FINAL REPORT

The Impacts of Adult Migration on Children's Well-being
The Case of Cambodia

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Acronyms and Abbreviations

BMI	Body mass index
CSES	Cambodia Socio-Economic Survey
IV	Instrumental variable
NGO	Non-government organisation
OLS	Ordinary least squares
2SLS	Two-stage least squares
UNICEF	United Nations Children's Fund

Abstract

In Cambodia, there is anecdotal evidence that adult migration has some negative effects on children left behind. There are cases where older children drop out of school to do more housework or earn income; there are also cases where children's health is at risk due to lack of good care or to child labour. This anecdotal evidence, however, has not been substantiated by scientific research. This study aims to provide empirical evidence on the impact of migration on the well-being of children left behind. It adopts an estimation model that assumes that all the systematic differences between migrant and non-migrant households can be explained by a set of individual, household and community characteristics. The study chooses three different sets of outcomes—education, child labour and health—extracted from CSES 2009 and employs instrumental variable (IV) regression to estimate the coefficients, taking village-level migration networks as an instrument.

Regression results suggest the following. First, migration is found to have a significant negative effect on school attendance. Children in migrant families are more likely to drop out of school. The main reasons include: children have little interest in school, they must contribute to household chores, and they must contribute to household income. The effect tends to be worse for girls. Nearly half of household heads believes that female children are well suited to perform household chores, and 20.3 percent said it is risky for girls to go far from home. Second, although migration is found to have a positive relationship with educational attainment, its causal effect is not statistically significant. Third, children in migrant households have a 27 percent larger probability of participating in economic activities than those of non-migrant households; children's work increased by 7.4 hours per week. Fourth, although migration is found to have no significant impact on vaccination of children, it does affect the health of children evident by increasing number of injuries and illnesses as well as malnutrition. Children in migrant households have around 0.3 more frequent illnesses or injuries than children in non-migrant households, and children of migrants have 0.33 and 0.39 points lower mean z-scores for underweight and wasting, respectively, than children in non-migrant households. Fifth, migration is important but not the only factor affecting children's well-being. Family socio-economic status, such as household size, structure of family labour, education of household head and other household members, residential area and wealth status also contribute to determining children's well-being.

1. Introduction

1.1. Context of Study

Migration has been and will continue to be an important part of Cambodia's development. Of the 3.5 million people, about 26.52 percent of the population, who are categorised as migrants, 97.3 percent migrate within the country and 2.7 percent migrate outside (NIS 2009). The dominant reasons for migration are to be with family (37.86 percent), followed by the search for employment (21.52 percent), marriage (14.62 percent) and transfer of workplace (9.22 percent). Phnom Penh is the largest destination of internal migration. The majority of migrants to Phnom Penh were young adults (40 percent were between 15 and 24, and 36 percent between 25 and 34 years). The main occupations of migrants in Phnom Penh are as business owners, garment workers, drivers, non-construction labourers, service/entertainment workers, domestic workers and construction workers. There is no sign that rural-urban migration in Cambodia has reached its potential pace or scale. Provided that urban employments in manufacturing and services continue to expand and that socio-economic development in rural communities occurs at a slower pace, the migration will continue. The UN (2011) estimated that Cambodia's urbanisation is expected to continue increasing to a level of about 24 percent of the population by 2025, by which time the urban population is predicted to be approximately 4 million.

The number of Cambodians who moved to other countries accounts for 0.7 percent of the total population or 2.7 percent of the total migrants. Cross-border migration has been largely pushed by poverty and lack of economic opportunities in communities of origin and pulled by greater demands for labour in the host countries (Chan 2009; IOM 2010). Cambodian external migration can be categorised as regular or irregular. The number of regular migrants has increased significantly over the last decade. Between 1998 and 2013, a total of 140,944 workers were officially sent to work abroad—to Thailand (55.2 percent of the total), South Korea (19.4 percent), Malaysia[1] (25.2 percent) and Japan (0.2 percent)—about 42.7 percent of whom were female. Irregular migrants illegally or surreptitiously enter another country to obtain work. Most Cambodian migrants are irregular. The causes of irregular migration are many, ranging from chronic poverty, lack of employment and economic hardship in community of origin to restrictive immigration policies in labour-receiving countries and lengthy, complex and expensive legal recruitment (Hing *et al.* 2011). Thailand is the main destination of irregular migration, with an estimated 180,000 workers, mainly from Prey Veng, Svay Rieng, Kompong Cham, Banteay Meanchey, Battambang and Pursat provinces (Hing *et al.* 2011: 10). The largest numbers of them are engaged in agriculture, construction, fisheries, wholesale and retail.

Migration has brought both positive and negative impacts for households and communities of origin. It helps to improve housing conditions, increases the amount, variety and quality of food consumed in the household, serves as a safety net in case of family shock and improves access to education and health services (Jampaklay *et al.* 2006; Maltoni 2006). Migration can also help reduce poverty—for example, Tong (2012) found that internal and international remittances could reduce the poverty ratio by 4.73 and 7.35 percentage points, respectively; while Roth *et al.* (forcoming) found that migration could reduce poverty by 3 percentage points. The main cost of migration is the loss of labour in the villages of origin, leaving behind children with limited care and support (MOP 2012). Anecdotal evidence suggests that there are many children, especially those who live in communities with high migration incidence, who are left behind by parents who seek work elsewhere. There are cases where older children drop out of

1 Between 1998 and 2013, Cambodia sent a total of 35,517 workers to Malaysia. About 75 percent were women, who were mostly domestic workers.

school to do more housework or earn income. There are also cases where children's health is vulnerable due to lack of good care or child labour. This evidence, however, has not yet been confirmed by scientific research. This study aims to help fill this serious knowledge gap. It examines the consequences of migration on the well-being of children left behind.

1.2. Research Questions and Objectives

The study attempts to examine the following three key interrelated research questions:

(1) How does adult migration affect school attendance and educational attainment of children left behind?

(2) How does adult migration affect labour participation of children left behind?

(3) How does adult migration affect the health of children left behind?

The study has two primary objectives. First, it aims to map out theories and cross-country experiences of the impact of migration on the well-being of children left behind. This sets a conceptual framework and empirical specifications for the subsequent analysis. Second, it strives to produce empirical evidence by applying a broadly used approach known as instrumental variables (IV) with recent nationally representative data from the Cambodia Socio-Economic Survey 2009.

Section 2 provides a literature review, specifically examining three thematic studies: migration and children's education, migration and child labour and migration and children's health. Section 3 specifies a research methodology, data and variables. Section 4 discusses key findings. It presents both descriptive statistics and empirical results for three outcome variables: education, child labour and health. Section 5 draws conclusions.

2. Literature Review

This section reviews theoretical and empirical studies on the relationship between migration and the well-being of children left behind. The review looks at the three broad indicators of children's well-being: education, child labour and health.

2.1. Migration and Children's Education

In theory, the relationship between migration and schooling of children is ambiguous. On one hand, migration could increase household income through remittances and thus increase investment in education; as a result, children's education improves. On the other hand, migration may disrupt the family's life and thus lead to a negative impact on children's school performance. The adverse effects result from two channels. First, absence of parents or adult members may reduce the level of supervision and inputs into children's education. Consequently, children may drop out of school or be held back due to non-completion or unsatisfactory completion of their work. Second, migration means losing adult working members and thus may force older children to undertake housework or engage in income-earning activities to meet short-term labour and cash shortages.

Empirical studies examine diverse subjects and have come up with contradictory evidence, making it hard to draw conclusions on the relationship between migration and the education of children left behind. One stream examines the effect of remittances on education outcomes of

children. The general hypothesis is that remittances will ease cash flow constraints and allow households to invest more in children's education. This will result in a positive relationship between remittances and schooling. Hanson and Woodruff (2003) found that children in migrant households in Mexico complete significantly more years of schooling. For girls, the estimated increase ranges from 0.2 to 0.9 years. The study concluded that the results are consistent with the idea that sending family members abroad raises family income and allows children to complete more schooling. Similar results in Mexico are found in Antman (2012). The author indicated that having a father migrate before the child is 20 increases educational attainment by about 0.73 years for girls. Cox-Edwards and Ureta (2003) and Acosta (2006) looked at a similar issue in El Salvador and came up with a positive relationship between remittances and schooling. The former found that recipients of remittances exhibit a higher propensity to spend on their children's schooling and as a result lower the hazard that a child will never enrol or will leave school. The latter shows that girls and boys (under 15 years old) from recipient households are more likely to be enrolled than those from non-recipient households. He further found that remittances were also used as a substitute for child labour (outside family businesses or farms), a practice usually associated with higher school dropout rates. These findings have been corroborated by Mansuri (2006) in the case of Pakistan and Calero *et al.* (2009) for Ecuador with the conclusion that remittances increase school enrolment and decrease the incidence of child work.

Another stream of literature looks at household migration status on educational attainment. The hypothesis is that migration will reduce parental care, disrupt family structure and thus have negative impacts on children's schooling. The most recent analysis, by Giannelli and Mangiavacchi (2010), firmly argued that father migration abroad in Albania negatively influences children's schooling in the long term, increasing the probability of dropping out and of delaying school progression. As well, parental education and households' social capital, the economic status of the family and logistical constraints influence the probability of school attendance and the frequency of drop-outs. Contrary to the analysis by Hanson and Woodruff (2003) and Antman (2012) in Mexico, McKenzie and Rapoport (2006) found negative effects of migration on school attendance and attainment in 12 to 18 year old boys and 16 to 18 year old girls. Living in a migrant household lowered the chances of boys completing junior high school by 22 percent and of boys and girls completing high school by 13 to 15 percent. By examining how labour migration and remittance affect black children's education in South Africa, Lu and Treiman (2007) showed that children in households with emigration but no remittances are disadvantaged with respect to school enrolment, and in some respects are even worse off than non-migrant households.

2.2. Migration and Child Labour

Migration affects the incidence of child labour through various channels. Income increase and accessibility to credit reduce children's participation in the labour market, while the disruption in family life and lack of adults at home could force increased participation in the labour market and housework. The net impact can be positive or negative depending on many factors. For example, Acosta (2006) found that children from households that are richer (in terms of asset holdings), better educated, married, medium aged, male headed, and with a higher number of adult males are less likely to work. De la Garza (2010) argues that migration can increase child work where there is a shortage of adult labour in the household, and where extended social support cannot be accessed to replace the labour of the migrant. Mansuri (2006) in the case of Pakistan, and Cortes (2007) for Ecuador, Mexico, the Philippines and Syria found that boys

have a greater burden of paid work when their father migrates, while girls help with domestic tasks.

Remittances are also an important determinant of child labour. Children may or may not engage in earning income depending on whether remittances are sufficient to fulfil basic needs. In general, higher remittances tend to lead to lower demand for child labour outside the household. One literature stream argues that migration reduces child labour via remittances and another indicates the contrary. On the negative relationship, Acosta (2006) found that remittances keep children out of work by supplying the income children would have to earn and reducing the need for their economic activity. Children from recipient families had 2.8 percentage points less chance of working. A similar conclusion can be found in Calero *et al.* (2008) for Ecuador, in Lu and Treiman (2007) for South Africa and in Mansuri (2006) for Pakistan. A number of empirical studies indicate contrasting evidence, arguing that, despite remittances, children may have to do more household chores to replace the absent adult members of the family. Yang (2004), for example, notes that although the receipt of remittances lowers the incidence of waged employment, it increases the amount of time spent doing household work. Similarly, Binzel and Assaad (2011) found that remittances do not help to reduce unpaid and subsistence work of the family, while Calero *et al.* (2008) showed that remittances increase the probability of domestic work, which probably reflects increased work pressure in the home due to migration of adult members.

2.3. Migration and Child Health

The effects of parent migration on the health of children left at home are both negative and positive. They are positive in that remittances mean children at home can afford medical services when needed and that their nutritional status can also improve. A study by Hildebrandt *et al.* (2005) as well as Kanaiaupuni & Donato (1999) and López-Córdova *et al.* (2005) suggests that migration from Mexico to the US improves children's health in Mexico and results in reduced infant mortality and higher birth weights. The authors reasoned that migrant remittances increase income and wealth at home, so households are able to allocate more resources for health care and food. Moreover, health knowledge absorbed by parents in the destination country also brings about a desirable outcome back home. An attempt by Acosta *et al.* (2007) measures the impact of remittances on children's anthropometric indicators, particularly underweight and stunting. The authors compare the z-score of the two indicators between recipient and non-recipient households and show that the z-score of the former is higher than that of the latter, suggesting a desirable effect of remittances – migration leads to better child growth. Migration in those authors' opinion should be promoted because it would raise the well-being of the migrant family.

However, the negative perspective finds that parent migration leads to adverse health outcomes for children. A cross-country study by Brockerhof (1994) revealed that rural-urban migration of women increased the probability of mortality among the children under the age two whether they accompanied their mothers or were left at home. Newborn children whose mothers migrate to work elsewhere are vulnerable to diseases because they lack proper care. One of the most important health issues at this stage is immunisation. Children of migrant mothers, according to Kiros and White (2004), are less likely to receive immunisation than those of non-migrant mothers. Young children who accompany their mothers may also suffer from health setbacks during the early stage of settlement. They need some time to get accustomed to the community. Nonetheless, Brockerhof (1994) also contended that improved health outcomes are observed among accompanied children who are born after their mother's migration. Because health care

access and quality in the destination are often better than in the source area, mother's and newborn's health are better after migration.

3. Methodology and Data

3.1. Estimation Specification

This study adopts an estimation model that assumes that all the systematic differences between migration and non-migration households can be explained by a set of individual, household and community characteristics. The impacts of migration on children's well-being, then, can be estimated with the following equation:

$$Y_i = \alpha X_i + \beta T_i + \varepsilon_i \qquad (1)$$
$$i = 1, 2, 3, \ldots, n$$

Where Y_i is outcome variable of household i. Three different sets of outcomes will be examined in separate models. The first outcome is education; the second is child labour; and the third is health outcomes of children.

X_i are a set of observed individual, household and village characteristics influencing child well-being; T_i represents a dummy of migration household, where "1" denotes a household with migration and "0" otherwise. $\varepsilon_i$is the randomly distributed error term indicating, in part, the unobservable factors affecting the outcome variables with, by assumption, zero conditional means. $E(\varepsilon_i|X_i, T_i) = 0$. α and β are parameters to be estimated.

The ordinary least squares (OLS) estimate is more consistent if key assumptions such as exogeneity of observed variables hold. However, in the case of the relationship between migration and children's well-being, there are a few concerns. First, the decision to migrate is correlated with other explanatory variables. For example, parents who care more about the education of their children may migrate or send adult family members to earn income that can be used to invest in children's education. Similarly, family structure, education of parents and family wealth status influence both the decision to migrate and children's health. This is commonly known as the endogeneity problem, and if this is the case, it violates one of the key assumptions of OLS and therefore the OLS estimate is biased. Second, OLS estimation of equation (1) may suffer from the reverse causality problem. For example, households that have children with poor health may send adult family members to other cities or countries in order to earn extra money to spend on their children's health care.

One solution to address these econometric concerns is to resort to the method of instrumental variables. Some of the literature, including Antman (2012), Calero *et al.* (2009), Mansuri (2006) and Hanson and Woodruff (2003) use IV as a method in their empirical analysis. All use migration network defined as family, friendship and community networks of previous migration as an instrument for migration. The fact that they use migration network as an instrument is largely based on widely recognized findings that migration network has a positive and significant impact on the decision to migrate (Massey and Espinosa 1997, Orrenius 1999, and Winters et al. 2001), but it is not correlated with unobserved characteristics affecting outcomes. Access to migration network helps lower migration costs by giving individual information about the migration process, obtaining a job, finding housing, etc. Households with better access to migration networks should be more likely to facilitate others in the same households or village to migrate.

Like most literature, this study adopts IV regression to estimate the coefficients. The instrument is village-level migration network calculated as the proportion of households in the village that have an adult member migrate to total households in the village. We employ a two-stage least square (2SLS) estimation method to compute the consistent estimates of the impact of adult migration on children education, labour and health and compare the results with those of OLS. As we use multiple outcome variables in our estimation, we do not expect that every equation model faces with the endogeneity problem of explanatory variable. The regression results also include the endogeneity test to confirm whether the model has the endogeneity problem and whether the instrumental variable is valid. Each stage equation can be written as follows:

Stage 1: regress migration decision with set of household and village characteristic variables (X_i) as well as village migration network (Z_i):

$$T_i = \gamma X_i + \delta Z_i + u_i \qquad (2)$$

$i = 1,2,3,\dots,n$

Stage 2: regress outcome variables on the predicted values from the first stage. The predicted values of T ($\hat{T}$) is substituted for treatment in equation (1) to create the following reduced-form outcome regression:

$$Y_i = \alpha X_i + \beta(\rho Z_i + \delta X_i + u_i) + \varepsilon_i \qquad (3)$$
$$i = 1,2,3,\dots,n$$

The IV estimate of program effect is then $\hat{\beta}_{IV}$ written:

$$\hat{\beta}_{IV} = \frac{cov(Y_i, Z_i)}{cov(T_i, Z_i)} \qquad (4)$$

STATA commands to obtain $\hat{\beta}_{IV}$ are:

- Probit regression:***ivprobit***depvar [varlist1] (varlist2 = varlist_iv) [if] [in] [weight] , twostep [tse_options]
- OLS regression:***ivregress 2sls*** depvar [varlist1] (varlist2 = varlist_iv) [if] [in] [weight] [, options]

3.2. Migration Definition and Variables

Defining migration remains controversial. Differences lie in components such as distance, time, place and purpose of migration. At one end of the spectrum, migration is defined as the movement of people over some distance and from one usual place of residence to another. The 2008 Cambodian population census, for example, adopts such a definition (NIS 2009). The "change of residence" in the definition receives some criticism, including ambiguity in reference to distance and the inherently problematic notion of usual place or residential area. At the other end of the spectrum, migration refers to a movement within a specific period of time to live or work elsewhere, either internally or abroad. The "time" dimension in this definition is a point of discussion on which consensus has not been reached. For example, De Jong (2000) considers migration as moving away from home for one month or more, Gubert (2002) considers it as a period of more than six months away from home, and Litchfield and Waddington (2003) consider a period of 12 months or longer as migration. The most simple and

widely accepted definition is provided in UN (2005), describing migrants as workers who are engaged in remunerated activities in places other than their areas of origin. In our study, we define migrants[2] as "adult (aged 15 or older) household members who leave their residence for a period of 6 months or longer to take or search for work elsewhere, internally or abroad". "Migrant households" thus refer to those that have at least one adult member migrant, whereas "non-migrant households" are those that do not. Internal migration is defined as inter-district movement of a person, which would include rural to rural, rural to urban and, least likely, urban to rural. International migration is similarly defined except that it is cross-border movement.

The study selects three commonly used sets of outcome variables to measure the well-being of children left behind. They are education outcomes, child labour status and health outcomes. For education, we focus our analysis on two outcome measures: school attendance and educational attainment. School attendance is a binary variable taking value 1 if children are currently attending school and 0 otherwise. Educational attainment refers to the highest grades completed by children. We limit the sample for education regression to children in the 10-17 years cohort. The primary reason is that there is relatively little variation in either school attendance or educational attainment among children aged between 6 and 9 years. There are three levels of independent variables. Individual variables are age and sex of the child; household variables are age and sex of household head, family size, education of adult member, access to electricity, residential area and total household consumption per day (or poverty status); and village variables are migration network (instrument), distance to district headquarters, availability of education programs and availability of school (full list in Table A.1 in the appendix).

For child labour regression, the study focuses on two outcome variables: child labour participation and working hours. Child labour participation takes value 1 if a child aged between 5 and 14 years engages in economic activities and 0 otherwise. The study defines child labour according to the definition widely accepted by the International Labour Organization, UNICEF and the National Institute of Statistics. They classify child labour as children aged 5 to 11 who perform at least one hour per week of economic activity or 28 hours of domestic work, or children aged 12 to 14 performing at least 14 hours of economic activities or 42 hours of both economic activities and domestic work. The second outcome variable is simply the number of working hours. The regression takes two levels of independent variables. Individual variables include the child's age, sex and educational level. These variables show characteristics of children that may lead to taking employment. The individual characteristics are intrinsic features defining the likelihood of labour participation. Household variables are whether a household has a member migrating, migration network, family size, age and education of household head and per capita daily consumption of household (full list in Table A.2 in the appendix).

For health regression, the dependent variables are the health outcomes of children aged 17 or less defined by the UN (see for example UNICEF n.d.). There are three age groups whose health outcomes we can observe. For children between 0 and 24 months, we use the data on whether or not children have ever received a vaccination. For children equal of five years or below, we employ data on malnutrition, including underweight, wasting, stunting and body-mass index. The CSES dataset does not have ready scores for those malnutrition indicators, so we have to calculate those scores on our own using information on child's age, weight or length and height available in CSES. Lastly, for children from 0 to 17 years old (all children), we

2 The study adopts the migration definition from CSES 2009, which is the primary data set for empirical analysis. One of its limitations, however, is that it could not capture seasonal migration, one of the important migration streams in Cambodia.

observe their health status—the number of times a child seeks health care and total treatment expenditure.

We adopt most independent variables from the model specification by Hildebrandt *et al.* (2005), which includes mother's age, mother's years of schooling and household size. All these variables are treated as exogenous (full list in Table A.3 in the appendix). Results by Hildebrandt *et al.* (2005) suggest that mother's age increases with the birth weight of the child, suggesting better health conditions. Also, mothers with more years of schooling are associated with healthier children. Larger household size reduces the average health of children. We observe these relationships as well in our regression.

3.3. Data

The analysis uses two sets of data. The first is the 2009 Cambodia Socio-Economic Survey (CSES 2009). It is compiled from a nationally representative survey, consisting of 3,600 households. The questionnaire captures comprehensive demographic and socio-economic information including household characteristics, members of households, food and non-food consumption, education, durable assets, land ownership, economic activity, income, migration and health. All the primary outcome indicators can be constructed from this data set and therefore it is used to estimate the impacts of migration on child well-being in equations (1) or (3).

The second data set is a survey of 600 households that have at least one adult member migrant. The primary objective was to capture family perception of the impacts of migration on children's education, health and labour participation. The sampling design was based on a multi-stage stratified cluster sample. First, provinces were sampled in purposively chosen regions whereby areas with high proportions of migration were over-sampled. Based on the migration survey conducted in 2011 under the Cambodia Rural Urban Migration Project (CRUMP), we selected Prey Veng, Takeo, Siem Reap, Kompong Thom, Battambang and Banteay Meanchey as sample regions. Then we sampled villages in the sampled provinces based on systematic sampling using list of villages in CRUMP as a sampling frame. A total of 30 villages were sampled (details in Table A.9 in appendix). In the last phase, households were sampled according to predefined numbers. In each village, field staff listed households that had at least one adult member migrate as a frame for selecting an interview sample. A total of 20 households in each village were interviewed. A questionnaire was used to collect data. Most questions were perception-based inquiries on the impacts of migration on children's education, health and labour status. The usefulness of this data is more qualitative information and perceptions that can complement the empirical estimation.

4. Key Findings

4.1. Descriptive Statistics

Migration and Education

Table 1 illustrates some characteristics of migrant and non-migrant households. Most indicators for both types of households vary but are not statistically significant. Migrant households, which account for 9.32 percent of the total sample, tend to have a smaller family size and more older and female household heads. Most adult members in both types of household have low levels of education. The adult members of non-migrant households have higher levels of

education than adult members of migrant households (8.1 versus 7.61 years of schooling). The statistics also confirm the previous argument that migration is largely a rural phenomenon, since 89.59 percent of migrant households live in rural areas.

Table 1. Characteristics of Migrant and Non-migrant Households

	All households	Migrant households	Non-migrant households
HH_MIG (%)	100	9.32	90.68
HH_SIZE	5.82	5.24	5.87
NUM_ADULT	2.87	2.60	2.90
NUM_ELDER	0.15	0.21	0.15
NUM_CHILD	0.23	0.18	0.23
NUM_OLDER	2.56	2.24	2.59
HEAD_AGE (years old)	46.08	51.36	45.56
HEAD_SEX (%)			
Male	82.77	72.29	83.80
Female	17.23	27.71	16.20
EDU_ADULT (year)	8.06	7.61	8.10
Primary (%)	32.95	36.88	32.57
Lower Secondary (%)	40.22	40.16	40.23
Upper Secondary (%)	17.75	16.97	17.83
Higher (%)	9.07	6.00	9.38
ELECT_ACC (% of hh access to electricity)	25.62	18.55	26.31
ARE_RESID (%)			
Urban	18.35	10.41	19.14
Rural	81.65	89.59	80.86
N (Household level)	5465	563	4902

Source: Authors' calculation based on CSES 2009

Table 2 shows school attendance and mean years of schooling of children aged between 10 and 17 years, by age and family status. Children in the sample have a fairly high school attendance rate at 79.73 percent. Children in non-migrant households tend to perform better than those in migrant households, but the difference is marginal. Except for children at 10 years, whose school attendance varies significantly between migrant and non-migrant households, children in both types of household have similar rates of school attendance. Mean years of schooling are rather low for children in both migrant and non-migrant households. In the majority of age categories, children in migrant households have attained more education than those in non-migrant households.

Table 2. School Attendance and Education Attainment by Age and Migration Status

	All households	**Migration household**	**Non-migration household**
% of children currently at school			
10 years old	97.06	93.33	97.94
11 years old	97.33	97.19	97.35
12 years old	93.61	93.41	93.62
13 years old	90.62	89.56	90.72
14 years old	82.94	84.07	82.83
15 years old	71.06	70.77	71.11
16 years old	59.90	59.52	59.94

17 years old	47.52	53.57	46.91
10-17 years old	79.73	78.96	79.80
Years of schooling attained			
10 years old	2.59	2.38	2.60
11 years old	3.35	3.17	3.37
12 years old	4.12	4.27	4.10
13 years old	4.83	4.59	4.86
14 years old	5.54	5.41	5.55
15 years old	6.17	6.2	6.17
16 years old	6.78	6.53	6.81
17 years old	7.01	7.17	6.99
10-17 years old	5.09	5.1	5.08

Source: Authors' calculation based on CSES 2009

Migration and Child Labour

Table 3 indicates some characteristics of children and their families in migrant and non-migrant households. About 25 percent of children aged between 5 and 14 years are engaged in economic activities. On average, they work more than 27 hours per week or 20 days per month. A majority (86 percent) were from rural households mostly working unpaid for family subsistence in livestock and crop growing activities, fishing and collecting wood. Their household heads were young at an average age of 44, and had very low education. Households with children engaged in economic activities had at least one adult member, had more than a hectare of farm land and earned less than 650,000 riels/month (USD157) from all sources. The prevalence of child labour was higher in migrant households, however, the average working hours of children in migrant households were slightly lower than that in non-migrant households. A small difference in education outcomes between the two groups was noted though this was negligible when controlling for aspects such as family structure and level of education. the income of migrant families was lower than for non-migrants.

Table 3. Characteristics of Children and Their Families, by Migration Status

	All households	Migration household	Non-migration household
Child_labor (% of children age 5-14)	25.0	27.5	24.8
Hour_work (average per week)	27.2	26.4	27.2
Individual			
Age_child_labor (average)	11.2	11.6	11.1
Sex_child_labor (%)			
Male	52.2	57.0	51.8
Female	47.8	43.0	48.2
Child_school_completion (average)	3.1	3.5	3.1
Male	3.0	3.7	3.0
Female	3.2	3.3	3.2
N (number of child labor)	3173.0	263.0	2910.0
Household (having child labor)			

HH_size (average)	5.9	5.3	5.9
Head_age (average)	43.6	48.8	43.1
Head_sex (%)			
Male	82.5	70.3	83.6
Female	17.5	29.7	16.4
Head_edu (average)	3.9	3.7	3.9
Area_residence (%)			
Urban	5.3	2.7	5.5
Rural	94.7	97.3	94.5
Member_ages1864 (average)	1.3	1.2	1.3
HH_land (average-ha)	1.5	1.2	1.5
HH_incom (riels/month)	620945.5	504667.0	631454.5
N (number of household having children in economic activities)	2354.0	216.0	2138.0

Source: Author calculation based on CSES 2009

Migration and Health

As presented in Table 4, there is no significant difference between children in migrant and non-migrant households in terms of the number of vaccines received. The T-statistics for the mean comparisons are not statistically significant. The mean z-scores of wasting, underweight and BMI among children of migrant households are higher than their non-migrant counterparts, while that of stunting is higher for children in non-migrant households. However, the differences in mean scores among these variables are not statistically significant. Children in migrant households are sick more often than those in non-migrant households, and therefore spend more on medical expenses. Mothers of children in migrant households on average are 10 years older than those in non-migrant households, yet the former have fewer years of schooling than the latter. The family size of migrant households tends to be smaller.

Table 4. Major Health Indicators of Children, by Migration Status

Variables	All Household	Migrant Households	Non-migrant Households	T-statistics
VACCIN_CHILD (=1; %)	3.02 (1.06) N=2,089	3.01 (1.04) N=100	3.02 (1.06) N=1,989	−0.12
WASTING_CHILD (mean z-score)	−0.44 (1.34) N=2,320	−0.33 (1.18) N=137	−0.45 (1.35) N=2,183	1.13
UNDERWEIGHT_CHILD (mean z-score)	−0.81 (0.94) N=2,320	−0.79 (0.87) N=137	−0.81 (0.94) N=2,183	0.43
STUNTING_CHILD (mean z-score)	−0.91 (1.05) N=2,320	−0.99 (1.02) N=137	−0.90 (1.05) N=2,183	−1.01
BMI_CHILD (mean z-score)	−0.40 (1.36) N=2,320	−0.28 (1.18) N=137	−0.41 (1.37) N=2,183	1.22
ILLNESS_CHILD (mean)	0.22 (0.78) N=22,434	0.27 (1.14) N=1,643	0.21 (0.75) N=20,791	−2.83**
EXPENSE_CHILD (mean in moeun riel)	0.35 (3.03) N=22,433	0.40 (3.02) N=1,643	0.35 (3.03) N=20,790	0.28

AGE_MOTHER (mean)	40.67 (12.62) N=9,053	51.24 (9.91) N=663	39.83 (12.43) N=8,390	−23.03***
SCHOOL_MOTHER	5.19 (2.72) N=9053	4.56 (2.49) N=663	5.24 (2.73) N=8390	4.90***
HH_SIZE	4.77 (1.93) N=11,971	4.31 (1.94) N=1,080	4.81 (1.93) N=10,891	8.12***
MIGRANT_NETWORK (%)	3.17 (4.84) N=11,970	9.09 (6.89) N=1080	2.60 (4.17) N=10,890	45.25***

Note*:* Standard deviations in parentheses. T test is for difference in means between migrants and non-migrants.

4.2. Empirical Findings

4.2.1. Impacts of Migration on Children's Education

Impacts of Migration on School Attendance

Table 5 presents the results of regression that estimates the impact of migration on school attendance of children left behind. Coefficients of two specifications (OLS and IV-Probit) are estimated to test the robustness of results. We also estimate coefficients for female and male children separately to explore gender dynamics of school attendance in relation to migration. Before we discuss the regression results, let us assess which model produces a consistent estimation. In order to prove this, we conducted two tests: 1) a relevance test to see if the instrument is weak or strong and, 2) endogeneity test, commonly known as the Wu-Hausman test. The first stage regression result in Table A.4 in the appendix suggests that a migration network has a significant positive impact on migration. In other words, villages that have had more people migrate in the past are likely to continue witness more intense migration. The result confirms that a migration network contributes to the decision to migrate. The second test is to verify whether migration is exogenous—the null hypothesis in the IV model. The regression result produces a p-value of Durbin-Wu-Hausman chi-square test at 0.3825. This suggests that there is not sufficient information in the sample to reject the null hypothesis and thus we conclude that OLS estimation is appropriate. In fact, both OLS and IV models produce very similar estimations. Coefficients of all variables in both specifications have the same sign.

Migration is found to have a negative and significant effect on school attendance of children left behind. Children in families with at least one adult member migrant are more likely to drop out of school. The survey of 600 migrant households suggests that a high proportion (17.2 percent) of children aged between 10 and 17 years are not currently attending school. Households with members migrating to other countries tend to have more children drop out of school than those with members migrating within the country, but the difference is not significant (17.3 percent versus 15.6 percent). The main reasons for dropping out of school include: children have no aspiration to study (19 percent), they must contribute to household chores (15.3 percent), and they must contribute to household income (10.2 percent). The magnitude of the estimated effect is even worse for girls. Although gender mainstreaming efforts have intensified in the government's agenda and donors' programmes, gender inequality in education remains high. When asked whether they would remove a girl or boy from schooling, 73.8 percent of household heads would take female children out of school. The decision reflects customary thinking, nearly half of household heads still believe female children are well suited to household chores rather than attend school; 20.3 percent said it is risky for girls to go far from home; 20.4 percent see girl as more in demand by the labour market.

Besides migration, characteristics such as family size, educational level of members, consumption status and access to electricity as well as village characteristics also have some effect on school attendance. Families with high education are more likely to send their children to school; family access to electricity increases children's likelihood of attending school; poverty reduces children's likelihood of attending school. Family structure has mixed effects. The presence of elderly members increases the likelihood of attending school. In other words, having elderly family members living in the household can not only care for children whose parents have migrated but also take on some of the child rearing responsibilities that might otherwise be assigned to a school aged child. In contrast, the presence of children both aged below 6 and between 6 and 17 years decreases the likelihood of attending school. This is because older children may need to drop out of school to take care of younger siblings due to the absence of adult family members. In the best scenario, they can take care of younger siblings after school; in a worse scenario, they have to drop out of school to take care of younger siblings. The negative relationship between having multiple children aged 6-17 and school attendance reflects competition for education among siblings given family human capital and budget constraints. At the village level, the availability of government and NGO educational programmes has positive and significant effects on school attendance.

Table 5. Impact of Migration on School Attendance

	OLS (Probit)			**2SLS (IV-Probit)**
	Both sexes	Boy	Girl	Both sexes
Child is in a migrant household	-0.115***	-0.104*	-0.126**	-0.0321
	(0.0392)	(0.0549)	(0.0560)	(0.102)
Highest level of adult member education	0.118***	0.125***	0.112***	0.119***
	(0.00691)	(0.00991)	(0.00969)	(0.00648)
Number of elderly	0.0858*	0.0538	0.114	0.0886*
	(0.0481)	(0.0674)	(0.0693)	(0.0481)
Number of children aged below 6	-0.0767**	-0.0582	-0.102*	-0.0746**
	(0.0388)	(0.0559)	(0.0540)	(0.0377)
Number of children aged 6-17	-0.0414***	-0.0583***	-0.0275	-0.0387**
	(0.0152)	(0.0220)	(0.0211)	(0.0155)
Access to electricity	0.114**	0.166**	0.0575	0.118**
	(0.0548)	(0.0788)	(0.0772)	(0.0535)
Poverty	-0.0906**	-0.0250	-0.160***	-0.0885**
	(0.0379)	(0.0537)	(0.0540)	(0.0384)
Distance to district headquarters	0.000612	0.00231	-0.000811	0.000667
	(0.00157)	(0.00240)	(0.00213)	(0.00155)
Availability of government education programme	0.188**	0.313***	0.0875	0.185**
	(0.0809)	(0.117)	(0.113)	(0.0826)
Availability of NGO education programme	0.208***	0.275***	0.145	0.209***
	(0.0711)	(0.104)	(0.0996)	(0.0743)
Constant	4.248***	6.082***	2.830**	4.309***
	(0.879)	(1.348)	(1.168)	(0.840)
Observations	10,020	5213	4807	10,020
Durbin-Wu-Hausman chi-sq test (p-value)	-			0.3825

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Instruments are village migration rate in 2009.

Table 6 illustrates the results of regression that estimates the impact of migration on children's school participation, disaggregated by grade. Migration is found to have insignificant effect on school attendance of primary and lower secondary school children. At upper secondary school level, the relation becomes negative and significant. The effect is even greater for female students. In other words, children from migrant households who are in upper secondary school, are more likely to drop out of school than their peers in non-migrant households.

Table 6. Impact of Migration on School Attendance, by Grade

	Primary Student		**Lower Secondary Student**		**Upper Secondary Student**	
	Male	Female	Male	Female	Male	Female
Child is in a migrant household	-0.0191	0.057	0.0006	-00291	-0.145*	-0.206**
	(0.206)	(0.138)	(0.101)	(0.099)	(0.07)	(0.076)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Instruments are village migration rate in 2009.

Impacts of Migration on Educational Attainment

Table 2 suggests that children in migrant households tend to accumulate more schooling without controlling for observable characteristics. In Table 7, we see whether these differences still exist once we control child, family and village characteristic variables. The dependent variable is the number of school grades completed. As in the first outcome regression, we discuss the results of the relevance test and endogeneity test so that we can draw conclusions on which model produces a consistent estimation. The relevance test suggests that a migration network is a good instrument to regress because it has a positive and significant effect on a household decision to migrate. The endogeneity test results in a p-value of Durbin-Wu-Hausman chi-square test at 0.0037, suggesting that there is an endogeneity bias in the OLS estimate. Therefore we conclude that IV (2SLS) regression is appropriate.

Although migration is found to have a positive relationship with educational attainment, its causal effect is not statistically significant. This means school performance of children in both migrant household and non-migrant household does not vary notably. The finding is contradictory to many countries' experience that migration eases family financial constraints and allows children to complete more schooling. The survey of household heads suggests similar result. First, although some parents believe that migration has some positive spill-over effects on their children's school performance, more than half of household heads (52 percent) perceived that their children's education did not improve much compared to the period before migration. Second, once asked to compare children's school performance with the peer in non-migrant household, 63 percent of household head said it's more or less the same.

Consistently with international literature, family structure appears to have important effects on educational attainment. Children living with an adult member who has higher education accumulate more schooling. An additional one year of schooling of adult members can help children complete an extra 0.241 years of education. While presence of elderly members has positive but insignificant effect on children's schooling, the presence of multiple children between 6 and 17 years decreases schooling. More specifically, an additional child that family has can reduce children's education by 0.12 years. The empirical results also indicate the importance of rural electrification in education. Access to electricity can help children complete an extra 0.332 years of education. Poverty is found to have a negative and significant effect on

years of schooling. This result is not new and is consistent with most literature; it is also confirmed by the perception survey. It found that the factors that adversely affect children's education include: insufficient livelihoods (43.6 percent); not having adult members to help take them to school (13.9 percent); children having to help with household chores (12.7 percent); and children earning income (8.8 percent). Some village characteristics appear to have important effects on educational attainment. As in most literature, the village distance from district headquarters tends to have a negative and significant impact on children's school performance. An additional one kilometre of the village from district headquarters is likely to reduce schooling by 0.009 year. This highlights the importance of school accessibility, especially in remote areas.

Table 7. Impact of Migration on Educational Attainment

	OLS	2SLS (IV)		
	Both Sex	**Both Sex**	**Boy**	**Girl**
Child is in a migrant household	-0.077	0.211	0.225	0.204
	(0.042)	(0.108)	(0.147)	(0.159)
Sex of child	-0.222***	-0.225***	-	-
	(0.033)	(0.033)	-	-
Highest level of adult member education	0.237***	0.241***	0.243***	0.238***
	(0.006)	(0.006)	(0.008)	(0.008)
Number of elderly	0.077	0.088	0.114	0.0471
	(0.047)	(0.046)	(0.064)	(0.066)
Number of children aged below 6	-0.061	-0.051	-0.0655	-0.0338
	(0.038)	(0.037)	(0.050)	(0.056)
Number of children aged 6-17	-0.137***	-0.128***	-0.157***	-0.0933***
	(0.016)	(0.016)	(0.022)	(0.022)
Access to electricity	0.320***	0.332***	0.358***	0.310***
	(0.053)	(0.053)	(0.073)	(0.076)
Poverty	-0.307***	-0.301***	-0.319***	-0.286***
	(0.040)	(0.040)	(0.056)	(0.058)
Distance to district headquarters	-0.0115***	-0.0112***	-0.00946***	-0.0132***
	(0.002)	(0.002)	(0.002)	(0.002)
Constant	-4.462***	-4.254***	-3.333***	-5.418***
	-0.077	0.211	(0.969)	(0.989)
Observations	7982	7982	4243	3739
R-squared	0.666	0.505	0.658	0.665
Durbin-Wu-Hausman chi-sq test (p-value)	-	0.0037	0.056	0.021

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Instruments are village migration rate in 2009.

4.2.2. Impacts of Migration on Child Labour

Impacts of Migration on Child's Participation in Labour Market

Table 8 presents the results of regression that estimates the impact of migration on participation in the labour market by children left behind. Coefficients of two specifications (Probit and IV-Probit) are estimated to test the robustness of results. The Wald test of exogeneity produces the IV-Probit p-value of 0.022 and thus there is sufficient information in the sample to reject the null hypothesis, and thus we conclude that IV-Probit estimation is more consistent. Migration is found to have a positive and significant effect in increasing children's participation in the

labour market. Children from migrant households have a 27 percent higher probability of participating in economic activities than those from non-migrant households. Children over 9 years old tend to work more than those of smaller ages. However, from the quadratic relationship, there is a turning point indicating the lesser possibility of child labour at prospective ages. The children would be more mature, physically stronger and reach the age of real employment. An additional year of schooling decrease probability of children in taking job by 2.3 percent.

Table 8. Impact of Migration on Children's Participation in Labour Market

	Participation in Labour Market (marg. effect)	
	(1) Probit	**(2) IV-Probit**
HH_MIG	-0.016	0.273*
	(-0.013)	(-0.152)
AGE_CHILD	0.153***	0.540***
	(-0.011)	(-0.040)
AGE_CHILDSQ	-0.487***	-1.721***
	(-0.055)	(-0.200)
SEX_CHILD	0.006	0.019
	(-0.007)	(-0.026)
EDU_CHILD	-0.006**	-0.023**
	(-0.003)	(-0.009)
HH_SIZE	-0.009***	-0.023***
	(-0.002)	(-0.008)
AGE_HHH	-0.003	-0.014
	(-0.002)	(-0.009)
AGE_HHHSQ	0.002	0.010
	(-0.002)	(-0.009)
EDU_HHH	-0.005***	-0.019***
	(-0.001)	(-0.004)
MEMBER_AGE18_64	-0.008**	-0.026**
	(-0.003)	(-0.012)
DAILY_CONSUM	-0.000***	-0.000***
	(-0.000)	(-0.000)
REGION	0.169***	0.752***
	(-0.008)	(-0.048)
N	12674	12674
Wald test	-	0.022

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Instruments are village migration rate in 2009.

Household characteristics also affect child labour in different ways. The bigger the family, the less likely children are to participate in labour. This is contrary to the expectation that a bigger household would push children into work due to greater expenses. Additionally, children living with caregivers or relatives are rarely pushed into economic activities. For extended families, moreover, the presence of working adults with sufficient income might reduce child labour (Webbink *et al.* 2010). Empirical result confirms that families with adult members are likely to withdraw children from work. Children who come from families with more adult members are 2.6 percent less likely to engage in work than those with fewer adult members, at a 5 percent significance level. Higher household consumption, an indicator of household wealth, is also associated with lower likelihood of children to participate in economic activities. Children in

rural areas are more likely to be in the labour market than those in urban areas. Children are less likely to be involved in economic activities the higher the education of their household head.

Impacts of Migration on Children's Working Hours

The study introduces Tobit model to describe the relationship between migration and children's working hours because some observations on children's working hours are censored (having many zeros). The Tobit model will then observe only the working hours that are other than zero. Table 9 presents the results of regression that estimates the impact of migration on children's working hours. Similarly to the previous regression, the Wald test of exogeneity produced a p-value of 0.0199, and thus we conclude that IV-Tobit is appropriate. The result suggests that migration has a positive and significant effect in increasing working hours of the children left behind. Migration is likely to add 7.4 hours more on children's work per week. As they get older, children tend to work longer hours. Similarly to labour participation, an additional year of education leads to a decrease of working hours by 0.9 hours. Per capita household consumption, the number of adult members and education of the household head contribute positively to the reduction of child working hours.

Table 9. Impact of Migration on Children's Working Hours

	Working Hours (marg.effect)	
	(1) Tobit	**(2) IV-Tobit**
HH_MIG	-2.099	7.420*
	(-1.412)	(-4.325)
AGE_CHILD	13.27***	13.23***
	(-1.187)	(-1.188)
AGE_CHILDSQ	-28.36***	-28.13***
	(-5.792)	(-5.799)
SEX_CHILD	0.540	0.484
	(-0.750)	(-0.752)
EDU_CHILD	-0.974***	-0.984***
	(-0.246)	(-0.247)
HH_SIZE	-0.802***	-0.645***
	(-0.230)	(-0.240)
AGE_HHH	-0.282	-0.385
	(-0.241)	(-0.246)
AGE_HHHSQ	0.218	0.273
	(-0.244)	(-0.246)
EDU_HHH	-0.639***	-0.629***
	(-0.118)	(-0.118)
MEMBER_AGE18_64	-0.628*	-0.591*
	(-0.329)	(-0.330)
DAILY_CONSUM	-0.001***	-0.001***
	(-0.000)	(-0.000)
REGION	22.97***	22.63***
	(-1.379)	(-1.388)
N	12674	12674

Wald test	-	0.0199

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Instruments are village-level migration rate in 2009

4.2.3. Impacts of Migration on Children's Health

Impacts of Migration on Children's Vaccination

Table 10 shows the estimation results of equation (3), where the dependent variables are the number of vaccinations a child between 0 and 24 months has received. Since the decision to migrate is endogenous, an instrumental variable is needed. A 2SLS method using the current migration network as an instrument is employed. Columns (1) and (2) of Table 4.10 report the estimated coefficients from OLS and 2SLS, respectively. Since the null hypothesis that the explanatory variables are all exogenous is not rejected, OLS in this case gives more consistent estimates. Intuitively, migration may affect the number of vaccinations a child could receive, but not vice versa. The results from OLS suggest that migration has no significant impact on vaccination of children. Vaccination in Cambodia is a universal campaign in which health personnel are mobilised in many locations close to the community for easy access. Hence, most children likely receive the immunisation even if they are in a household whose parents and/or other adult members are migrants. Data from CSES reveals that around 93 percent of children in non-migrant households were vaccinated; the figure for those in migrant households is similar.

Table 10. Impact of Migration on Children's Vaccination

	Vaccination	
	(1) OLS	**(2) 2SLS**
MIGRANT	0.083	0.846
	(0.157)	(0.895)
AGE_MOTHER	0.002	0.006
	(0.016)	(0.016)
AGE_MOTHER_SQ	0.000	−0.000
	(0.000)	(0.000)
SCHOOL_MOTHER	0.031***	0.032***
	(0.009)	(0.009)
HH_SIZE	−0.045**	−0.046**
	(0.022)	(0.022)
CONSTANT	3.092***	3.047***
	(0.277)	(0.283)
Observation	1,187	1,187
R-squared		0.001
Durbin-Wu-Hausman probability > chi-squared[a]		0.416

Standard errors are in parenthesis. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels.
[a] Test of endogeneity. The null hypotheses are no endogeneity.

Impacts of Migration on Children's Illness

Column (1) in Table 11 shows the estimates using 2SLS method which is preferred to OLS because one cannot reject the null hypothesis that all explanatory variables are exogenous. Here, migration has a positive and significant relationship with the number of children's illnesses or injuries. The coefficient of "migrant" is significant at the 1 percent level. Children in migrant households have around 0.3 more illnesses or injuries than children in non-migrant households (data in 2009). This suggests that children whose father and/or mother are migrants receive less care compared to children whose parents are not migrants. The perception-based qualitative interviews confirm this result. The results in column (3) also show consistent estimates. Migration is associated with more health expenditure. The 2SLS estimate reports that migrant households spend 7,280 riels (USD $1.80) per month more than non-migrant households on medical treatment for children.

Estimated coefficients of other control variables show expected signs and are statistically significant. Children with older mothers have fewer illnesses. This maybe because older mothers have more experience taking care of children, hence minimising the chance of illness. Mothers with more years of schooling are associated with more vaccination, less frequent illnesses and fewer medical expenses for their children. One more year of schooling, for instance, decreases the frequency of illness by 1 percent. Larger household size reduces the number of vaccinations, but unexpectedly, at the same time, reduces illness frequency and health expenses. One possible explanation is that parents with many children might have more experience in taking care of children, hence reducing the frequency of sickness among younger children.

Table 11. Impact of Migration on Children's Illness

	Child Illness		**Health Expenditure**	
	(1) **2SLS**	**(2)** **OLS**	**(3)** **2SLS**	**(4)** **OLS**
MIGRANT	0.285***	0.109**	0.728*	0.192
	(0.103)	(0.048)	(0.413)	(0.184)
AGE_MOTHER	−0.024***	−0.024***	0.011	0.011
	(0.005)	(0.005)	(0.015)	(0.015)
AGE_MOTHER_SQ	0.000***	0.000***	−0.000	−0.000
	(0.000)	(0.000)	(0.000)	(0.000)
SCHOOL_MOTHER	−0.011***	−0.011***	−0.016*	−0.018**
	(0.003)	(0.003)	(0.009)	(0.009)
HH_SIZE	−0.018***	−0.020***	−0.048***	−0.053***
	(0.004)	(0.004)	(0.018)	(0.016)
Constant	0.939***	0.939***	0.532**	0.533**
	(0.096)	(0.095)	(0.270)	(0.271)
Observation	12,171	12,171	12,170	12,170
R-square	0.009	0.012	−0.0003	0.001
Durbin-Wu-Hausman probability > chi-squared[a]	0.018		0.070	

Note: Standard errors are in parenthesis. *, **, *** indicate statistically significant at the 10%, 5%, and 1% levels.
[a] Test of endogeneity. The null hypotheses are no endogeneity.

Impacts of Migration on Children's Malnutrition

Table A.7 in the appendix displays the estimation results using malnutrition variables as dependent variables. We observe a negative impact of adult migration on stunting, underweight, wasting and BMI (OLS), yet the coefficients are not statistically significant. The results seem to be that we have no evidence on the effects of adult migration on malnutrition status among children. Nonetheless, such a conclusion might be misleading. Factors affecting malnutrition of children are not easily observed in the short term. For a mother who migrated a few months ago, it might not observable yet whether her child at home became stunted or underweight. To address this issue, we drop the observation of migrants who migrated after 2007. This leaves us only households that migrated around one or two years earlier. The estimation results are shown in Table A.8 in the appendix. In this case, OLS provides more consistent estimates than 2SLS. Intuitively, migration might have an impact on child malnutrition but not vice versa. Interestingly, as reported in columns (4) and (6), migration has a negative and significant effect on underweight and wasting. Children in migrant households have 0.33 and 0.39 points lower mean z-scores of underweight and wasting, respectively, than children in non-migrant households. Therefore, adult migration does have an impact on children's malnutrition in the long term, while the short-term effect could not be easily observed.

Adult migration has shown a negative effect on children's health, rejecting the notion that migration's remittances provide additional income that improves consumption and health of children left at home. Children, especially younger ones, need to be well taken care of, and the absence of parents, for instance, weakens the health of children even if there are always other adults at home to look after them. These findings might have become clearer if the data allowed us to differentiate between parent and non-parent migration. It is expected that the adverse effects of the former would be stronger than those of the latter. The findings also suggest that some effects are not easily observed in the short term.

5. Conclusion

The preceding empirical analysis of the relationship between migration and children's well-being allows us to draw the following conclusions:

Migration increases the likelihood of dropping out of school but has insignificant effect on educational attainment:

Migration is found to have mixed effects on children's education. It increases the likelihood of children, especially females, to drop out of school. Migration has a positive relationship with children leaving school However, regression results also indicate that family background and characteristics play a potentially more important role in shaping children's education. Families with high levels of education are more likely to send their children to school; access to electricity increases children's likelihood of attending school because it allows them to read, do their assignment and study in the evening; poverty reduces school participation.

Migration increase child participation in the labour market and working hours:

Migration is found to increase the likelihood of children to engage in labour and reduces working hours for children. The finding is consistent with the argument that migration

contributes to a shortage of adult labour in communities where adults are migrating from, while the financial support from migrant members could not complement; and thus pushes children to get into income-earning work.

Household socio-economic characteristics also influence the decision to place children in labour. The bigger the family, the less likelihood there is of children participating in labour. Children are less likely to be involved in economic activities when their household head has a higher level of education. Household per capita consumption and the number of adult members in the household contribute positively to the reduction of child working hours.

Migration adversely affects children's illnesses and malnutrition:

Migration has no significant impact on vaccination of children but it has a significant relationship with the number of illnesses or injuries experienced by children (Data from CSES 2009).

Migration has a negative and significant effect on underweight and wasting.

The many indicators related to well-being make it hard to generalise the effects:

This attempt to explore the relationship between migration and children's well-being is quite ambitious because well-being is a broad term and can be measured by various indicators from education or health to participation in the labour market. Migration may have different impacts on various outcomes, and its net effect cannot be simply summed up. The empirical results above illustrate a mixed effect of migration on children's education, a negative effect on children's engagement in labour and a negative effect on children's health. Yet we cannot say conclusively that migration has a net positive or negative impact on children's well-being.

The data set is not comprehensive enough to allow us to disaggregate the identities of migrants:

There is a major limitation in CSES 2009, in that we cannot classify who is migrating. This hinders us from going further to analyse the impacts of migration of different family members on children's well-being. We believe that parental migration has different impacts on children left behind than does sibling migration. Although this study contributes to the scarce literature on migration and children left behind in Cambodia, the field would benefit from additional research that attempts to disaggregate the impact analysis by identity of migrants. Future research should also look into a qualitative study on child well-being that would probe children's as well as adults' perceptions and experiences of migration.

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Appendix

Table A.1. Summary of Dependent and Independent Variables in Education Regression

Abbreviation	Definition
Dependent variables	
ENROL_CHILD	1 if children are currently at school, 0 otherwise
EDU_ATTN	Highest level of education (in years)
Independent variables	
Individual characteristics	
AGE_CHILD	Age of individual child in the household
AGE_CHILD_SQ	Squared age individual child in the household
SEX_CHILD	Sex of children (1 male, 0 female, male omitted)
Household characteristics	
HH_MIG	1 if household has a member migrate, 0 otherwise
HH_SIZE	Number of household members
HEAD_AGE	Age of household head
HEAD_AGE_SQ	Squared age of household head
HEAD_SEX	Sex of household head (1 male, 0 female, male omitted)
EDU_ADULT	Highest education of adult member (years)
NUM_ADULT	Number of adult members (aged 18-64)
NUM_ELDER	Number of elderly in the household (aged 65 or over)
NUM_CHILD	Number of young children in the household (below 6)
NUM_OLDER	Number of older children in the household (6-17)
ELECT_ACC	1 if household has electricity, 0 otherwise
ARE_RESID	Area of residence (1 if rural, 0 if urban)
lntotcons_day	Total household consumption per day (in log form)
Village characteristics	
MIG_NET	Migration network (ratio of migrants to total population in the village)
DIST_DIS	Distance to district headquarters
GOV_EDU_PRO	Existence of government education programme (1 if have, 0 otherwise)
NGO_EDU_PRO	Existence of NGO education programme (1 if have, 0 otherwise)
AVAIL_PRIM	Availability of primary school in the village (1 if have, 0 otherwise)
AVAIL_LOW_SEC	Availability of lower secondary school in the village (1 if have, 0 otherwise)
AVAIL_UPP_SEC	Availability of upper secondary school in the village (1 if have, 0 otherwise)
Instrumental variable	
MIG_NET	Percentage of current migrant population in village in 2009

Table A.2. Summary of Dependent and Independent Variables in Child Labour Regression

Variable	Definition
Dependent variables	
LABOR_PART	1 if child participates in economic activity, 0 otherwise
WORK_HOUR	Number of child's working hours
Independent variables	
HH_MIG	1 if household has migrant member, 0 otherwise
AGE_CHILD	Age of child (5-14)
AGE_CHILDSQ	Child's age squared
SEX_CHILD	1 if male child, 0 otherwise
EDU_CHILD	Education of child (level of school completed)
HH_SIZE	Household size
DAILY_CONSUM	Household's per capita daily consumption (average)
AGE_HHH	Age of household head
AGE_HHHSQ	Household head's age squared (logarithmic form)
EDU_HHH	Year of attending school
MEMBER_AGE18_64	Number of household member aged between 18 and 64
REGION	1 if household living in rural area, 0 in urban area
Instrumental variable	
MIG_NET	Percentage of current migrant population in village in 2009

Table A.3. Summary of Dependent and Independent Variables in Health Regression

Variable	Definition
Dependent variables	
VACCIN_CHILD	Number of vaccinations a child between 0 to 24 months has received[3]
WASTING_CHILD	Wasting z-score of a child aged 0 to 5 years
UNDERWEIGHT_CHILD	Underweight z-score of a child aged 0 to 5 years
STUNTING_CHILD	Stunting z-score of a child aged 0 to 5 years
BMI_CHILD	Body mass index z-score of a child aged 0 to 5 years
ILLNESS_CHILD	Number of times a child aged 0 to 17 years sought health care for illness or injury in the last 30 days
EXPENSE_CHILD	Amount of money in moeun riel a child aged 0 to 17 years spent on treatment in the last 30 days
Independent/Control variables	
MIGRANT	1 if a child was born in a migrant household, 0 otherwise
MIGRANT_SIZE	Number of migrants per household
AGE_MOTHER	Age of mother
AGE_MOTHER_SQ	Squared age
SCHOOL_MOTHER	Mother's years of schooling
HH_SIZE	Household size

3 According to CSES 2009, there were four vaccines: BCG, Hep0, DPT-HepB and measles.

Instrumental Variable	
MIG_NET	Percentage of current migrant population in village in 2009

Table A.4. Impact of Migration Network on Migration

	Probability to migrate (for school attendance)	Probability to migrate (for school attainment)
Migration network	0.002*	0.0023*
	(0.0009)	(0.0010)

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Instruments are village migration rate in 2009.

Table A.5. Impact of Migration on School Attendance and Educational Attainment

	School Attendance		Educational Attainment	
	Probit	IV-Probit	OLS	2SLS
Child is in a migration household	-0.115***	-0.0321	-0.0770*	0.211*
	(0.0392)	(0.102)	(0.0417)	(0.108)
Sex of child	0.190***	0.189***	-0.222***	-0.225***
	(0.0328)	(0.0329)	(0.0328)	(0.0329)
Age of child	-0.148	-0.147	0.633***	0.633***
	(0.122)	(0.115)	(0.0960)	(0.0993)
Age of household head	-0.0207*	-0.0233*	-0.0228*	-0.0319***
	(0.0123)	(0.0122)	(0.0120)	(0.0123)
Sex of household head	0.0371	0.0407	0.104**	0.119***
	(0.0429)	(0.0430)	(0.0452)	(0.0450)
Highest level of adult member education	0.118***	0.119***	0.237***	0.241***
	(0.00691)	(0.00648)	(0.00619)	(0.00567)
Number of elderly	0.0858*	0.0886*	0.0768	0.0877*
	(0.0481)	(0.0481)	(0.0469)	(0.0460)
Number of children aged below 6	-0.0767**	-0.0746**	-0.0606	-0.0512
	(0.0388)	(0.0377)	(0.0380)	(0.0373)
Number of children aged 6-17	-0.0414***	-0.0387**	-0.137***	-0.128***
	(0.0152)	(0.0155)	(0.0156)	(0.0158)
Access to electricity	0.114**	0.118**	0.320***	0.332***
	(0.0548)	(0.0535)	(0.0531)	(0.0527)
Poverty	-0.0906**	-0.0885**	-0.307***	-0.301***
	(0.0379)	(0.0384)	(0.0401)	(0.0402)
Area of residence	0.0574	0.0491	0.00321	-0.0299
	(0.0608)	(0.0596)	(0.0594)	(0.0586)
Distance to district headquarters	0.000612	0.000667	-0.0115***	-0.0112***
	(0.00157)	(0.00155)	(0.00153)	(0.00155)
Availability of government education programme	0.188**	0.185**	-	-
	(0.0809)	(0.0826)	-	-
Availability of NGO education programme	0.208***	0.209***	-	-
	(0.0711)	(0.0743)	-	-
Availability of primary school	0.00652	0.00651	-0.0198	-0.0216
	(0.0349)	(0.0349)	(0.0347)	(0.0350)
Availability of lower secondary school	-0.00914	-0.0100	0.0951*	0.0924*

	(0.0507)	(0.0519)	(0.0513)	(0.0514)
Availability of upper secondary school	0.0700	0.0714	-0.199**	-0.196**
	(0.0839)	(0.0850)	(0.0805)	(0.0804)
Constant	4.248***	4.309***	-4.462***	-4.254***
	(0.879)	(0.840)	(0.659)	(0.693)
Observation	10,020	10,020	7,982	7,982
R-squared			0.666	0.660
Durbin-Wu-Hausman probability > chi-squared[a]	-	0.3825	-	0.00337

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Instruments are village migration rate in 2009.
[a] Test of endogeneity. The null hypotheses are no endogeneity.

Table A.6. Impact of Migration on Child Labour

	Participation in Labour Market (marg. effect)		Working Hours (marg.effect)	
	(1) Probit	(2) IV-Probit	(3) Tobit	(4) IV-Tobit
HH_MIG	-0.016	0.273*	-2.099	7.420*
	(-0.013)	(-0.152)	(-1.412)	(-4.325)
AGE_CHILD	0.153***	0.540***	13.27***	13.23***
	(-0.011)	(-0.040)	(-1.187)	(-1.188)
AGE_CHILDSQ	-0.487***	-1.721***	-28.36***	-28.13***
	(-0.055)	(-0.200)	(-5.792)	(-5.799)
SEX_CHILD	0.006	0.019	0.540	0.484
	(-0.007)	(-0.026)	(-0.750)	(-0.752)
EDU_CHILD	-0.006**	-0.023**	-0.974***	-0.984***
	(-0.003)	(-0.009)	(-0.246)	(-0.247)
HH_SIZE	-0.009***	-0.023***	-0.802***	-0.645***
	(-0.002)	(-0.008)	(-0.230)	(-0.240)
AGE_HHH	-0.003	-0.014	-0.282	-0.385
	(-0.002)	(-0.009)	(-0.241)	(-0.246)
AGE_HHHSQ	0.002	0.010	0.218	0.273
	(-0.002)	(-0.009)	(-0.244)	(-0.246)
EDU_HHH	-0.005***	-0.019***	-0.639***	-0.629***
	(-0.001)	(-0.004)	(-0.118)	(-0.118)
MEMBER_AGE18_64	-0.008**	-0.026**	-0.628*	-0.591*
	(-0.003)	(-0.012)	(-0.329)	(-0.330)
DAILY_CONSUM	-0.000***	-0.000***	-0.001***	-0.001***
	(-0.000)	(-0.000)	(-0.000)	(-0.000)
REGION	0.169***	0.752***	22.97***	22.63***
	(-0.008)	(-0.048)	(-1.379)	(-1.388)
N	12674	12674	12674	12674
Wald test	-	0.023	-	0.020

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Instruments are village-level migration rate in 2009
a Test of endogeneity. The null hypotheses are no endogeneity.

Table A.7. Impact of Migration on Child's Malnutrition (Whole Sample)

EXPLANATORY VARIABLE	STUNTING_CHILD		UNDERWEIGHT_CHILD		WASTING_CHILD		BMI_CHILD	
	(1) 2SLS	(2) OLS	(3) 2SLS	(4) OLS	(5) 2SLS	(6) OLS	(7) 2SLS	(8) OLS
MIGRANT	−0.271	−0.108	−0.808	−0.069	−1.186	−0.067	−0.832	0.003
	(0.609)	(0.136)	(0.633)	(0.132)	(0.804)	(0.179)	(0.799)	(0.183)
AGE_MOTHER	−0.028	−0.027	0.001	0.003	0.017	0.021	0.026	0.029
	(0.018)	(0.017)	(0.016)	(0.015)	(0.024)	(0.023)	(0.024)	(0.023)
AGE_MOTHER_SQ	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SCHOOL_MOTHER	0.020*	0.020*	0.019*	0.019*	0.012	0.013	0.010	0.010
	(0.011)	(0.011)	(0.011)	(0.011)	(0.014)	(0.014)	(0.014)	(0.014)
HH_SIZE	0.045**	0.045**	0.002	0.002	−0.031	−0.031	−0.036	−0.036
	(0.021)	(0.021)	(0.019)	(0.019)	(0.027)	(0.026)	(0.027)	(0.027)
CONSTANT	−0.731**	−0.737**	−1.044***	−1.074***	−0.824*	−0.869**	−0.902**	−0.936**
	(0.320)	(0.317)	(0.293)	(0.281)	(0.428)	(0.417)	(0.421)	(0.414)
OBSERVATIONS	1,352	1,352	1,352	1,352	1,352	1,352	1,352	1,352
R-SQUARED	0.008	0.009	−0.014	0.007	−0.023	0.003	−0.009	0.004
Durbin-Wu-Hausman probability > chi-squared[a]	0.817		0.256		0.217		0.382	

Note: Standard errors are in parentheses. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels.
[a] Test of endogeneity. The null hypotheses are no endogeneity.

Table A.8. Impact of Migration on Child's Malnutrition (Only households with member migrating before 2007)

EXPLANATORY VARIABLE	STUNTING_CHILD		UNDERWEIGHT_CHILD		WASTING_CHILD		BMI_CHILD	
	(1) 2SLS	(2) OLS	(3) 2SLS	(4) OLS	(5) 2SLS	(6) OLS	(7) 2SLS	(8) OLS
MIGRANT	−0.310	−0.165	−0.783	−0.333**	−1.259	−0.389**	−0.744	−0.309
	(0.855)	(0.175)	(0.873)	(0.149)	(1.089)	(0.192)	(1.092)	(0.194)
AGE_MOTHER	−0.030	−0.028	−0.004	0.001	0.009	0.018	0.022	0.026
	(0.020)	(0.017)	(0.018)	(0.016)	(0.025)	(0.023)	(0.025)	(0.023)
AGE_MOTHER_SQ	0.000	0.000346*	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(098500)	(0.000)	(0.000)	(0.000)
SCHOOL_MOTHER	0.0202*	0.0202*	0.0193*	0.0196*	0.012	0.013	0.010	0.010
	(0.011)	(0.011)	(0.011)	(0.011)	(0.014)	(0.014)	(0.014)	(0.014)
HH_SIZE	0.0463**	0.0455**	0.006	0.004	−0.024	−0.029	−0.032	−0.034
	(0.021)	(0.021)	(0.019)	(0.019)	(0.027)	(0.026)	(0.028)	(0.027)
CONSTANT	−0.702**	−0.720**	−0.976***	−1.034***	−0.710	−0.822**	−0.840*	−0.896*
	(0.343)	(0.318)	(0.307)	(0.284)	(0.446)	(0.419)	(0.440)	(0.416)
OBSERVATIONS	1,352	1,352	1,352	1,352	1,352	1,352	1,352	1,352
R-SQUARED	0.009	0.010	0.005	0.010	−0.004	0.005	0.003	0.005
Durbin-Wu-Hausman probability > chi-squared[a]	0.985		0.674		0.521		0.790	

Note: Standard errors are in parenthesis. *, **, *** indicate statistical significance at the 10%, 5%, and 1% levels.
[a] Test of endogeneity. The null hypotheses are no endogeneity.

Table A.9. Details of Sampled Villages and Provinces

No	Village	Commune	District	Province	Sample Household
1	Phnom Prasat	Ou Prasat	Mongkol Borei	Banteay Meanchey	20
2	Kamping Puoy	Phnom Dei	Phnom Srok		20
3	Tro Louk Lech	Phnom Lieb	Preah Netr Preah		20
4	Ta Pon	Tuek Chour	Preah Netr Preah		20
5	Souriya	Koub	Ou Chrov		20
6	Kdaong	Phnom Sampov	Banan	Battambang	20
7	Prey Phdau	Ta Kream	Banan		20
8	Hai San	Chrey	Thma Koul		20
9	Spean	Bansay Traeng	Thma Koul		20
10	Veal	Ta Loas	Moung Ruessey		20
11	Prey Preah	Kompong Svay	Kompong Svay	Kompong Thom	20
12	Pou	Tbaeng	Kompong Svay		20
13	Kruos	Doung	Prasat Ballangk		20
14	Traeuy Myab	Prasat	Santuk		20
15	Srae Krasang	Popok	Stoung		20
16	Kork Sandaek	Reaks Chey	Ba Phnom	Prey Veng	20
17	Sdau	Theay	Ba Phnom		20
18	Boeng Antong	Chres	Me Sang		20
19	Ta Mau	Prey Khnes	Me Sang		20
20	Sampoar	Prey Totueng	Me Sang		20
21	Bat Santrea	Kompong Popil	Pea Reang		20
22	Prey Sniet	Prey Sniet	Pea Reang		20
23	Ta Poar Pir	Pongro Kraom	Chi Kraeng	Siem Reap	20
24	Preah Lean	Chonloas Dai	Kralanh		20
25	Doun Sva	Samraong Yea	Puok		20
26	Baek Kamphleung	Chan Sar	Soutr Nikom		20
27	Chikeak	Kien Sangkae	Soutr Nikom		20
28	Dak Por	Rovieng	Samraong	Takeo	20
29	Krang Ta Chan	Kus	Tram Kak		20
30	Tnaot Chum	Ou Saray	Tram Kak		20
Total Sample					**600**