Internal Migration, International Migration, and Physical Growth of Left-Behind Children: A Study of Two Settings *

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Abstract

Parental out-migration has become a common experience of childhood worldwide and tends to have important ramifications for child development. There has been much debate on whether overall children benefit or suffer from parental out-migration. The present study examines how the relationship between parental out-migration and children's growth differs by the type of migration (internal vs. international). This comparison is conducted in two diverse settings, Mexico and Indonesia. Data are from two national longitudinal surveys: the Mexican Family Life Survey and the Indonesian Family Life Survey. Results from fixed-effect regressions show that international migration tends to have a less beneficial, sometimes even more detrimental, impact on the growth of children left behind than internal migration. Results also reveal contextual differences in the role of parental out-migration. Possible explanations are discussed.

Keywords: internal migration; international migration; left-behind children; health; height; growth

1. Introduction

Hundreds of millions of people in developing countries migrate to urban areas (internal migration) or to more developed countries (international migration) for better living conditions. Recent estimates indicate that about 214 million people from developing nations live outside their home country (United Nations 2009). Internal migration occurs at even higher rates, but the scale is difficult to accurately determine (International Organization for Migration 2005). As a result, children in developing settings are increasingly affected by migration (UNICEF 2007). While some children migrate with their parents, many children are left behind as one or both parents migrate for work.

Parental out-migration (international and internal) is a form of family transition with conflicting consequences, as a result of parent-child separations and economic improvement through remittances. These countervailing processes have generated much debate on the overall effect of parental out-migration on child well-being such as education and health (McKenzie 2005; Parreñas 2005; Toyota et al. 2007; Dreby 2010; Hoang and Yeoh 2012). The discrepancies among previous studies point to a research direction for identifying the conditions under which children benefit or suffer from parental out-migration. A comparative perspective is particularly helpful in these respects because it specifies different conditions in which to examine the effect of migration and allows for identifying similarities and differences of the effect.

The present study examined how the role of parental migration differs by stream of out-migration (internal vs. international). The focus is on children's physical growth, a relatively under-studied area. Specifically I assessed how each group of left-behind children (by internal or international migrant parent) compares to children not left behind. Previous studies have suggested that internal and international migration are alternative strategies in response to broad

social and economic forces, and can be studied under a unified framework (Pryor 1981; Castles and Miller 1998; DeWind and Holdaway 2008). I argued that internal and international migration entail different levels of family disruption and economic return, which can potentially have different ramifications for children.

To evaluate the generalizability of results, the cross-stream comparison was conducted in two diverse settings, Mexico and Indonesia. The two countries share broad similarities as developing countries and both experience large-scale internal and international migration (Hugo 2005; Mishra 2007). In the meantime, the two countries differ in potentially important ways, for example, in terms of the level of socioeconomic development and population nutritional status (World Bank 2005), that may have implications for the relationship between migration and child growth. To the extent that the cross-stream similarity or difference holds in the two study settings, there is more confidence that the results reveal a fairly general pattern.

I studied children's physical growth, an important health indicator linked to health and productivity later in life (Alderman et al. 2002). This focus adds to existing research that largely concentrates on educational outcomes or early-life health measures such as birth weight and infant mortality (Borraz 2005; Lopez-Cordoba 2005; Amuedo-Dorantes and Pozo 2010). Moreover, the analysis covered a wider age range of children than in previous studies, using the expanded WHO child growth standards.

2. Background

2.1. Children's physical growth

Children's physical growth, mainly measured by height and weight growth, is a critical dimension of child development. It has been linked to health and mortality, cognitive and mental

development, educational achievement, and even adult outcomes (Pelletier, Frongillo, and Habicht 1993; Mendez and Adair 1999; Alderman et al. 2002; Case and Paxson 2008; Scholder et al. 2013.). Growth faltering can significantly increase a child's risk of mortality and persistent cognitive and behavioral dysfunction in the long term. For this reason, child height is often considered a useful indicator of child health and welfare (Waterlow et al. 1977).

A number of factors shape children's physical growth. Innate characteristics inherited from parents are unarguably crucial determinants of child height and weight. But beyond genetic disposition, ample evidence points to the pivotal role of children's living environment (Seckler 1982; Mosley and Chen 1984; Martorell and Habicht 1986; Thomas, Strauss, and Henriques 1991). The living environment is associated with children's physical growth through exposure to malnutrition and frequent morbidity such as infections and diarrhea (Martorell and Habicht 1986).

Children's nutrition intake depends on the amount and quality of foods and feeding (Seckler 1982). This is especially true for young children, who depend much on breastfeeding and supplementary foods to thrive. In this respect, the quantity and quality of child care and household economics are critical for child growth. Any familial conditions that can deplete the parent's or caregiver's ability to nurture the children, or that deprive material resources to be spent on children are likely to put children at high risk for growth deficiency.

Child morbidity is especially sensitive to households' sanitation levels. Household hygiene, such as clean water supply and sewage system, protects children from environmental contamination that can cause repeated episodes of diarrhea and illness (Seckler 1982; Mosley and Chen 1984). Such health problems initiate metabolic responses to biological stressors and could reduce the efficiency of conversion of food into energy, and thus physical growth. Factors

such as household economic resources are closely related to sanitation, with well off families better able to provide children with a sanitary living environment.

2.2. Parental out-migration and child growth

Several strands of literature provide a useful framework for understanding the potential impact of parental migration on children's growth. The literature on family dissolution and parental employment on child development demonstrates the critical consequences of parental presence or absence, with high-levels of parental input improving a wide range of child outcomes while parental absence exerting detrimental impacts on children (McLanahan and Sandefur 1994; Waldfogel 2006). The literature on the economic and social impact of migration perceives migration as a household strategy for improving household economic welfare (Stark & Bloom 1985). This view necessitates the importance of family in fully understanding the decisions to and consequences of migration. On the one hand, a large fraction of migrants' incomes are devoted to remittances, which reduce the economic vulnerability of the original families (Azam & Gubert, 2006; Semyonov & Gorodzeisky, 2008). On the other hand, the family separation as a result of out-migration has inevitably led to changes in family life and could put strains on family relationships (Parreñas, 2005; Dreby, 2010). A synthesis of these bodies of literature suggests that the impact of parental out-migration is multifaceted.

First, the adverse impact of parental absence noted in the broader family literature tends to arise in the context of migration. Parent-child separation due to out-migration leads to reduced parental input essential for child growth (Suarez-Orozco et al. 2004; Parreñas 2005; Toyota et al. 2007; Dreby 2010; Graham and Jordan 2011; Hoang and Yeoh 2012). The remaining parent or

caregiver may face additional household responsibilities, thus further occasioning a decline in the quantity and quality of care provided to children (McKenzie 2005).

Relevant to child health, the out-migration of parents likely leads to less time and energy available for caregivers to provide child care. This may limit the caregiver's ability to prepare and serve a good variety of quality foods, carry out sanitary child care practices (clean child frequently), and to use health services to boost child health (immunize children) (Hildebrandt and McKenzie 2005). Specifically for young children, time constraints can severely disrupt feeding practices, leading to shorter periods of breastfeeding, less attentive feeding, and thus insufficient or less nutrient intake (Hildebrandt and McKenzie 2005). Such disrupted practices are likely to hinder the proper growth of children. Much of the detrimental impact of family separation due to out-migration carries over even after family reunification (Suarez-Orozco et al. 2004).

One important yet understudied question is how the level of family disruption may vary by international and internal migration. International migration may imply a longer duration of separation and less frequent contact than internal migration (DeWind and Holdaway 2008). Such prolonged separation may result in substantial reductions in parental input and disrupted childcare practices that can ensue over a child's growth (Dreby 2010). By contrast, internal migration can be quite circular and usually generates shorter episodes of disruption (DeWind and Holdaway 2008).

Second, parental out-migration is distinct from many other types of parent-child separation (e.g., divorce, parental death), which are commonly accompanied by declines in economic well-being (Garfinkel & McLanahan, 1986). Households with migrants often receive substantial remittances (Semyonov & Gorodzeisky, 2008). These resources serve as a critical

means for enhancing family income and standard of living, allowing for more resources to be allocated toward health-related expenses such as better quality and quantity of food, household sanitation, and use of health care services (Amuedo-Dorantes et al. 2007; Anton 2010). Remittances may also help mitigate the time and energy constraints of the remaining caregiver (Brown and Poirine 2005), enabling them to dedicate more time to caring for children.

These economic benefits, however, may be constrained, especially in the initial stage of out-migration when households receive limited remittances while suffering from reduced household labor (Kandel 2003). Because of a common time lag before remittance receipt, one immediate aftermath for families left behind is financial hardship, which could compel caregivers to shift more time from childcare into home production and force families to reduce spending on children. The time lag between out-migration and improved household welfare tends to increase over time—especially for families of undocumented migrants—as a result of the rising costs and difficulties of out-migration. Even at later stages of out-migration, some households continue to experience large fluctuations in remittances (Amuedo-Dorantes and Pozo 2010; De Brauw and Mu 2011).

The time lag, initial economic difficulties, and fluctuations of remittances facing family left behind tend to be greater for families of international migrants because such a move often entails a longer period of adjustment than internal migration (Kandel 2003). These constraints may be intensified for families of undocumented immigrants as a result of rising costs of illegal immigration and precarious conditions facing illegal immigrants (Durand and Massey 2006). Therefore, although in theory international migration can generate a higher level of remuneration than internal migration due to differences in wage rates between sending and receiving nations, it is not always the case.

How do these competing forces balance out to affect the health and growth of children left behind? This question has drawn growing interest but thus far most attention has been paid to child health rather than physical growth. In one of the earliest studies, Kanaiaupuni and Donato (1999) found higher rates of infant mortality in Mexican communities with high levels of U.S. migration, but this negative effect diminishes as the level of remittances increases. Frank and Hummer (2002) demonstrated that having a U.S. migrant in the household has a positive effect on birth weight in Mexico. Carletto et al. (2011) provided similar evidence for a positive impact of migration to the U.S. on the height-for-age of children left behind in Guatemala. The importance of migration and remittances is particularly salient in times of crisis, which have been shown to mitigate declines in child growth during food crisis in El Salvador (de Brauw 2011).

Several studies have taken into account potential selection bias that the observed relationship may be due to certain family characteristics that affect both out-migration and child health. Using historic migration rates and the distance to the U.S. as instrumental variables, Lopez-Cordoba (2005) found that the receipt of remittances is associated with lower rates of infant mortality in Mexico. Hildebrandt and McKenzie (2005) demonstrated that the presence of U.S. migrants in the household has a negative impact on the probability that children are breastfed, fully vaccinated, and use health services, though it also lowers the risks of infant mortality and low birth weight. Nobles (2007) specifically examined young children's growth in Mexico. Using sibling-pair comparisons, she finds that parental migration outside of the community is associated with lower height-for-age. Among a small body of research in non-Mexico settings, a positive impact of remittances on the nutritional status of children is found in Ecuador (Anton 2010) and rural Nicaragua (Macours and Vakis 2010).

These previous studies provided invaluable insights. However, they yielded inconsistent findings. It is not yet well understood under what circumstances children benefit or suffer from parental out-migration. The present study sought to speak to this gap by comparing children of internal and international migrants. To assess the generality of the results, the analysis was conducted in two settings (Mexico and Indonesia).

2.3. Study settings: Mexico and Indonesia

For the comparison, it is important to identify settings with both large internal and international migration, that are situated at different levels of development and health profiles, and that have comparable data available for a meaningful comparison. These criteria led me to choose Mexico and Indonesia.

First, the two countries experience large-scale migration, both overseas and within the country. Mexican overseas migrants now represent about 15% of the Mexican working-age population (Mishra 2007). The vast majority of these immigrants go to the United States and many of them are undocumented. The dynamics of Mexico-US migration have shifted since the mid-1990s, reflected in the sharply decreased rate of circular migration because of the tightening militarization of the border (Mendoza 2008). Internal migration within Mexico has also been voluminous, though it is steadily being replaced by U.S. migration (Boucher et al. 2005). Between 1990 and 2002, the share of Mexican migrants at domestic destinations rose from 11% to 15% (Mora and Taylor 2004).

Indonesia has also experienced large-scale internal and international migration, though to a lesser extent than Mexico (Rogers et al. 2004; Hugo 2005). Since the late 1970s the country has been a primary source of unskilled migrant workers to Southeast Asian countries and the

Middle East. By the early 2000s the country sent around 2.5 million immigrants (Hugo 2005). About 70% of them are women working in the informal sector, mostly as domestic helpers. Internal migration is more substantial than international migration in Indonesia (Hugo 2005), with large cities such as Jakarta and Surabaya as the main domestic destinations. The proportion of domestic and international migrants combined is estimated to be around 15% (Rogers et al. 2004).

Second, while being classified as a developing country, Mexico has experienced relatively high levels of economic development compared to many other developing settings (GDP per capita is $14,183; World Bank 2005). Mexico has undergone a nutritional transition and has witnessed a rapid increase in rates of overweight and obesity (Rivera et al. 2002). This is largely a result of dietary shifts towards highly processed and unhealthy foods. As for child growth, while child malnutrition still exists, the magnitude is less than in many other developing countries. Less than 20% of children suffer from malnutrition in Mexico (UNICEF 2005). Moderate and severe stunting occurs in 18% of Mexican children under 5. The rate of underweight is only below 4%, while the overweight and obese rate is 25%.

By contrast, Indonesia remains a poor country (GDP per capita is $3,730; World Bank 2005). In many parts of the country, food insecurity and malnutrition remain highly prevalent. Over 30% of children are malnourished (UNICEF 2005). Stunting is a particularly serious health concern, affecting 37% of children under age five. The proportion of children who are underweight remained at about 18% in the late 2000s. By contrast, only 5% of children were overweight in the mid-2000s.

2.4. Hypotheses

The present study focuses on studying how children left behind by internal and international migrant parents fare comparing to each other and comparing to the children of non-migrant parents. As discussed above, international migration implies longer durations of family disruption than internal migration, which tends to result in great disruptions in caregiving practices. In the meantime, while international migration can generate a higher level of remittances, families left behind by international migrants may face fluctuations in remittances. Taken together, the net effect of international out-migration on children's education may be similar to or even more detrimental than that of internal migration (hypothesis 1).

I also examine an auxiliary question: How does the relationship vary by children's age? Younger children tend to have an especially strong need for extensive care (Waldfogel 2006). They rely almost exclusively on caregivers for frequent nursing and feeding. Older children, while becoming more independent, depend on a good variety of foods for sustained growth (Scholder et al. 2013). This may result in a greater need for material resources. Thus, the disruptive effect of parental out-migration may be greater for younger children, while the economic benefits of migration should be more importance for older children. On balance, young children tend to suffer more from parental out-migration than older children (hypothesis 2).

3. Methods

3.1. Data

The present research is facilitated by comparable longitudinal data (the Indonesian Family Life Survey [IFLS] and the Mexican Family Life Survey [MxFLS]). Both are large-scale national representative surveys. The two data sets have excellent comparability with respect to study design, content, and specific measures.

Two waves of the MxFLS are available. MxFLS1 was collected in 2002 and interviewed 35,677 individuals in 8,440 households representative of the Mexican population in urban and rural areas (Rubalcava and Teruel 2006). MxFLS2 was fielded in 2005-2006 to re-interview all members of the original households, including migrants both within Mexico and to the U.S. It achieved a high follow-up rate of 91%. The final sample of MxFLS2 consists of 35,089 individuals.

Four waves of the IFLS are available. The first wave was conducted in 13 out of 27 provinces in Indonesia in 1993, and interviewed 7,224 households and 22,347 individuals. In 1997, IFLS2 was conducted to re-interview all IFLS1 households and respondents. IFLS3 and IFLS4 were fielded in 2000 and 2007 and successfully interviewed over 80% of all households and individuals in previous waves (Strauss et al. 2004). The final sample of IFLS included over 50,000 individuals across all waves. For the present study, IFLS3 and IFLS4 were used because they allow for distinguishing between internal and international out-migration.

The analytic sample included children between age 0 and 15 across waves of each survey (age 15 was used in both surveys to divide adults and children). Specifically, the analysis was performed on children age 0-12 in MxFLS1 and children age 0-8 in IFLS3 (who became age 15 or under by MxFLS2 and IFLS4). The attrition rate for eligible children in IFLS was 24.9% between 2000 and 2007. The rate in MxFLS between 2002 and 2005 is 12.5%. The amount of missing information in both surveys was relatively small, with the exception of anthropometric measures (height and weight). Overall 18.5% and 14.7% of the analytic sample have missing data, respectively, in IFLS and MxFLS. The number of panel children included for final analysis in Indonesia and Mexico was 5,246 and 3,484. I conducted sensitivity analysis using multiple imputation methods for missing data, which yield similar results.

3.2. Variables

The variables used in the analysis were constructed very similarly for the MxFLS and IFLS data to enhance comparability. Anthropometric measurement was used to create children's growth indicators, namely height-for-age z-scores (HAZ) and BMI-for-age z-scores (BMIZ). Z-scores are commonly used to study child health in developing economies. They were created by comparing each child to an international standard population of children of the same age and sex, where the standard population reflects normal child growth under optimal conditions. The revised WHO standards in 2007 (and the Anthro macros developed by WHO) were implemented. They extend the previous age-restricted (under 5) standards to include appropriate references for children age 5 to 19, thereby allowing for studying child growth across a wide age range (Onis et al. 2007).

HAZ reflects relatively long-term nutritional and health status. Low HAZ is associated with poor nutrition, insufficient protein and energy intake, frequent infections, and sustained inappropriate feeding practices (Waterlow et al. 1977). Young children are especially vulnerable to shocks that could lead to low HAZ. BMIZ is a relatively short-term measure of nutritional status for children age 2 and above, which reflects deficiencies or excesses in nutrition. It is considered more accurate than weight-for-age (WHO 2007).

The main predictor is parental out-migration status. The surveys include a detailed household roster with information linking a child with his or her father and mother as well as information on the parents' status (i.e., whether they are alive, whether they are married, whether they currently live in the household, and if not, the current place of residence [domestic or international]). To focus on parental out-migration, a small proportion of children whose parents

were divorced or dead were dropped in the analysis. I created a measure of parental out-migration status in each wave of the two surveys, distinguishing children in families where 1) both parents were present, 2) one or both parents had migrated and currently lived in a domestic destination (internal migrants), and 3) one or both parents had migrated and currently lived in a foreign country (international migrants). Very few children (less than 0.5%) had one internal migrant parent and one international migrant parent. Because it is such a small sample, the results remain consistent whether I dropped these children and categorized them as children with international migrant parents (as it incurs more costs and benefits than internal migration). For the main models, I used the latter classification. As additional analyses, I studied father's migration status alone and disaggregated the measure by mother's and father's out-migration status. Duration of migration is an important factor that can shape child well-being. However, this study does not have sufficient information to accurately ascertain parent's migration duration for a large number of parents because of missing data on the year or month of migration.

Other covariates included children's sex and age (both linear and quadratic terms to capture nonlinear trajectories of growth) and the highest educational level of adults in the households. The analysis also controlled for the number of children age 0-15 in the household, an indicator of competition for family resources, and whether children lived in extended families (presence of grandparents and other relatives). The analysis further controlled for household sanitation—whether the household used piped water. Household income or expenditures were not included because they may partially reflect migrants' remittances and confound the estimates of parental out-migration status.

The community-level variables included urban and rural residence and the state/province of residence. Two aggregated community-level variables were also included: the logarithm of

average household per capita monthly expenditures as an indicator of the level of local socioeconomic development, and the proportion of households with children (age 0-15) of emigrant parents, which reflects the institutionalization and norm of parental migration in the community. The migration prevalence measure was included because it could influence how caregivers cope with out-migration, which in turn affects the quality of their caregiving practices.

3.3. Methods

Longitudinal data analysis was used to adjust for potential endogeneity bias. First, migrants tend to be healthier than non-migrants (the "healthy migrant effect") and children left behind could share with their parents a latent genetic disposition for good health. Also, certain shared unobserved factors may both select parents into out-migration and predispose children to better or worse health (e.g., a disadvantaged family background), or drive caregivers toward good or poor child-rearing practices (e.g., motivation). Many of these aforementioned factors are unmeasured in the data or missing for absent parents (e.g., birth weight/height of child, parents' height, and pre-migration family conditions). I thus used longitudinal data to control for latent individual and familial characteristics via fixed-effect models (FE), as formulated below:

$$G_{it} = \mu_t + \beta PM_{it} + \gamma \mathbf{X}_{it} + \alpha_i + \varepsilon_{it} \qquad (1)$$

where G_{it} is the continuous growth outcomes (HAZ or BMIZ) for child i at year t; PM_{it} is parental out-migration status; $\boldsymbol{X}_{it}$ is a vector of other covariates at the child, family, and community level; μ_t is the intercept; $_{it}$ is the error term; and α_i represents unobserved factors specific to each child and constant over time that may affect both parental out-migration and children's growth. FE models can be estimated by pooling the two waves of each survey and including a dummy variable for each child (α_i), or equivalently purging out α_i by differencing the

equation across waves of each survey. The FE approach relies on the assumption that unobserved heterogeneity is time invariant. Whereas I cannot rule out time-varying selection factors, this assumption may not be seriously violated because many endogenous factors are related to family background or highly heritable and thus rather consistent across the study period. To adjust for possible time-varying factors, I included interaction terms between province of residence and survey year to account for macroeconomic shocks and province-level contextual effects. I also included household per capita income as controls for socioeconomic shocks at the household level.

4. Results

4.1. Descriptive statistics

Descriptive statistics on parental out-migration status are shown in Table 1. In Mexico, 12.2% of children were left behind by one or both parents in 2002, compared to 8% of children in Indonesia in 2000. Over time the percentage of left-behind children increased to 13.6% and 9.4%, respectively, in Mexico and Indonesia. Much of the increase was attributed to growing international migration. At the individual level, the proportion of children who experienced changes between three categories of parental migration status was 9.5% in Mexico and 9.2% in Indonesia.

International out-migration is more common than internal out-migration in Mexico, but this pattern is the opposite in Indonesia. These observations largely hold when mother's and father's out-migration status were examined separately. The out-migration of mothers alone is generally a rare event, with the exception of female immigrant workers from Indonesia. To obtain more stable results, I thus combined mother's out-migration with both parents' out-

migration in the regression analysis.

[Table 1 about here]

Table 2 presents descriptive statistics for variables used in the analysis. Mexico had a better nutritional profile than Indonesia. Both HAZ and BMIZ were much lower in Indonesia (over 1 and 0.5 standard deviations below the international reference), suggesting that Indonesian children face greater growth hurdles than Mexican children. For brevity, descriptive statistics of other variables are not discussed here.

[Table 2 about here]

4.2. Regression results

Table 3 presents results from the FE regressions of children's HAZ. Results point to some difference between internal and international migration. In Mexico, children left behind by international migrant parents seemed to fare worse in height growth than both children of non-migrant parents and those left behind by internal migrant parents, though this difference lacks statistical significance at the 0.05 level. Similarly in Indonesia, children left behind by internal migrant parents fared significantly better than both those with non-migrant parents and those with international migrant parents. In general, the results are quite consistent with hypothesis 1.

The overall (net) effect of parental out-migration is different between the two countries. In Mexico, children left behind by international migrant parents experience significantly lower height growth. Children of internal migrant parents do not fare significantly differently from children with both parents. In Indonesia, by contrast, the coefficients turn positive, especially for those left behind by internal migrant parents. However, children left behind by international migrant parents are not significantly different from those with non-migrant parents. Coefficients

of other covariates are generally as expected and thus not discussed for brevity.

[Table 3 about here]

Furthermore, the results provide some evidence for age variations (hypothesis 2) in Mexico. For children left behind by international migrant parents, the age interaction is positive and significant (β=0.043, *p-value*<0.05), while the main effect of parental out-migration is negative (β=-0.534, *p-value*<0.01). This suggests that young children are more vulnerable to family disruptions due to out-migration, as they have a greater need for intensive care and feeding. Because early years are particularly crucial for children's physical growth, the health consequences of parental out-migration could carry long-term implications for well-being. These patterns are displayed in Figure 1, where children of international migrant parents are shorter than the other two groups, especially at younger ages. In Indonesia (Figure 2), the age interactions are insignificant (e.g., for children left behind by internal migrant parents: β=0.013, *p-value*<0.95). This suggests that the material benefits conferred by out-migration seem to help children garner growth gains throughout their development.

[Figure 1 and 2 about here]

Turning to BMIZ (Table 4), the results show no clear relationship between parental out-migration and BMIZ in Mexico, which may be explained by the multiple processes associated with weight growth. On the one hand, children experiencing disrupted caregiving practices may suffer disrupted weight growth. On the other hand, Mexico has undergone a rapid nutritional transition with overweight and obesity becoming serious public health concerns. This is partly attributed to international migration from the country, which tends to bring about dietary changes (e.g., more fat and sugar-based food) in families left behind, subsequently raising the risks of overweight. But high fat and sugar diet is not necessarily related to height growth of children

(Skinner et al. 1999). These two offsetting processes likely lead to a neutral association between out-migration and BMI. In Indonesia, children left behind by internal migrant parents appear to enjoy slightly better weight growth, but the coefficient is only marginally significant. This potential advantage is offset by the greater disruptions encountered by the children of international migrant parents. The relationship between out-migration and weight growth is generally weaker than that with height growth in both countries. This may be partly due to an ongoing nutritional transition in the developing world, which leads to noticeable weight gains for many children, even those of non-migrant parents. As a result, slow height growth is a more serious problem than slow weight growth.

[Table 4 about here]

4.3. Cross-country difference

While the cross-stream difference is supported in both study settings, the overall net effect of migration shows substantial cross-country difference, with a positive effect in Indonesia but a negative one in Mexico. What could be the possible explanations for this difference? A plausible explanation relates to the different levels of development and nutritional profiles in the two countries. Earlier research on child development in developing economies finds that basic material inputs are most important for children's well-being in resource-poor settings with inadequate or highly variable resources, but are less important in contexts that have achieved a minimum level of basic resources (Lockheed et al. 1986). Following this argument, it is conceivable that remittances from migrant parents have a greater impact on children's nutritional status in less developed settings with a higher prevalence of malnutrition (e.g., Indonesia). In such settings, these material resources can tip the balance as to whether the family is able to provide necessary resources for children. This positive economic impact may largely offset the

disruptive effect of out-migration. By contrast, in relatively more developed Mexico where children generally have better nutritional status, remittances may not necessarily grant left-behind children a significant advantage. This leads to an overall neutral or even negative impact of out-migration.

I also explored other possibilities but find them less plausible. For example, it is probable that the more negative coefficient in Mexico may be partly due to the large-scale undocumented immigration from Mexico, which entails greater family disruption and less regular remittances. This, while plausible, is unlikely to be an overarching explanation because even when only comparing children left behind by internal migrants in the two countries, where legal status is no longer an issue, the coefficients across various models still point to a more negative effect in Mexico.

5. Discussion

The present study joins a growing literature on the consequences of migration for children left behind by offering a comparative analysis of different streams of out-migration (internal and international). The results, while demonstrating an important association between parental out-migration and children's physical growth, also highlight the complexities of the relationship. Rather consistently across the two study settings, international out-migration tends to have a more deleterious or less positive effect on children than internal migration. This difference is presumably due to the longer duration of family disruption and fluctuations in remittances. While improved material resources from remittances could generate some positive effects, this is mostly seen in children left behind by internal migrant parents. For international out-migration, the substantial disruptions in household and childcare arrangements present important hurdles for

migrant families. This can offset or even reverse the potential benefits resulting from migrants' remittances. The results also show some variations by which parent migrates and children's age. I find that, with a few exceptions, the detrimental effect of migration is greater when mothers or both parents migrate, and for younger children.

The aforementioned results largely apply to children's height growth. This is especially alarming because height faltering is often difficult to reverse and can carry long-lasting consequences for health and well-being (Alderman et al. 2002). The effect size is also non-trivial. For example, a coefficient of 0.4 translates into a 2-centimeter height difference for five-year old girls and boys that are otherwise similar. By contrast, for BMI, the analysis does not show a clear pattern, presumably because it is subject to multiple offsetting processes associated with out-migration. Also, because BMI reflects shorter-term nutritional status, the effect of out-migration tends to be more transitory and may not be fully captured in the analysis.

The findings also reveal some interesting cross-country differences. Out-migration is sometimes an advantage for children in Indonesia, but it results in a disadvantage for children in Mexico. One plausible explanation hinges on the different levels of socioeconomic development of the country under investigation. The two-country comparison is useful not only in identifying differences by context but also in demonstrating similar patterns of the role of parental migration (as shown above, a more negative consequence of international migration for children than domestic migration). However, I cannot definitively pin down the factors underlying the observed cross-country variation. Larger-scale cross-national comparisons with information on development indicators and government subsidies are needed to reach more solid conclusions.

Overall, the results help reconcile findings in previous studies of children left behind that depict a positive, neutral, or negative effect of parental migration. A negative impact of parental

migration on health was sometimes found in Mexico and in the context of international migration (Nobles 2007), whereas the net impact tends to be less adverse and may even turn positive in internal migration and more resource-constrained countries (Anton 2010; Macours and Vakis 2010). The negative impact of migration seems to occur when parental migration status is distinguished from migration of other family members and when child well-being beyond birth outcomes was examined (Nobles 2007). In studies that focus on birth outcomes (i.e., infant mortality, birth weight) and use measures of household migration or remittance status, a positive effect of migration is often found (Hildebrandt and McKenzie 2005; Lopez-Cordoba 2005). This could in part be because such a migration measure captures common situations where migrants are household members other than the parents (i.e., siblings, other relatives). This type of family migration arrangements (where parents stay but other members migrate) gives rise to economic improvements from remittances without incurring family disruptions due to parental migration.

Several limitations warrant discussion. The data lack important information related to migrants' remittances and their spending, caregiving practices of the main caretaker and input from other family members who provide care for children. These limitations preclude many interesting analyses that could uncover mediating mechanisms of the effect of out-migration. Although IFLS and MxFLS represent national surveys with unusually high quality, they were not designed specifically for understanding the effects of migration and remittances. For example, both surveys provide at best indirect and incomplete information on remittances in the form of transfers from non-coresident family members (i.e., parents, siblings, and children). For instance, one important limitation is that the questions neglect a common situation where the spouse of the respondent was a migrant. Therefore, to more fully understand the role of migration for child

outcomes, improved data collection efforts are needed, which gather a rich set of information specific to multiple complex mechanisms underlying the effect of migration.

Moreover, despite the fact that the fixed-effects regressions and various robustness checks seemed to point in the same direction, I cannot completely rule out all potential biases, especially those due to time-varying latent selection factors. For example, if parents make migration decisions in order to improve child health and growth, then there tends to be reverse causation and the positive aspect of migration is likely to be overestimated. Despite this possibility, the fact that the results point in different directions in the two study settings suggests that this potential bias may not be a major concern, because if it is the main story, we are likely to observe largely positive coefficients across countries and streams. It should be noted, however, the challenge to identifying a causal effect of migration reflects the very nature of the phenomenon—that parental migration cannot be randomly assigned. In the lack of experimental data, fixed-effects regression is a reasonable strategy. Future research including a rich set of potential confounding factors (time-varying) will yield more robust results.

The findings demonstrate that in many scenarios, especially in the case of international migration, parental out-migration has not granted left-behind children significant comparative advantage in growth. This is disheartening because the sheer number of children affected is growing and one of the primary reasons for migration is to improve children's well-being. The responses to the problems brought about by parental out-migration are certainly not to impose stringent mobility restrictions, but to devise effective programs that can address the social costs of out-migration while enhancing its potential economic benefits (e.g., good–quality substitute child care; support for remaining caregiver; effort to allow migrant parents to stay in close contact; efficient transmission and receipt of remittances). Also, given that successful poverty-

alleviation programs have been running in many developing countries (e.g., conditional cash transfers in Mexico and microfinance programs in Indonesia), its expansion to regions with large out-migration may provide an alternative to migration, which allows families to improve their economic well-being without having to endure long and stressful family separation.

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Table 1 Parental emigration status (percentage), Mexico 2002-2005 and Indonesia 2000-2007

	Mexico		Indonesia	
	2002	2005	2000	2007
Both parents nonmigrants	87.8	86.4	92.0	90.6
One or both parents internal migrants	5.4	5.2	5.1	5.3
One or both parents international migrants	6.8	8.4	2.9	4.1
N	5,246	5,246	3,484	3,484
Both parents nonmigrants	87.8	86.4	92.8	90.6
Father internal migrant	3.8	3.6	2.9	3.1
Mother internal migrant	0.2	0.2	0.1	0.2
Both parents internal migrants	1.4	1.4	1.8	2.0
Father international migrant	4.5	5.6	1.4	1.7
Mother international migrant	0.1	0.2	0.8	1.8
Both parents international migrants	2.2	2.6	0.1	0.6
N	5,246	5,246	3,484	3,484

Table 2 Descriptive statistics (mean and percentage) of children in the survey sample, Mexico 2002-2005 and Indonesia 2000-2007

	Mexico	Indonesia
HAZ: Height-for-age z scores (Age 0-15)	-0.08	-1.11
	(1.45)	(1.27)
Stunting (Age 0-15)	8.0%	23.5%
BMIZ: BMI-for-age z scores (Age 2-15)	0.51	-0.52
	(1.26)	(1.29)
Age	8.2	8.5
	(3.6)	(4.1)
Male	50.9%	51.0%
Household human capital		
Primary school and no education	46.5%	43.6%
Junior high education	30.3%	31.5%
High school education or above	23.2%	24.9%
Extended family arrangement	18.7%	29.7%
Number of children in household (Age 0-15)	2.4	2.7
	(1.6)	(1.4)
Rural residence	43.8%	54.4%
Piped water in household	36.3%	28.6%
Community average household per capita monthly expenditures	1,678	447,755
	(894)	(428,728)
Community proportion of households with children of emigrant parents	0.17	0.14
	(0.11)	(0.13)

Note: Standard deviations for continuous variables are in parentheses. Currency for expenditure data is Peso in Mexico and Rupiah in Indonesia. In 2005, 1 Rupiah = 0.0015 Mexican Peso (1 US dolloar is about 9,700 Rupiah, and 11 Peso).

Table 3 Estimated effects of parental migration status and other explanatory variables on children's height-for-age (HAZ), using fixed-effects regressions, Mexico 2002-2005 and Indonesia 2000-2007

	Mexico	Indonesia
Age	-0.098***	-0.195**
	(0.021)	(0.013)
Age squared	-0.002	0.008***
	(0.002)	(0.001)
Parental emigration status (ref. Parents nonmigrants)		
Parents internal migrants	-0.044	0.402**
	(0.099)	(0.133)
Parents international migrants	-0.205*	0.096
	(0.083)	(0.601)
Household human capital (ref. Primary school and no education)		
Junior high education	0.081	0.034
	(0.057)	(0.064)
High school education or above	0.103	0.085*
	(0.082)	(0.039)
Number of children in household	-0.048+	-0.050*
	(0.026)	(0.024)
Extended family arrangement	0.019	0.056
	(0.066)	(0.048)
Piped water in household	0.082*	0.075*
	(0.041)	(0.032)
Rural residence	-0.108	-0.224+
	(0.167)	(0.121)
Community average household per capita monthly expenditures (logged)	0.119+	0.126**
	(0.061)	(0.027)
Community proportion of households with emigrant parents	-0.189	0.195
	(0.282)	(0.134)
Intercept	0.823*	-2.005***
	(0.396)	(0.387)
N	10,492	6,968

+p <0.1; *p <0.05; **p <0.01; ***p <0.001.

Note: Standard errors are in parentheses. Year and province variables and interactions are not shown. Other variables such as gender are omitted in the fixed-effects models.

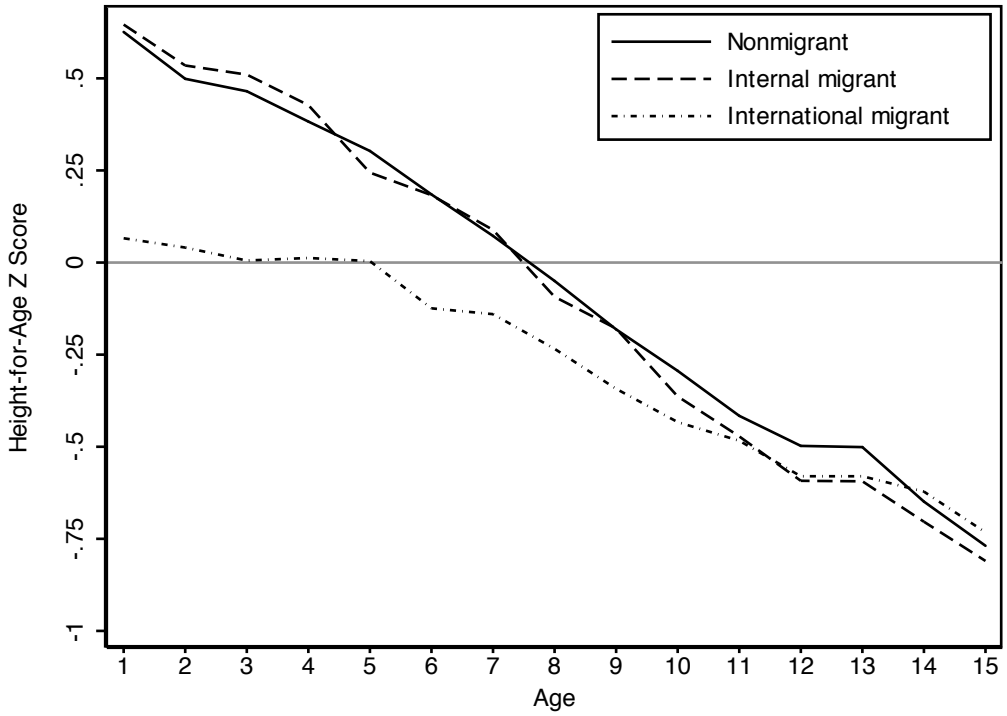
Table 4 Estimated effects of parental migration status and other explanatory variables on children's BMI-for-age (BMIZ), using fixed-effects regressions, Mexico 2002-2005 and Indonesia 2000-2007

	Mexico	Indonesia
Age	0.025	-0.016
	(0.019)	(0.011)
Age squared	-0.003	0.002*
	(0.001)	(0.001)
Parental emigration status		
(ref. Parents nonmigrants)		
Parents internal migrants	-0.042	0.262+
	(0.089)	(0.141)
Parents international migrants	0.058	0.079
	(0.073)	(0.081)
Household human capital		
(ref. Primary school and no education)		
Junior high education	0.066	0.077
	(0.055)	(0.076)
High school education or above	0.138+	0.157+
	(0.074)	(0.093)
Number of children in household	-0.034	-0.021
	(0.024)	(0.019)
Extended family arrangement	0.034	0.001
	(0.065)	(0.057)
Piped water in household	0.034	0.192**
	(0.065)	(0.058)
Rural residence	-0.033	-0.031
	(0.095)	(0.078)
Community average household per capita monthly expenditures (logged)	0.055	0.024
	(0.057)	(0.033)
Community proportion of households with emigrant parents	-0.147	0.081
	(0.253)	(0.169)
Intercept	0.917*	0.960*
	(0.401)	(0.413)
N	9,892	6,334

+p <0.1; *p <0.05; **p <0.01.

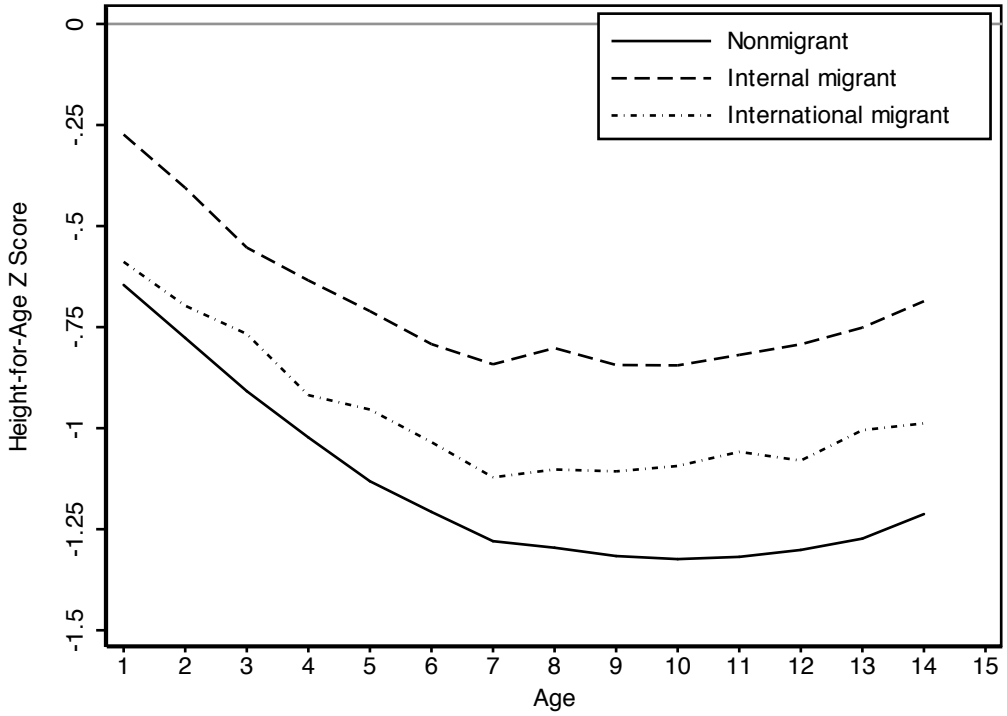
Note: Standard errors are in parentheses. The sample sizes of the BMIZ regressions were slightly smaller because this measure was restricted to children age 2-15.

Figure 1 Predicted values of children's height-for-age (HAZ) by parental migration status, using using fixed-effects regressions, Mexico 2002-2005



Note: Horizontal line marked 0 indicates the median for the international reference

Figure 2 Predicted values of children's height-for-age (HAZ) by parental migration status, using using fixed-effects regressions, Indonesia 2000-2007



Note: Horizontal line marked 0 indicates the median for the international reference