide the wages families need, and allow mothers to remain in the villages with their children. Papp (2012) uses the same data as are used here to look at the effects of NREGS work on migration. He finds a high demand for NREGS work among migrants despite a large gap between the migration wage and the NREGS wage. Additionally, adults living in Rajasthan, a state that provided more NREGS work than Gujarat

and Madhya Pradesh, spent less time outside the village doing migrant work than adults living in Madhya Pradesh and Gujarat, states that provided fewer days of NREGS work.

Women in our sample are more likely than men to have participated in NREGS work in the year before the survey. Such a pattern is common; Khera and Nayak (2009) document the participation of women in NREGS work across north India, and describe the benefits that accrue to women as a result. Despite these benefits, the amount of work supplied for villagers falls far short of the number of days demanded in our study region; the mean adult aged 14 to 69 worked an average of 11 days on NREGS projects in the summer before the survey, but would have liked to work 44 days.

These stylized facts suggest that expanding access to NREGS work might be a useful way to convince parents, and especially mothers, to migrate for shorter periods or not at all. Less migration would diminish the need for non-parental child care, and, if mother's migration leads to child migration, and if the relationship from migration to education is causal, it may improve education levels among children. Future research should focus on how to improve NREGS implementation such that the supply of work comes closer to meeting the demand, and particularly the demand of women in high migration areas.

¹ Papp (2012) explains the survey's findings about NREGS. The sample structure was designed to facilitate a comparison of villages across state borders for the purpose of identifying an effect of differential NREGS implementation on seasonal migration. In particular, "[t]he specific villages surveyed were selected based on pairwise matching using proximity to each other, land composition (irrigated land, cultivable non-irrigated land, culturable waste [land available for cultivation but not cultivated in the last five years]), population density, and caste composition. Data for all of these characteristics was taken from the 2001 census" (Papp, 2012, p. 98). Papp (2012) further states that "[a] detailed description of the matching algorithm used is provided in the supplemental appendix available on request from the author" (98).

² The fraction of households belonging to ST groups may actually be higher than this; many households said they did not know to what category they belonged.

³ Among women over 45 years old whose child died, the mean number of children who died is two.

⁴ In contrast, 29 per cent spent time outside the village during winter 2009-2010, and 10 per cent spent time outside the village during the monsoon of 2009.

⁵ For six per cent of children, information on mother's education was missing. These children were not used to compute the statistic about the fraction of children whose mother never attended school. Father's information was missing for 12 per cent of children, and the same strategy was used to compute the fraction of children whose fathers never attended school.

⁶ Students who start school on time and progress normally should be in seventh grade by the time they are 13.

⁷ Controlling for age, and only looking at children aged 6 to 13, an OLS linear probability model finds that girls are 9.4 percentage points less likely to have ever been to school than boys. This is a significant difference, but it is much less than the difference in educational attainment between their mothers and their fathers.

⁸ Unfortunately, these data do not permit an exploration of the relationship between children's migration and their health. However, this is an important area of future research; our data show that about half of infants in the sample migrated with their mothers in the year before the survey, and much recent scholarship (see Currie and Almond (2011)) suggests that investment in children *in utero* and at very early ages can have important effects for their well-being later in life. If migration leads to worse health or less investment in pregnant women and young children, it would almost certainly have life-long implications.

⁹ Children whose mothers were away from the village at the time of the study, or those whose mother refused to answer an adult survey are not included. Data about 33 per cent of children aged zero to three are missing for these reasons.

¹⁰ The figure for diarrhea is high in comparison to the relevant state-wide estimates. The 2007-8 District Level Health Survey (DLHS) reports diarrhea rates for children 0 to 3 using a reference period of 2 weeks before the survey. In the Rajasthan DLHS, 8.4 per cent of children aged 0-3 were reported to have had diarrhea in the two weeks before the survey. The figures for Gujarat and Madhya Pradesh were 11.8 per cent and 15.0 per cent, respectively. Note that the figures in our survey and the DLHS are not directly comparable due to our use of a shorter reporting period.

¹¹ In this survey, children were defined as people under 14 years of age.

¹² We do not have information on children who may have migrated on their own. Our data on children's migration comes from asking adults in the household which children accompanied them on migration trips in the past year.

¹³ The mean number of days that a child's mother spent away was 105.

¹⁴ Future research, and perhaps more detailed data, will be needed to explore the mechanisms through which the duration of mother's migration is related to child migration. It might be useful, for instance, to focus on families in which some children migrate and not others. In our data, there were 233 women who were both mothers of more than one child aged 3 to 13 and who migrated in the last year. For only 36 per cent of these women did some of their children migrate and not others.

¹⁵ A 30 day increase in the duration of mother's migration is associated with a 4.3 percentage point increase in the probability that her child migrated in the year before the survey. The t-statistic for this coefficient, calculated using standard errors clustered at the village level, is 3.46.

¹⁶ Unfortunately, the data do not allow us to explore in detail the welfare consequences of these child care arrangements for the children left behind. Joint families are common in the study villages; therefore, children left behind probably stay in the same homes, with adults they already know well when their parents migrate. However, the health of grandparent care givers in this sample is probably quite poor, which could affect the quality of care they give to children. Deaton et al. (2004) study the health of a similar, predominately tribal, population in rural Udaipur district, and find that the elderly, in particular, suffer from poor health. There is evidence from South East Asia that children left behind by migrant parents do not suffer psychological consequences of care by relatives (Graham and Jordan, 2011), although another article using the same data found that children left behind by parents were less happy, and less likely to seek support from care givers than children in their care of their parents (Graham et al., 2012). Park et al. (2010) describe the many dimensions of child welfare affected by parents' internal migration in China.

¹⁷ When asking about what children do when they migrate, surveyors were provided with a pre-coded set of options. These options were: cooking/cleaning, taking care of younger children, working for pay, working not for pay, school, nothing, other. This list was not read to respondents.

¹⁸ If two or more adults reported on the activities of the same child and their accounts disagreed, the maximum of the reported activities was used. For example, if one parent says that the child did domestic work, and the other parent says only that the child did nothing, then the child would be coded as having done both activities.

¹⁹ There are two plausible reasons that the fraction of migrant children going to school would be higher in the group that was away from the village at the time of the survey. The first is that the head of household may be less informed about what the child does on a migration trip than those adults who accompany the child. The second is that adults who were away during the time of the survey generally migrated for a higher fraction of the year than those migrant adults who were in the village at the time of survey. We would expect that the children accompanying longer duration migrants would be longer duration migrants themselves. Thus, they may be better able to attend school at the place to which they migrate.

²⁰ It is important to note, however, that this finding only applies to young children from the ages of 0 to 13 years. A study that defines children to be under 18, or even 16, will find higher rates of child labour. Additionally, these data cannot shed light on whether or not children work for pay when they are living in the village. For instance, Galab et al. (2008) find that 30 per cent of ST 12 year olds in the "Young Lives" sample in Andhra Pradesh worked for pay in 2006-2007.

²¹ If the school was closed for a "legitimate" reason the day of the survey (i.e. it was Sunday or a national holiday), then we asked whether the child attended school the day before.

²² In the regressions in table 2, grade completed by the mother and father are entered as linear terms. In all of the regressions that use these controls, the results are very similar if dummy variables for the grade completed are used.

²³ If instead of using grade completed as the dependent variable, we use the log of grade completed (adding one to each grade because many children had completed zero grades), the coefficient on child migration is statistically significant coefficient and of similar magnitude.

²⁴ We thank an anonymous reviewer for suggesting these robustness checks.

²⁵ Previous research has suggested that the poor are less likely to report morbidity than the rich. However, Das et al. (2004) present the results of a survey in Delhi in which poor and rich respondents are asked about their morbidity. When the reference period is a month, rich people report more symptoms than poor people. When the reference period is a week, the poor report more symptoms than the rich. Given that the reporting period in our survey was only a week, it is unlikely that differential reporting of morbidity is a concern for these placebo tests.

²⁶ Even compared to living in arid, isolated villages, migration can be an uncomfortable experience. 85 per cent of respondents to the adult survey had no formal shelter on their last migration trip, and 58 per cent cooked and slept in the open in public spaces because they lacked even an unfinished building or a private construction site in which to stay.

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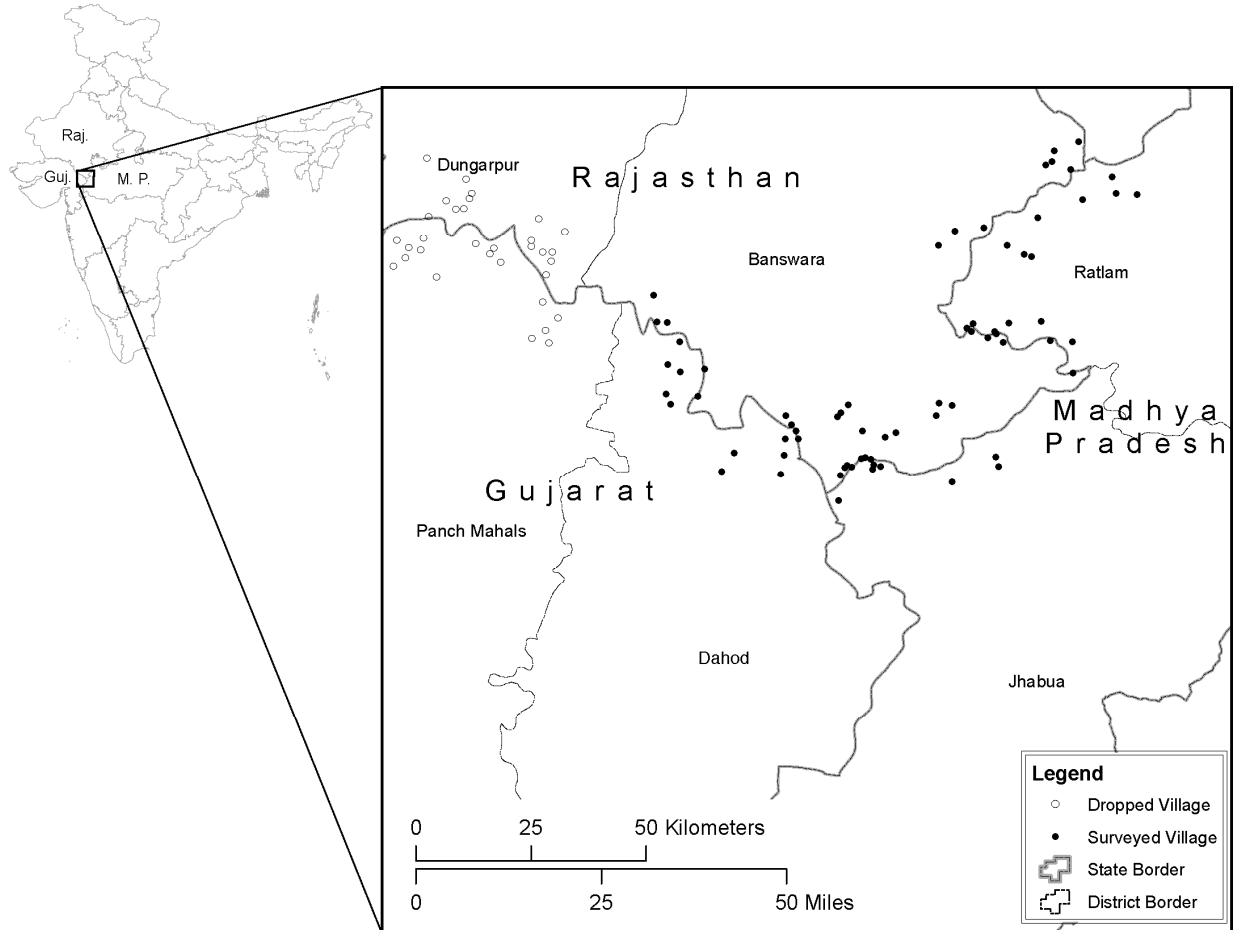
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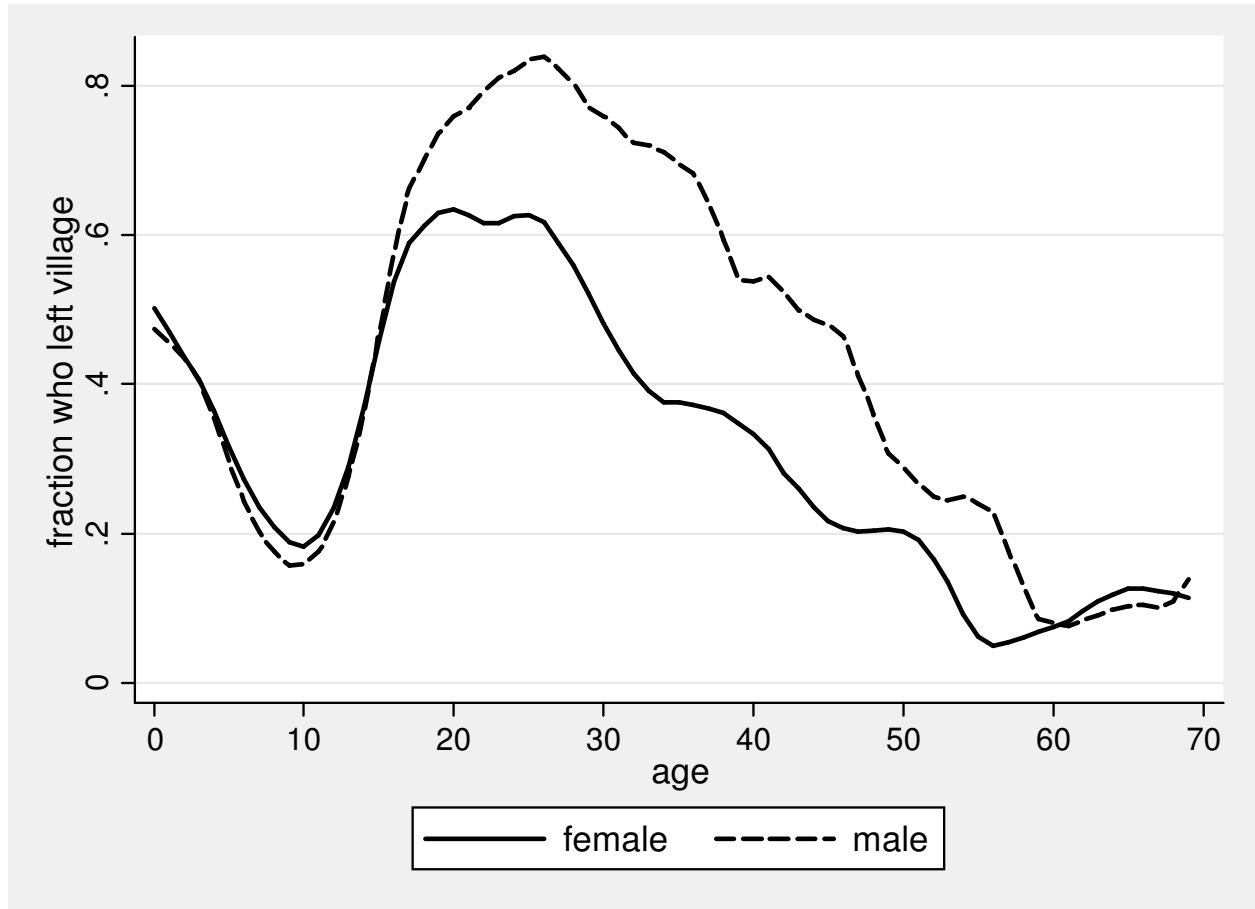
Figures

Figure 1. Map of survey villages



Source: Papp (2012) copyright John Papp

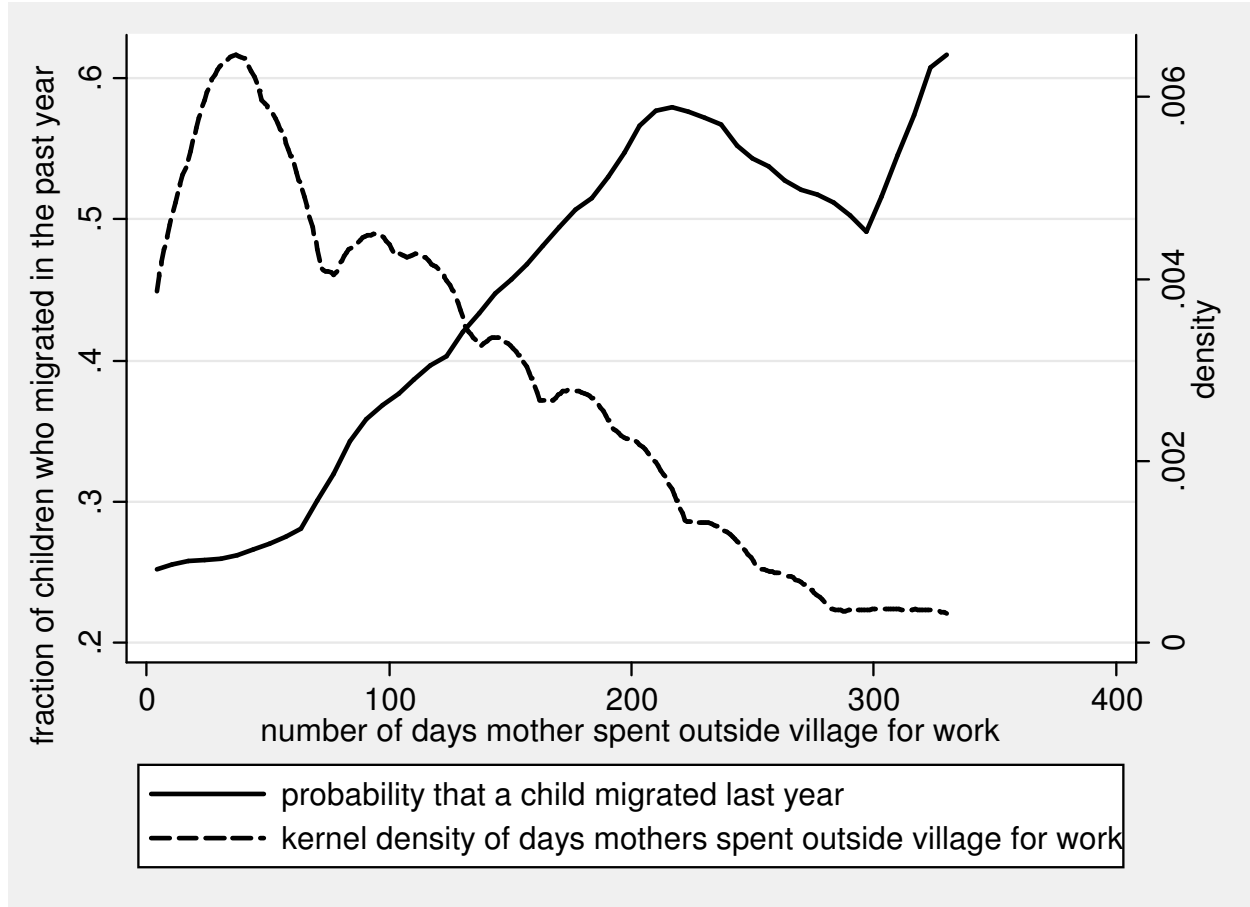
Figure 2. Fraction of people who migrated in the year before the survey



Source: Coffey et al. (2011)

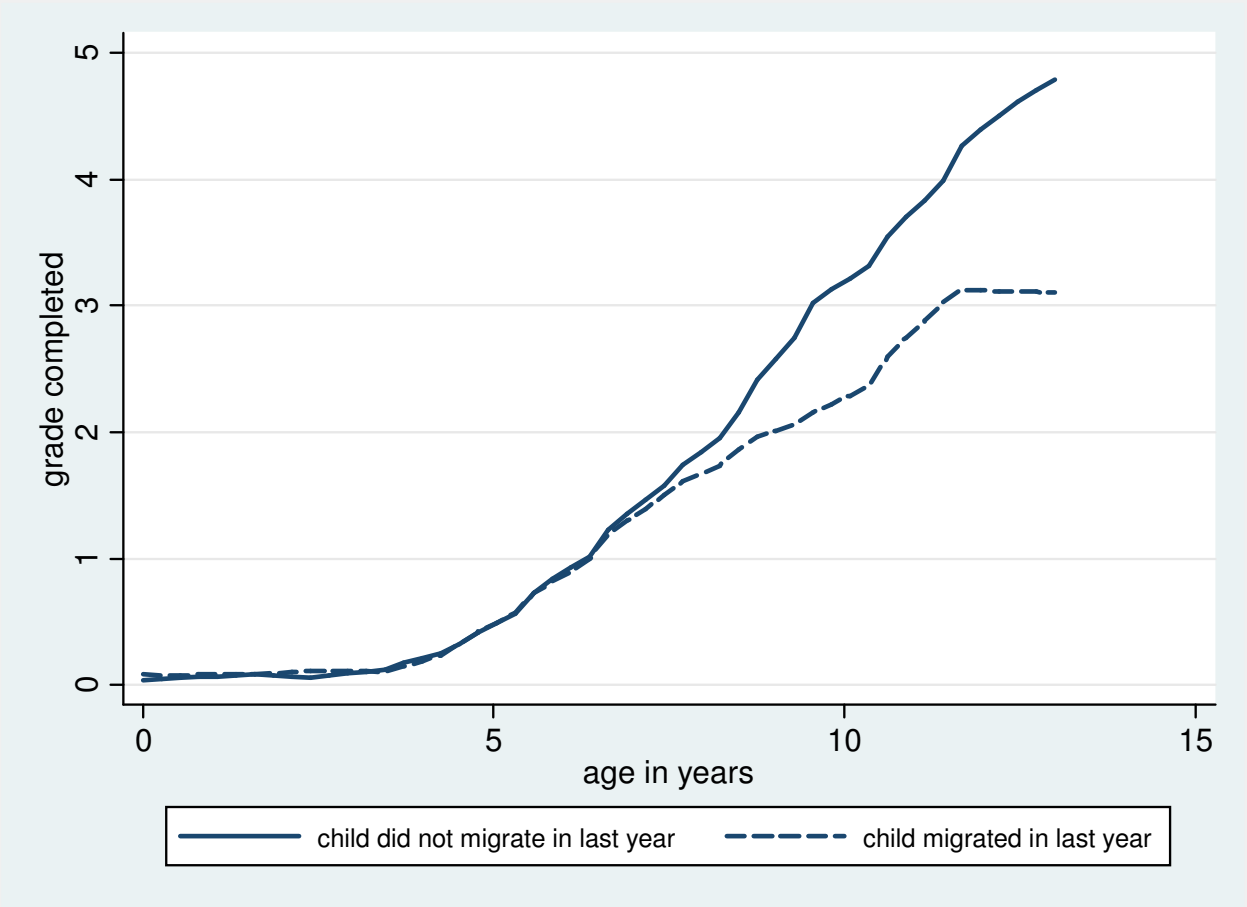
Note: Each individual is an observation. This graph shows the fraction of males and females at each age who left the village for work, or to accompany a worker, in the year before the survey.

Figure 3. Child migration and duration of mother's migrant work



Note: The units of observation for this graph are children between the ages of 3 and 13. The solid line shows the fraction of children who migrated by duration of maternal migration. The dashed line, for which the unit of observation is also children, shows the density of mother's days away for work in the year before the survey.

Figure 4. Grade completed among children age 0 to 13



Tables

Table 1. Summary statistics

	Mean	Standard deviation	n
Dependent variables, using children aged 3 - 13 as the unit of observation			
ever attended school	0.73	0.45	1526
went to school the day of the survey	0.52	0.50	1227
grade completed	1.95	2.31	1536
had diarrhea in the week before the survey	0.14	0.35	1234
had another illness in the week before the survey	0.22	0.42	1235
Independent variables, using children aged 3 - 13 as the unit of observation			
migrated in the year before the survey	0.24	0.43	1591
female	0.50	0.50	1591
age	7.70	3.18	1591
household asset index score	-0.02	1.71	1587
household size	9.09	4.16	1591
household has irrigation	0.60	0.49	1591
household has a member with a salaried job	0.06	0.24	1587
grade completed by father	2.95	3.92	1750
grade completed by mother	0.64	2.06	1486
Other variables of interest, using children aged 0 - 2			
migrated in the year before the survey	0.30	0.46	1980
was left behind by mother in the year before the survey	0.26	0.44	1760

Table 2. Child migration and education outcomes

	(1)	(2)	(3)
	Dependent variables:		
Independent variables:	ever school	school today	grade completed
Panel A: full sample of children aged 3 - 13			
migrated in last year	-0.0722*	-0.0892*	-0.345*
	(0.0360)	(0.0384)	(0.134)
child is female	-0.0739***	-0.0347	-0.265**
	(0.0204)	(0.0250)	(0.0907)
controls	✓	✓	✓
age and village FEs	✓	✓	✓
constant	0.832***	0.593***	2.402***
	(0.0594)	(0.0747)	(0.249)
R^2	0.319	0.299	0.544
n	1522	1223	1532
Panel B: children aged 3 - 13 whose mother migrated in the last year			
migrated in the last year	-0.0821+	-0.0972+	-0.568***
	(0.0479)	(0.0563)	(0.163)
child is female	-0.0388	-0.0251	-0.119
	(0.0332)	(0.0521)	(0.139)
controls	✓	✓	✓
age and village FEs	✓	✓	✓
constant	0.737***	0.633***	2.259***
	(0.0978)	(0.169)	(0.425)
R^2	0.389	0.368	0.610
n	613	523	619

Note: Columns 1 and 2 are linear probability OLS. Column 3 is OLS. Standard errors are clustered at the village level and given in parentheses. Two sided p-values: +0.10, *0.05, **0.01, ***0.001. Controls include the child's household's asset index score, household size, whether the household has irrigation, whether anyone in the household has a salary job, the grade completed by her father, and the grade completed by her mother, and dummy variables for whether grade completed was imputed. Where grade completed for father or mother was missing, the mean was imputed.

Table 3. Child migration and education outcomes: Mother fixed effects

Independent variables:	(1)	(2)	(3)
	Dependent variables:		
	ever school	school today	grade completed
migrated in last year	-0.0155	-0.0566	-0.467+
	-0.0693	-0.0814	-0.278
child is female	-0.0683*	-0.0319	-0.239+
	-0.0327	-0.0344	-0.137
age and mother FEs	✓	✓	✓
R^2	0.692	0.679	0.786
n (children)	1441	1227	1451
n (mothers)	633	506	635

Note: Children aged 3 to 13 are included in the regressions. Mother fixed effects are used to identify the effect of child migration on education by looking at the difference in schooling outcomes between children of the same mother, one or more of whom migrated, and one or more of whom did not. If all, or none, of the children of a given mother migrated, they will not be included in the estimation, except insofar as their information contributes to controls for within-mother variation in children. 85 children are maternal orphans and are dropped from the regressions. Because the dependent variables in columns 1 and 3 were reported by household heads, and the dependent variable in column 2 was reported by mothers, and because there was more non-response in the adult survey than the household survey, there are fewer numbers of observations in the regression in column 2.

Columns 1 and 2 are linear probability OLS. Column 3 is OLS. Standard errors are clustered at the village level and given in parentheses. Two sided p-values: +0.10, *0.05, **0.01, ***0.001

Supplementary Appendix

Children's Welfare and Short Term Migration from Rural India

Appendix A: Comparison of the survey population to the rural population of Gujarat, Rajasthan & Madhya Pradesh

Appendix table 1 compares household and adult characteristics from our survey to the rural populations of Rajasthan, Madhya Pradesh and Gujarat. The latter figures are taken from the National Sample Survey 64th round “Socioeconomic Survey” and “Employment and Unemployment and Migration Particulars” survey. This survey is representative at the national and state levels.

Households and individuals in our survey are of considerably lower socioeconomic status than other households in these three states—they have more people per household, are less likely to have electricity, and are more likely to be from a scheduled tribe. They are more likely to be illiterate, and more likely to have migrated in the year before the survey. These differences suggest that the conclusions from our study pertain to one of the poorest and most marginalized populations in these three states.

Appendix table 1.

	own survey (means)			rural sample of NSS*		
	Rajasthan	MP	Gujarat	Rajasthan	MP	Gujarat
household characteristics						
household size	7.0	7.3	7.6	5.1	4.9	4.6
number of children 0-13	3.1	3.4	3.1	1.7	1.6	1.3
dirt floor	0.88	0.96	0.88	-	-	-
lacks electricity**	0.77	0.70	0.46	0.35	0.20	0.10
owns TV	0.01	0.02	0.03	-	-	-
scheduled tribe***	0.67	0.55	0.68	0.15	0.21	0.15
<i>n</i>	353	252	100	5494	6908	5157
adult characteristics****						
age	35.3	35.5	33.8	33.3	33.5	34.4
female	0.53	0.54	0.50	0.50	0.48	0.48
marital status	0.71	0.73	0.71	0.73	0.72	0.72
illiterate	0.67	0.76	0.50	0.54	0.40	0.37
migrated for 30 - 180 days (NSS) /2 - 330 days (own) in last year	0.49	0.52	0.56	0.02	0.04	0.05
<i>n</i>	1501	1098	489	12096	14583	8374

Notes: *These weighted means are taken from the Nation Rural Sample Survey, 64th round, 2007-2008. **Our survey asks households whether they have any electricity; NSS 64th round asks whether it is the main source of energy for lighting. ***A higher fraction of households had missing data for this variable in Madhya Pradesh than other states. It is likely that 0.55 is an underestimate of the fraction of scheduled tribe households in MP. ****Adults are defined as individuals aged 14-69. Some data are missing for some adults in our survey.

Appendix table 2 compares the percent of out-of-school children aged 6-14 presented in Pratham’s 2011 Annual Status of Education Report (ASER) to the fraction of children of those ages who are not studying in our own survey. Because we did not specifically ask about enrollment, but rather asked household heads a more general question designed to gauge whether the children were studying at the time of the survey, we cannot compare the figures directly. It is possible that our figures overestimate non-enrollment. However, because of the relative disadvantage, it is probably the case that the fraction of out of school children in the survey area is indeed higher than in these rural districts as a whole.

Appendix table 2.

State	District	ASER 2011: percent out of school	own survey: percent not studying
Rajasthan	Banswara	8.8	23.6
	Dungarpur	3.7	
Madhya Pradesh	Ratlam	6.2	30.0
	Jabua	9.5	
Gujarat	Dahod	4.1	20.4

Appendix B: Missing data in tables 2 & 3

The survey analyzed in this article collected data on 1,980 children between 0 and 13, and 1591 children between the ages of 3 and 13. Some information is missing for the dependent variables used in tables 2 and 3. Information about the dependent variables “ever school” and “grade completed” was asked of household heads in the household survey, and is missing for 65 and 55 children respectively. The dependent variables in columns 2, 3, 4, and 6 of tables 2 and 3 use information about 1,261 children whose mothers responded to the adult survey. We did not ask household heads the more specific questions about children's education and health if their mothers were unavailable for the adult survey, because we felt that the household heads were unlikely to be able to give accurate answers. 34 observations are missing from column 2 because information on the dependent variable is missing. The corresponding numbers for columns 3, 4, and 5 are 31, 27, and 26.

There is also missing data for some of the independent variables. Information about the grades completed by parents is missing for 118 mothers and 230 fathers; the mean values were imputed. The results in tables 2 and 3 of the main paper are robust to dropping observations with missing values for parent’s education. The asset index score is also missing for 5 observations, which are dropped from the regression in tables 2 and 3.

Appendix C: Propensity score matching

This appendix reports the results of a propensity score matching exercise used to check the robustness of the results presented in columns 1-3 of panel A of table 2.

We estimated a child’s propensity to migrate in the year before the survey using a probit model in which the following variables are predictors of migration: age dummies, village dummies, a dummy for female children, a measure of the child’s household’s asset wealth constructed by taking the first principal component of indicators for the ownership of 23 assets, the number of people in his/her household, an indicator for whether the household has irrigation, an indicator for whether anyone in the household holds a salaried job, the grades completed by the mother and the father of the child and dummy variables for whether grade completed was imputed.

Then, a propensity score was estimated for each child. The median propensity score among migrant children was 0.379 and the median propensity to migrate among non-migrant children was 0.174. Two matching strategies were used: five nearest neighbor matching, with replacement, and kernel matching, with a bandwidth of 0.01. For each outcome, there was common support for between 98% and 100% of the observations. The average treatment on the treated (ATT) effects that were estimated from these procedures are reported in appendix table 2.

[Appendix table 2.](#)

Outcome	Type of matching	Difference	Standard error	n
ever school	5 nearest neighbor	-0.104	0.037	1142
	kernel matching, bandwidth 0.01	-0.110	0.035	1142
school today	5 nearest neighbor	-0.092	0.043	1414
	kernel matching, bandwidth 0.01	-0.117	0.042	1414
grade completed	5 nearest neighbor	-0.381	0.171	1424
	kernel matching, bandwidth 0.01	-0.400	0.166	1424

The differences shown in appendix table 2 are all statistically significant, and their magnitude is somewhat larger than the results of the OLS regressions shown in columns 1-3 of panel A of table 2 of the main paper.

Appendix D: Assessing selection on unobservables

This appendix reports the results of implementing a procedure for assessing selectivity bias based on measuring the ratio of selection on observables to selection on unobservables that would be present if the whole effect of migration were due to selection bias. This procedure was recommended by Altonji, Elder & Taber, 2005.

We want to calculate how large the selection on unobservables relative to selection on observables would have to be in order for the entire effect of education on migration to be due to selection bias. Here we use different notation than in our own paper so as to follow the notation of Altonji, Elder & Taber, 2005 (from pages 175-6). We implement the procedure only for the regression reported in column 3 of panel A of table 2. The idea is to assess the plausibility of a causal effect of $\hat{\alpha}$, the coefficient on $migrate_{iv}$ in the following regression (used to estimate the results in column 3 of panel A of table 2).

$$\begin{aligned} \text{gradecompleted}_{iv} = & \alpha \text{migrate}_{iv} + \gamma_1 \text{female}_{iv} + A_{iv}\Gamma_2 + \gamma_3 \text{assetindex}_{iv} + \\ & \gamma_4 \text{householdsize}_{iv} + \gamma_5 \text{irrigation}_{iv} + \gamma_6 \text{salary}_{iv} + \\ & \gamma_7 \text{grademomcompleted}_{iv} + \gamma_8 \text{gradedadcompleted}_{iv} + \\ & \gamma_9 \text{grademomcompletedimputed}_{iv} + \\ & \gamma_{10} \text{gradedadcompletedimputed}_{iv} + \gamma_v + \varepsilon_{iv}. \end{aligned}$$

Recall, this regression is restricted to children aged 3 to 13. $\text{gradecompleted}_{iv}$ is the grade completed by child i in village v ; migrate_{iv} is whether or not the child accompanied an adult migrant in the year before the survey; female_{iv} is a dummy equal to one if the child is female; A_{iv} is a vector of age dummies; assetindex_{iv} is a measure of the child's household's asset wealth constructed by taking the first principal component of indicators for the ownership of 23 assets; $\text{householdsize}_{iv}$ is the number of members in the household; irrigation_{iv} an indicator that is one if the household has irrigation; salary_{iv} is an indicator that is one if someone in the household has salaried job. $\text{grademomcompleted}_{iv}$ and $\text{gradedadcompleted}_{iv}$ indicate the grade in school completed by the child's mother and father, respectively. $\text{grademomcompletedimputed}_{iv}$ and $\text{gradedadcompletedimputed}_{iv}$ are indicators for whether the parent's grade completed was imputed using mean imputation. γ_v are village fixed effects.

We can assess the selection into migration based on observables using the following equation:

$$\begin{aligned} \text{migrate}_{iv} = & \beta_0 + \beta_1 \text{female}_{iv} + A_{iv}B_2 + \beta_3 \text{assetindex}_{iv} + \beta_4 \text{householdsize}_{iv} + \\ & \beta_5 \text{irrigation}_{iv} + \beta_6 \text{salary}_{iv} + \beta_7 \text{grademomcompleted}_{iv} + \\ & \beta_8 \text{gradedadcompleted}_{iv} + \beta_9 \text{grademomcompletedimputed}_{iv} + \\ & \beta_{10} \text{gradedadcompletedimputed}_{iv} + \beta_v + \widetilde{\text{migrate}}_{iv}. \end{aligned}$$

Here, $\widetilde{\text{migrate}}_{iv}$ is an error term.

By the standard omitted variable bias formula and the two equations above:

$$\text{plim } \hat{\alpha} \simeq \alpha + \frac{\text{Var}(\text{migrate}_{iv})}{\text{Var}(\widetilde{\text{migrate}}_{iv})} [E(\varepsilon | \text{migrate} = 1) - E(\varepsilon | \text{migrate} = 0)].$$

If the true α were zero, such that the only reason for a negative effect is because of selection on unobservables, then $\frac{\text{Var}(\text{migrate}_{iv})}{\text{Var}(\widetilde{\text{migrate}}_{iv})} [E(\varepsilon | \text{migrate} = 1) - E(\varepsilon | \text{migrate} = 0)]$ would be equal to $\hat{\alpha}$.

We can compute $[E(\varepsilon | \text{migrate} = 1) - E(\varepsilon | \text{migrate} = 0)]$ because we have estimates for $\hat{\alpha}$, as well as for $\frac{\text{Var}(\text{migrate}_{iv})}{\text{Var}(\widetilde{\text{migrate}}_{iv})}$:

$$[E(\varepsilon | \text{migrate} = 1) - E(\varepsilon | \text{migrate} = 0)] = \frac{-0.3448996}{0.18228798/0.14651349} = -0.27721216$$

We can standardize the selection on unobservables by dividing by the variance of ε :

$$\frac{-0.27721216}{2.4376157} = -0.11372267$$

Similarly can standardize selection on observables by its variance as follows:

$$\frac{[E(X'\gamma | migrate = 1) - E(X'\gamma | migrate = 0)]}{Var(X'\gamma)}$$

The corresponding estimates in my data are:

$$\frac{-0.6688626}{2.8874301} = -0.23164633$$

Thus, the standardized selection on the unobservables would have to be as much as half the selection on observables ($\frac{-0.11372267}{-0.23164633} \simeq 0.49$) in order for the true effect of α to be zero.

Because the observables include a full set of age dummies (which figure 3 of the text shows is a strong predictor of migration) and include a set of household wealth variables (which importantly explain maternal migration) it seems unlikely that unobservables could be this quantitatively important. There is, however, no standard error for this computation.