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Does Having a Migrant Parent Reduce the Risk of Undernutrition for Children Who Stay Behind in South-East Asia?

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Abstract

Many parents from South-East Asia who go overseas to work are motivated by a desire to secure a better future for their children, yet the health consequences for children who stay behind are poorly understood. This study is the first cross-country comparison to explore the relationships between parental migration and the risk of undernutrition (stunting) for primary school-aged children. The analysis uses data from the CHAMPSEA Project for children aged 9 to 11 years in the Philippines (N = 480) and Vietnam (N = 482). A series of logistic regression models compares outcomes for children living in transnational households and children living with both parents in non-migrant households in the same communities.

We find no general advantage of having a migrant parent. Rather there is a reduced risk of stunting only for some left-behind children in the Philippines, whereas having a caregiver with low educational attainment is a major risk factor for all children. The findings point to a complex set of relationships between parental migration and child nutrition, possibly reflecting differential opportunities for accumulating household wealth through overseas earnings. Moreover, differences between the two countries caution against generalizing across national or cultural groups. We conclude by considering the implications of the findings for theories of transnationalism and for the UN Millennium Development Goal of reducing childhood undernutrition.

Introduction

The increase in overseas labor migration from many countries in South-East Asia over the last few decades has seen a growth in the number of transnational households with members living in more than one country. The transnational household has thus become the site of livelihood strategies and social practices negotiated across distance, and the lived reality for millions of South-East Asians. Although many studies have examined different aspects of transnationalism, the health and well-being consequences of living in a transnational household for children who stay behind when one, or both, of their parents migrate have been relatively neglected. On the one hand, we might expect the absence of a parent,

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especially perhaps a mother, to impact adversely on the quality of childcare, love and attention that the child receives (Skrbis, 2008). On the other hand, the great majority of migrant parents will send substantial sums of money in remittances to close family members they leave behind. Parents often emphasize providing for their children and giving them better opportunities in the future when explaining their motivations for working overseas (Parreñas, 2001). The impacts of parental migration on children's health and well-being may therefore be the outcome of a complex interplay of risk and resilience (Graham et al., 2012). Increased wealth in transnational households will only serve to protect child health if it is not outweighed by any negative effects of parental absence, yet few systematic studies to date have recognized this complexity or compared the implications of parental absence overseas for children in different countries. Anecdotal evidence may highlight important concerns but it does not provide a sound evidence base for livelihood decisions at the household level or government policy at the national scale. With many millions of children in the global South now growing up in transnational households, there is an urgent need to improve understanding. The main aim of our project on Child Health and Migrant Parents in South-East Asia (CHAMPSEA) is to contribute to this research agenda.

In this paper, we investigate the impact of parental migration on one of the most basic requirement for child health - adequate nutrition. We ask whether having a migrant parent is associated with a reduced risk of undernutrition for children who stay behind. We examine outcomes for children aged 9, 10, and 11 years (i.e., children in middle childhood) living in transnational households in two South-East Asian countries. Undernutrition in this age group is less often studied compared with the extensive literature on under five-year-olds, possibly because of the complexities involved in the longer time period during which insults to nutritional status can occur. However, a few studies have examined undernutrition among school children in low- and middle-income countries such as India (von Laer Tschudin et al., 2009), Nigeria (Senbanjo et al., 2011), Iraq (Al-Saffar, 2009) and Iran (Esfarjani et al., 2013). Moreover, understanding risk factors for undernutrition among school-aged children is important because it holds potential policy implications. For example, Senbanjo et al. (2011) concluded their study of stunted growth among school children and adolescents in Southwest Nigeria by advocating the provision of free school-meals in public schools.

This study compares the nutritional status of children in transnational households with outcomes for children of the same ages living with both parents in the same communities. The comparison provides some insight into the counter-factual of what might have happened to these children had their mother or father not migrated. We also consider selection into migration both in modelling the outcomes and in the interpretation of the results, as this factor is likely to introduce bias into the comparison. In addition to providing new evidence on the risks and benefits of parental migration as a livelihood strategy, the study informs theories of transnationalism by extending understanding of 'linked lives' to incorporate the impact of micro-scale transnational practices on non-migrant family members.

We focus on two somewhat different sending countries from the CHAMPSEA Project – the Philippines and Vietnam. The Philippines has been described as 'the prototype of a labor-exporting nation' (Semyonov and Gordodzeisky, 2005:47) and, over the past four decades, its economy has seen an increasing dependence on the remittances sent home by its overseas

foreign workers. It is also the country that has featured most often in previous studies of transnational migration in the region. Vietnam, on the other hand, is a relative newcomer to international circuits of labor within the global economy. While its overseas workforce has been growing since the socio-economic reforms of Doi Moi in the mid-1980s, this phenomenon has drawn relatively little research attention. The comparison is therefore of interest not only for what it tells us about risk and resilience among children who stay behind, but also as an indication of whether or not the experiences of Filipino transnational households are shared by other, less studied, South-East Asian countries.

Labor migration from the two countries, though different in scale, does share some common features. Most pertinent here is the substantial number of parents who now take up temporary work contracts overseas and leave their children behind. Both countries have also experienced a rise in demand for female labor, which has seen an increasing feminization of these labor flows (Hugo, 2005) and thus an increase in the number of mothers who migrate and leave children behind. Moreover, in both the Philippines and Vietnam, child undernutrition remains a serious public health problem despite recent improvements in nutritional status. One common measure of undernutrition is stunting, and, in the period 2003-2008, both countries were among the top 15 in the world with the largest number of children under five years old who were moderately or severely stunted, with stunting prevalence rates of between 34 and 37 percent (UNICEF, 2009).

Several recent studies have examined child nutrition in these countries but there have been very few studies that explicitly examine child nutrition in relation to parental migration overseas. Our aim is to address this knowledge gap using survey data collected in the Philippines and Vietnam in 2008. The lack of previous work on the relationship between child nutrition and parental migration presents particular challenges as there are no extant theoretical frameworks to guide the analysis. This paper is thus exploratory and takes one measure of nutritional status, namely child stunting (low height-for-age), as the outcome of interest. There are four main sections. First, the literature on child nutrition is used to identify possible determinants of nutritional status before considering how parental migration might be expected to influence child stunting. Second, the CHAMPSEA dataset is introduced and the analytical strategy is described. Third, the findings from a series of multivariate models predicting child stunting are reported. Finally, the major relationships between stunting and a series of independent variables, including parental absence overseas, are discussed before conclusions are drawn about future research directions, and the theoretical and policy implications of the findings.

Determinants of Child Stunting

Anthropometric measurements of height and weight, along with data on age and sex, allow the calculation of three standard indicators of children's nutritional status (stunting, wasting and underweight), each indicative of different aspects of undernutrition. We selected stunting as the outcome of interest here because it signifies the cumulative or long-term consequences of chronic malnutrition on physical growth, and because "child height captures the effects of a broad range of economic and social influences on health" (Lutter et al., 2011:23). As Senbajo et al. (2011:364) remark, stunting "reliably gives a picture of the

past nutritional history and the prevailing environmental and socioeconomic circumstances” of the child.

Anthropometric studies of stunting have examined the prevalence, causes and implications of stunting in infancy and childhood, as well as the effects of feeding programs and other interventions. Stunting is an important indicator of severe malnutrition, and WHO has set a target of reducing the prevalence of stunting to under 20 percent in all countries by the year 2020. Globally, it has been estimated that some 200 million children under the age of five are stunted and that 90 percent of the developing world’s stunted children live in Asia and Africa (UNICEF, 2009). Poor nutrition in infancy and childhood is not only detrimental to long-term health and life expectancy but has also been shown to be associated with deficits in cognitive development and schooling outcomes (Mendez and Adair, 1999; Berkman et al., 2002; Daniels and Adair, 2004; Victora et al., 2008; Duc, 2009), as well as being implicated in the intergenerational transmission of socio-economic status (Carvalho, 2012). Progress is thus being made in knowledge of the extent and implications of childhood nutritional deficits but the social determinants of stunting are less well understood. In South-East Asia, studies from several countries have examined the association between diet and height, the severity and timing of stunting, catch-up growth, and the associations between undernutrition and various other factors such as child gender, household socio-economic status, working mothers, childcare practices, private schooling and community characteristics (UNICEF, 2008; Crookston et al., 2010; Petrou and Kupek, 2010; Rahmawati et al., 2010). One early study of Filipino children identified age-specific factors related to new cases of stunting in children under two years of age (Adair and Guilkey, 1997). The possibility of moving out of, as well as into, stunting during childhood is of particular interest as it suggests that standards of nutrition continue to be important throughout childhood.

A large number of studies have identified poverty as the main underlying determinant of stunting in young children, with the poorest countries generally having the highest incidence of stunting (Eckhardt et al., 2005; Black et al., 2008; Paraje, 2009; Petrou and Kupek, 2010). Within a country, the poorest groups also tend to have the highest incidence of chronic undernutrition, although the pattern of economic risk may vary between those living in urban and rural areas. For example, Menon et al. (2000) found a significantly higher incidence of stunting among low socio-economic status (SES) groups compared with high SES groups across a number of countries in Asia, Africa and Latin America, and lower risks of stunting in urban areas compared with rural areas associated with spatial disparities in wealth in several countries. At the household level, poorer families are likely to suffer from greater food insecurity, including reduced access to nutritious food (Pasricha and Biggs, 2010). Urban children may have an advantage in this respect, although risks for stunting may also change with the age of the child. In their study of undernutrition among Filipino children under 30 months in Metro Cebu, Ricci and Becker (1996) reported that risk factors for stunting varied across age and place of residence, such that “household socioeconomic status influenced the risk of stunting earlier in rural than in urban barangays” (Ricci and Becker, 1996:972). For older children, Florentino, Villaveja, and Lana (2002) found other measures of socio-economic status, including type of school (private or public), were associated with nutritional outcomes. Since parental migration is often, though not always,

associated with increased incomes, we might expect children in transnational households to be at lower risk of stunting, or remaining stunted, than their peers in non-migrant households.

Although poverty is a major challenge to food security, wealth differentials do not explain all variations in stunting. In Vietnam in the 1990s, household incomes improved rapidly and there was a dramatic decline of almost a third in the incidence of stunting among 0-60 months old children, from 50.2 percent in 1993 to 34.6 percent in 1998 (Glewwe et al., 2002). This improvement has continued since 2000, although at a slower pace (Khan et al., 2007). However, Glewwe et al. (2002) cautioned against assuming that economic improvement is the main determinant of improved nutrition, as their study found that the impact of increased household expenditure on improvements in children's nutrition was not very large. Other studies, also using data from the Vietnam Living Standards Surveys but incorporating a larger age range of children, offer different conclusions. For children under 10 years of age, O'Donnell, Nicholas, and Van Doorslaer (2009), for example, found much larger effects of improvements in living standards on reductions in child malnutrition. While poverty has been seen as the main cause of stunting in both Vietnam (Khan et al., 2007; O'Donnell et al., 2009) and the Philippines (Mendez and Adair, 1999; Florentino et al., 2002), poverty is a determinant that is associated with a number of other factors.

The conceptual framework developed by UNICEF (1990) has been used to guide analysis in many studies of child nutrition both globally and in South-East Asia (Milman et al., 2005; Pasricha and Biggs, 2010). This framework identifies dietary intake and health as the immediate determinants of children's nutritional status, with dietary intake being influenced by both food security and quality of childcare, and health being influenced by both quality of childcare and health services/environment. While food security is directly influenced by household wealth, quality of care reflects a number of underlying factors including caregiver education and health. Household-level studies have found mother's education to be associated with children's nutritional status in many developing countries (Desai and Alva, 1998; Waters et al., 2004; Boyle et al., 2006; Miller and Rodgers, 2009). Ricci and Becker (1996) reported that lower levels of maternal education were a significant risk factor for stunting among children aged 12 to 24 months in Metro Cebu in the Philippines, and Semba et al. (2008) found that both maternal and paternal education were strong predictors of child stunting in Indonesia and Bangladesh. This suggests that, in the context of parental migration, the quality of child nutrition may be influenced by the education of the principal caregiver.

Parental Migration and Stunting in Children

It is well-established that stunting can impede child development and be detrimental to a child's long-term life chances (UNICEF, 2009). When parents migrate to another country for work leaving children behind, one major motivation is to improve the long-term life chances of their children, often through investments in schooling (ECMI/AOS-Manila et al., 2004). However, it is also possible that increases in household wealth associated with remittances from overseas employment lead to an improvement in children's nutritional status by strengthening food security and, perhaps, allowing the purchase of more nutritional

foods. Although most stunting occurs before a child reaches the age of 36 months and most infants who are stunted remain stunted as adults, there may be multiple pathways into, and out of, stunting. A recent study of infants in South Africa and the Philippines suggested that the risk of undernutrition increases through the weaning process as more infants were stunted at two years of age, compared with at one year of age (Jones et al., 2008). Nevertheless, some children later experience sufficient catch-up growth to recover from stunting, while others become stunted after infancy. This indicates that improved nutrition, even after the age of three years, could reduce the overall prevalence of stunting observed later in childhood. One study using longitudinal data for over 2000 children in the Philippines found around a third of the children stunted at age two were no longer stunted at age 12 (Adair, 1999). It is thus possible that increases in household wealth from the overseas earnings of migrant parents during childhood may serve to promote catch-up growth and significantly reduce stunting prevalence by age 12, with adequate nutrition either moving children out of stunting or ensuring that they do not become stunted during childhood.

In contrast to those who move out of stunting, those children who become stunted after infancy may have experienced a number of insults during childhood that negatively affected their growth. Reductions in nutritional intake provoked by increases in poverty is one plausible pathway, but there are others. Non-dietary influences, including infection or illness and childcare practices or deficits in parental attention, have also been identified as possible causes of poor nutritional status (Semba et al., 2008; UNICEF, 2008). The latter is of particular interest as children left behind by migrant mothers may be more vulnerable to negative effects if a substitute caregiver fails to provide adequate care. Further, the mental health of mothers has also been shown to influence infant growth (Stewart, 2007). In Vietnam, Harpham et al. (2005) found a positive association between maternal common mental disorders (CMD) and having a stunted infant (6 to 18 months), such that the odds of an anxious and depressed mother having a stunted child are around 25 percent greater compared with a mother who is not depressed and anxious; and, in a case-control study of maternal CMD and underweight in children under five years old in Brazil, Santos et al. (2010) found that maternal CMD doubled the risk of moderate or severe malnutrition in children. More generally, if the quality of care is inadequate or declines for any reason, the child is likely to be at greater risk of undernutrition.

The anthropometric literature on child stunting is silent on the impacts of parental migration, but it does allow us to hypothesize that impacts could be both positive and negative. Children in transnational households may be protected by increases in wealth due to overseas earnings on the one hand, but made more vulnerable on the other hand, if the quality of the childcare they receive declines or is inadequate. In both the Philippines and Vietnam, the majority of children are cared for by their mother. In the CHAMPSEA survey, for example, 91 percent of Filipino children and 71 percent of Vietnamese children aged 9-11 years living with both parents were cared for by their mothers. When a mother goes abroad to work, a substitute carer is therefore required. This might be the father, a grandparent or other relative, or even a paid worker. In these circumstances, it is possible that children are more at risk of poor quality care and thus of stunting. In the following analysis, we use individual and household-level data from the CHAMPSEA Project to investigate the hypothesis that having a migrant parent is associated with (a) a migration

effect [expectation of the beneficial influence of overseas earnings on child nutrition]; and (b) a carer effect [expectation of the detrimental impact of a care deficit on child growth] for stunting among children in middle childhood in the Philippines and Vietnam.

Data and Methods

Study Sample

The present study analyzes data from the CHAMPSEA Project on children aged 9-11 years. Anthropometric measures of height and weight were taken for all index children and structured interviews were conducted both with the children themselves and with other members of their households. In each country, households were recruited from a number of communities within two provinces identified as having high rates of overseas migration. To facilitate comparison between children living in transnational and non-migrant households, only those households where the parents of the index child were currently married were recruited into the study. The flexible quota sampling method ensured that transnational households comprised at least 50 percent of the sample and that equal numbers of boys and girls were drawn from non-migrant and transnational households. Only one qualifying child from each household was identified as the index child. All participants were interviewed in local languages using standardized questionnaires tested in a pilot survey and adapted for local idioms. Ethics approval for the study was granted by universities and research institutions in the UK, Singapore and each of the study countries. The resultant samples are not nationally representative as they over-sample the children and households of international labor migrants. There were no available national estimates for the numbers of Filipino or Vietnamese parents working overseas who had left school-aged children behind to allow correction for oversampling or for the non-metropolitan bias of the samples. Nevertheless, a rigorous sampling strategy¹ produced a valuable dataset which enables us to investigate associations between the migration status of a child's household, a range of other variables and the likelihood of the child being stunted.

The analyses focus on two of the CHAMPSEA study countries. Data were collected from communities in the provinces of Laguna and Bulacan in the Philippines and Thai Binh and Hai Duong in Vietnam during 2008. The analytical samples include children living with both parents in non-migrant households and children in transnational households where one parent (mother or father) was an international labor migrant. Cases of children living in transnational households where both parents were international migrants were dropped because of small numbers (n=17, 3.4 percent of the Philippines sample; n=24, 4.7 percent of the Vietnam sample), as were a very small number of cases with incomplete data (n=3 for the Philippines; n=5 for the Vietnam). Table 1 shows the distribution of cases in the analytical sample by household migration status and country.

Measures

The main outcome measure of interest is child stunting. Anthropometric measures of height were taken for each index child by trained staff following WHO guidelines. Stunting is

¹For a more detailed discussion of the sampling strategy see the Editorial Introduction to this volume.

defined as the incidence of child height-for-age z-scores (HAZ) more than two standard deviations below the median of the 2006 WHO Child Growth Standards. HAZ scores were calculated using the WHO Anthro software.

To test our hypothesis of a migration effect and a carer effect, a composite categorical measure of household migration status and child carer status was derived. Four categories were defined: (1) Non-migrant households (both parents usually resident with majority mother carer), which was used as the reference category; and three types of transnational household - (2) father-migrant/mother-carer; (3) mother-migrant/father-carer; (4) parent-migrant/other-carer (either mother or father migrant with non-parental carer). This enabled us to gain a more detailed insight into the relationships between parental migration and child stunting, according to which parent was absent and who was providing care for the index child, while avoiding problems of collinearity.

Potential confounders of any association between living in a transnational household and child stunting in middle childhood were identified from our review of the child nutrition literature. Child characteristics included were child age (in completed years), sex, and low birth weight (under 2,500 grams). Low birth weight is recognized as an important predictor of stunting in early childhood and is included here to control for variations in fetal nutrition and growth. Further, it is likely that the incidence of low birth weight was higher in poorer households and this measure therefore also provides an additional control (along with father's education) for differences in socio-economic status at the time of the child's birth, which were not observed in the survey.

Data on child birth weight were collected from the child's principal carer in one of two ways. Where the precise birth weight was known, this was recorded in full. Where the precise weight was unknown, the carer was asked whether or not the child weighed less than 2.5 kilograms (5.5 pounds) at birth. For the children aged 9, 10, and 11 in the analytical sample, a little more than half (54 percent) of the principal caregivers were able to provide the precise weight measurement. The remainder responded to the second question and, given the potential unreliability of these responses, we conducted analyses both including and excluding such responses. The results were very similar overall, thus the models presented below include all reported cases of low birth weight.

Carer characteristics were included as indicators of the nature of the care the index child received. For children living in transnational households, the migration/carers status variable identified which parent or other carer had the main childcare responsibility. For children living with both parents, mother-child interaction was maintained on a daily basis and only 8.1 percent in the Philippines and 17.6 percent in Vietnam were mainly looked after by another carer. The majority of the other caregivers in these two-parent resident households were fathers (67 percent in the Philippines and 95 percent in Vietnam). In addition to distinguishing different groups according to who looked after the index child, carer educational attainment (upper secondary school or more, lower secondary, primary or less) was included as an important marker of childcare practices. This variable is indicative of completed years of schooling and, for adult carers, can be assumed to be relatively time invariant. Carer mental health (measured using the 20 item Self-Reporting Questionnaire

(SRQ-20), with eight or more positive responses indicating a mental health problem and lower scores, the absence of such a problem) was examined but was not found to be significant as a predictor of stunting in middle childhood. This finding is not surprising as the SRQ score reflects the mental health status of the index child's principal carer at the time of interview and cannot be extrapolated across the child's lifetime. Therefore, the measure of carer's current mental health was not included in the final models.

Household characteristics were also considered as potential confounders. The presence of siblings could result in competition for resources. A variable was therefore included to indicate the number of younger siblings an index child had, with values ranging from 0 to 5. The greater variability in this measure for Filipino children reflects the generally larger family sizes in the Philippines compared to Vietnam. In addition, the number of adults aged 15 and over in the household was included as the size of the household might have an impact on resources available for the child, although in this case adults could be expected to contribute to, as well as consume, household resources. We also considered the presence, or absence, of parents during the crucial years of infancy and early childhood by deriving two binary indicators of whether or not the mother, or the father, was an international migrant during the first 36 months of the index child's life. We investigated a more detailed variable measuring the duration of the mother's or father's absence in the first 36 months of the child's life, but small numbers² precluded the derivation of useful measures for migrant mothers in both countries and, additionally, for migrant fathers in Vietnam. We tested the duration variable for migrant fathers in the model for the Philippines (not shown) and found that it was not significant and did not improve the model fit. Hence, the models reported below use the binary variable indicating whether or not a mother, or father, was away in the first three years of their child's life.

Selection Issues

In order to take account of potentially unobserved characteristics influencing selection into migration (whereby, for example, parents in higher socio-economic status households were more likely to have chosen to work abroad) which might confound the comparison between index children in non-migrant and transnational households, we sought a measure that would capture the socio-economic status of the household prior to migration. In the absence of retrospective data on household income in the CHAMPSEA dataset, we examined two possible controls for selection. These were father's occupation at the time of the index child's birth and father's educational attainment, which has been used as an indicator of socio-economic status in other recent studies (Carvalho, 2012). In contrast to the educational measure, we found no significant difference between non-migrant and transnational households in father's occupation at the time of the index child's birth. We therefore included father's educational attainment as a surrogate for prior socio-economic status and a more robust control than occupation for selection into migration. Two categories of educational attainment were derived. Primary education or less was grouped with lower secondary education because of the small number of fathers who had not proceeded beyond

²For Vietnam, only five mothers and four fathers were working abroad in the first 36 months of the index child's life. The comparable figures for the Philippines are 11 mothers and 79 fathers.

primary school; likewise the small numbers with post-secondary school education were grouped with those who had completed secondary school. Since both categories therefore relate to school qualifications (upper secondary or more; lower secondary, primary or less), it is highly likely that these were obtained before the birth of the index child. Interestingly, fathers in all types of transnational households in the Philippines have, on average, significantly higher educational attainment than their counterparts in non-migrant households ($\chi^2 = 30.90$, $p < 0.001$). Although the opposite is observed in the case of the Vietnamese fathers, with a slightly higher percentage of those in non-migrant households having higher educational attainment, the difference is not statistically significant ($\chi^2 = 7.03$, $p < 0.1$).

Current Socio-economic Status

The final variable included in the fully-adjusted model is a composite wealth index, based on the methodology by the Young Lives project (www.young-lives.org.uk). We include it as an indicator of the current socio-economic status of the household and its access to health-related resources. The index summarizes scores for housing quality, consumer durables and services including electricity, source of drinking water and sanitation. Scores within each country sample were divided into quintiles and then grouped into three categories of low (first and second quintile), medium (third and fourth quintile) and high (fifth quintile) wealth for the analysis, following Filmer and Pritchett (2001). It should be noted that the wealth index provides a measure of relative household wealth within a country sample. High wealth in the Philippines cannot therefore be equated with high wealth in Vietnam, where levels of wealth are lower overall. However, the advantage of this index over a measure of current income is that it is a marker of living conditions reflecting accumulated wealth over a period of time (including the impact of any remittances from overseas earnings), and can be compared across different households and communities.

Analytical Methods

To provide an overview of the anthropometric data, mean heights for boys and girls were compared with the WHO Child Growth Standards for each year of age, and separately for children living in non-migrant households and transnational households in (i) the Philippines, and (ii) Vietnam. The results were graphed to allow a visual comparison of differences between groups relative to growth standards.

A conceptual framework was then devised to guide the multivariate analysis (Figure 1). A series of three hierarchical logistic regression models was fitted to estimate the effects of living in different types of transnational households on the odds of an index child being stunted at ages 9-11. Separate models were fitted for Filipino and Vietnamese children. Groups of covariates were added to the model in sequence and the aim was to explore how each addition affected the relationship between living in a transnational household and child stunting. In particular, we expected to find an association between living in a transnational household and a reduced risk of child stunting (pointing to the positive impact of overseas earnings on nutrition), at least for children of migrant fathers. For children of migrant mothers, we expected a strengthening of this relationship once carer education was added to account for a possible care deficit. We also expected an attenuation of the main migration

effects when the household wealth variable was added, indicating that any advantages of parental migration for child stunting are likely to operate mainly through the accumulation of wealth from overseas earnings. Model A (the base model) tested the relationship between migrant-carer status and child stunting accounting for child characteristics. Model B added carer education, household characteristics, father's education, and two binary variables indicating whether or not mothers or fathers were absent working overseas during the first 36 months of the child's lifetime. The fully-adjusted model, Model C, then added the measure for relative household wealth.

Results

The analysis of mean heights by sex and age in years shows that, on average, children in our samples were shorter than WHO reference standards, with Vietnamese children generally being shorter than Filipino children. Dividing the samples into two groups according to whether the children were living in non-migrant or transnational households reveals some differences between the mean heights of children in the two household types (Figures 2 and 3). Both boys and girls living in transnational households in the Philippines were, on average, taller than their peers in non-migrant households. This difference is observable in all three age categories, but tends to be small. For boys and girls in Vietnam, there is very little difference between those in non-migrant and transnational households, although 10-year-old girls in non-migrant households are actually taller, on average, than their counterparts in transnational households. To examine height differences in more detail, we turn to the measure of stunting (HAZ) that enables the identification of height-for-age significantly below the median WHO standard.

On this measure, the prevalence of stunting among children aged 9-11 in the samples is 16 percent for the Philippines and 17 percent for Vietnam. These proportions are somewhat lower than those reported elsewhere.³ If having a migrant parent does reduce the risk of stunting, the lower prevalence could be a reflection of the purposeful oversampling of transnational households in the CHAMPSEA Project. However, when stunting prevalence among children in non-migrant and transnational households is compared, differences between the two study countries become evident (Table 2). In Vietnam, there is little variation in the prevalence of stunting between the two household types, whereas there is a significant difference for the Philippine sample ($\chi^2 = 15.07$, $p < 0.001$). This suggests considerably more scope for a migration effect in the Philippines, and much less scope in Vietnam, other things being equal. By way of comparison, stunting prevalence is higher among young children (aged 3, 4 and 5) in the CHAMPSEA survey. Young Vietnamese children had the highest prevalence of stunting at 24.0 percent (Graham and Jordan, 2010), an almost identical prevalence rate to that found by Petrou and Kupek (2010) in their study of young Vietnamese children aged 4 to 5 years. Since the national prevalence of stunting in early childhood was higher still in both countries in the late 1990s when the 9, 10 and 11

³Estimates for strictly comparable age groups are not available. Petrou and Kupek (2010), for example, found a stunting prevalence rate of 23.6 percent for children aged 4.5 to 5.5 in Vietnam. And, while figures from the 7th National Nutrition Survey in the Philippines (Food and Nutrition Research Institute, 2008) indicate a national stunting prevalence of 33.1 percent for 6-10 year olds, lower rates of 23.0 percent and 27.6 percent were recorded for the two provinces from which the CHAMPSEA sample was drawn.

year olds were infants, it is likely that some of the children in the current study have experienced catch-up growth during childhood.

Our question is whether 9, 10 and 11 year olds living in transnational households were at lower risk of being stunted at the time of interview compared to their peers in non-migrant households. Exploration of the bivariate relationship between household migration status (non-migrant vs. transnational) and child stunting showed a significant difference between the two groups in the Philippines, with children in non-migrant households being more than twice as likely to be stunted as children in transnational households (OR = 2.79, $p < 0.001$). However, no significant difference was found in the Vietnamese sample. This may be an indication of contrasting experiences of migration in the two countries, or it may reflect other confounders. We therefore fitted separate multivariate logit models for the Philippines and Vietnam, predicting stunting among children in middle childhood.

Multivariate Results

Once we account for selected confounders, the multivariate models predicting child stunting provide some evidence for possible migration effects, although these differ between the Philippines and Vietnam. In the base model, we entered the migrant-carer status of the child's household, the sex and age (in completed years) of the child, and low birth weight (Tables 3 & 4, Model A). Low birth weight is confirmed as a risk factor for stunting in middle childhood in Vietnam; children of low weight at birth are two- and-a-half times more likely (OR = 2.49, $p < 0.05$) to be stunted around a decade later compared to children who weighed at least 2,500 grams at birth. Further, Vietnamese girls are significantly more likely to be stunted than boys at this age (OR = 1.67, $p < 0.05$), possibly reflecting child feeding practices favoring males over females. Neither of these relationships is replicated for children in the Philippines.

Once child characteristics are accounted for, there is also evidence of an advantage for children living in transnational households, but this varies by country and according to which parent migrates and who is caring for the child. For the Philippines (Table 3, Model A), children of migrant fathers cared for by their mothers are significantly less likely to be stunted than children in non-migrant households, translating into a decreased likelihood of more than 60 percent (OR = 0.33, $p < 0.001$). The results in Table 3, Model A suggest a similar advantage for children of migrant mothers left in the care of their fathers, although the difference is significant only at the 90 percent level (OR = 0.36, $p < 0.1$). For Vietnam, the results (Table 4, Model A) also suggest an advantage for children of migrant mothers cared for by their fathers, although the higher odds ratio indicates a smaller advantage compared with the Philippines, and again the statistical significance is marginal (OR = 0.58, $p < 0.1$). Notably, there is no evidence that Vietnamese children of migrant fathers cared for by their mothers enjoy any advantage relative to their peers in non-migrant households, unlike their Filipino counterparts. The subsequent models account for additional confounders to investigate the stability of these findings.

After the inclusion of carer education, household characteristics, father's education (controlling for selection into migration) and the absence of mothers and fathers during the first 36 months of the child's life, migration/carers status remains a significant predictor of

stunting in the Philippines but only for children of father migrants left in the care of their mothers. Further, the relative advantage has also been reduced to just over 50 percent (OR = 0.47, $p < 0.1$). However, the marginally significant associations between mother-migrant/father-carer and stunting in the base models for both Filipino and Vietnamese children are no longer significant once other variables are entered in the model. This suggests that the lower likelihood of stunting among children of migrant mothers left in the care of their fathers may be related to differences in the household-level characteristics of transnational and non-migrant households rather than to maternal migration per se.

There is also some evidence for a carer effect, although its association with migration is more difficult to discern (Tables 3 and 4, Model B). In both countries, carer educational attainment is significantly associated with child stunting. Filipino children whose carer has only primary education or less are over twice (OR = 2.29, $p < 0.01$) as likely to be stunted compared with those whose carer has upper secondary or post-secondary education. The disadvantage of having a carer with primary education or less is even greater for Vietnamese children, who are over five-and-a-half times (OR = 5.60, $p < 0.01$) more likely to be stunted than their peers whose carer has at least upper secondary education. The odds ratio for children whose carer has lower secondary education, although only marginally significant, suggests a lesser disadvantage (OR = 2.51, $p < 0.1$). These findings are comparable to the well-established risk factor of maternal education for child stunting, which is taken as a marker of the quality of care given to the child and, in particular, the standard of nutrition. Where low educational attainment compromises care quality, the risk of stunting in middle childhood is increased 2- to 5-fold compared to children with better educated carers. We were unable to include interaction terms in the models due to small numbers in some groups and thus cannot test the relationships between migrant-carer status and carer education. Interestingly, the only household characteristic significantly related to child stunting is the number of adults aged 15 years and over in Vietnam, with a higher number of adults associated with reduced odds of the child being stunted, suggesting that the quality of childcare is increased where more adults are present in the household to share the care burden.

The relationships between living in a transnational household and the risks of stunting observed in the base models are attenuated after the addition of carer and household characteristics and father's education, which serves to confirm the protective effects of parental migration only for the children of father migrants/ mother carers in the Philippines (Table 3, Model B). To explore the impact of parental migration further, we included indicators of the timing of parental absence.⁴ We find that paternal absence overseas during the first 36 months of a child's life is not predictive of stunting at ages 9, 10 and 11 in the Philippines but that it appears to more than double the risk of stunting among left-behind children in Vietnam (OR = 2.25, $p < 0.1$); more surprisingly, there is no evidence that

⁴We tested different indicators of parental time away: (a) proportion of child's lifetime mother/father has worked overseas; (b) a dummy indicating whether a mother/father was working overseas during the first 36 months of a child's life. The two indicators are highly correlated, so could not both be included. We chose to use (b) in this study because most stunting occurs in children under three years of age. Note that this variable also accounts for early absences of parents in the currently non-migrant group, although the numbers are small.

maternal absence during the crucial early years is associated with child stunting, although the small number of cases precludes any firm conclusions.

The final, fully-adjusted model for child stunting adds relative household wealth (Tables 3 and 4, Model C). Transnational households with a currently migrant parent tend to be wealthier than non-migrant households, so we expected the inclusion of the wealth indicator to further attenuate any relationships between migrant-carer status and child stunting. Moreover, since poverty has been identified in other studies as a major risk factor for undernutrition, we expected low relative wealth to be independently associated with higher odds of child stunting. The results only confirm our expectations for the Philippines where the odds of stunting for children in the poorest households are over three times (OR = 3.04, $p < 0.1$) higher than those for children in the richest households. Relative household wealth is not significantly related to stunting among the Vietnamese children, net of all other factors. This finding requires further investigation but may be related to narrower wealth disparities in the Vietnam sample compared to the Philippine sample. Of particular interest here is the impact of including household wealth on the associations between having a migrant parent and the likelihood of being stunted in middle childhood. For Filipino children, the protective effect of having a migrant father and being left in the care of their mother, as observed in the previous model (Table 3, Model B), is no longer significant. This strongly suggests that the nutritional advantages of having a migrant father operate through increased household wealth and therefore greater food security. As we have seen, this advantage does not appear to extend to left-behind children of migrant mothers, nor to children of migrant fathers in Vietnam. Thus, having a migrant parent may reduce the risk of stunting for some children living in transnational households through increases in household wealth, but this effect is limited to children of migrant fathers and is country-specific.

There have been few previous empirical demonstrations of a relationship between parental employment overseas and the nutritional status of children who stay behind, and none that we are aware of which explicitly examines child stunting. However, caution must be exercised in interpreting our findings as they suggest a complex set of associations that point to a differentiated migration effect, which is protective only for some children.

Discussion

This study has examined predictors of stunting, or low height-for-age, for groups of children aged 9, 10 and 11 years in two South-East Asian countries and, in particular, the relationship between household migration status and child stunting. Our initial hypothesis posited a migration effect and a carer effect associated with stunting among children living in transnational households in both the Philippines and Vietnam. The results of the multivariate models demonstrate a number of relationships between type of household arrangement, the timing of parental absence and the nutritional status of children in middle childhood. The findings suggest a reduced risk only for some children. For others, there appears to be no protective effect of having a migrant parent. Indeed, there is some evidence that a Vietnamese child whose father was working overseas during the first 36 months of his/her life is at higher risk of being stunted in middle childhood.

In the Philippines, poverty and low levels of caregiver educational attainment are found to be the main risk factors for child stunting. Both are considered indicative of the quality of care and nutrition the child receives, regardless of whether one of their parents is a transnational migrant. While having a migrant father reduces the likelihood of stunting relative to children in non-migrant households, being left in the care of someone other than a parent does not. Household wealth attenuates the migration effect for children of migrant fathers, suggesting that the advantages of paternal migration may work primarily through increasing household resources and hence standards of nutrition for children. The nutritional advantages of having a migrant father may also be related to lower levels of disruption in the quality of care provided for children when their mother is the parent who stays behind and/or the greater tendency of mothers to prioritize the nutritional well-being of their children. Although the base model suggests that children of migrant mothers left in the care of their fathers also benefit, further interrogation reveals that this relationship may in part be due to selection into migration as the effect is attenuated when a surrogate for prior socio-economic status (i.e., father's education) is included.

In Vietnam by contrast, relative wealth appears to have no independent influence on the likelihood of being stunted in middle childhood, and a low level of caregiver educational attainment is the main risk factor. Children of migrant fathers and children of migrant mothers who are cared for by non-parental caregivers do not demonstrate a nutritional advantage over their peers living in non-migrant households; nor are they at a disadvantage, unless their caregiver has low educational attainment. Although maternal migration is associated with a reduced risk of stunting in the base model if the child is left in the care of their father, the relationship is attenuated once household characteristics and father's education (as a control for selection into migration) are taken into account. This finding is intriguing precisely because there is no evidence of a similar effect for paternal migration, even in the base model, and the disparity between children living in different transnational household arrangements warrants further research. One possible explanation could be that Vietnamese fathers incur higher debts compared to other groups when taking up overseas employment, and money diverted to debt repayments vitiates otherwise expected improvements in the quantity and quality of food available to those who stay behind.⁵ The nutritional advantage for children cared for by their (better educated) fathers⁶ is less easy to explain but may relate to the patriarchal nature of Vietnamese society, which is also reflected in the higher risk of stunting among girls compared to boys, a gender difference that is not found among Filipino children. Overall, however, there is no evidence to support the idea of a general nutritional advantage for children living in transnational households compared to those in non-migrant households. Rather, having a migrant parent seems to

⁵Alternative explanations include the possibility of higher remittances from migrant mothers compared to migrant fathers resulting in better child nutrition, or mothers only migrating when they are happy with the quality of substitute care (e.g., when other adults in the household contribute to childcare). The testing of these explanations is beyond the scope of the present article but could provide a fruitful focus for future studies.

⁶In many cases where Vietnamese fathers identified themselves as the child's main carer, in-depth interviews conducted in the year after the survey data collection revealed that other family members (usually female) also contributed to childcare (see Hoang and Yeoh, 2012). It could be, therefore, that children 'left in the care of their fathers' actually had more overall support and attention from several carers than children in transnational households cared for by mothers or others. These interviews also highlighted the extent of household debt related to brokering a migration placement.

reduce the risk of undernutrition in middle childhood only for one group of children in the Philippines.

There is strong evidence of the well-established association between the education of those looking after the child and the risks of being stunted at ages 9, 10 and 11 in both countries. Although there is a clear association with carer education, which increases the risks of stunting for children cared for by adults with low educational attainment net of other factors, it is more difficult to link this explicitly to parental migration since small numbers in some groups precluded the testing of interactions. Nevertheless, descriptive statistics provide some evidence that migrant mothers may leave their children in the care of an adult with lower educational attainment than themselves. For example, in the Philippine sample, 22.7 percent of migrant mothers have low educational attainment (primary or lower secondary) compared with 45.5 percent of those caring for their children. This suggests that the quality of care may indeed decline for some children and it may be that the absence of a demonstrable advantage of having a migrant mother is related to the counter-balancing effects of wealth increases and a relative care deficit. However, no comparable differences between the education of migrant mothers and those left behind to care for their children is apparent for the Vietnamese sample, where over 80 percent of both groups have low educational attainment. Future research could usefully be directed to disentangling these complex relationships.

In common with all cross-sectional analyses, our study is limited by the nature of the data available. Despite being able to include retrospective data for weight at birth and parental absence in early childhood, the CHAMPSEA dataset does not allow us to determine the timing of insults or track changes in stunting over time. We cannot, therefore, identify those who remained stunted through childhood, those who became stunted after infancy, and those who recovered from early stunting; nor do we know whether children who were stunted in infancy were more likely to recover from stunting following the migration of a parent. Longitudinal data are necessary to follow children over time and track changes in their nutritional status.

We recognize too that we have only imperfectly accounted for selection into migration by using father's educational attainment as a marker for prior socio-economic status. It could still be that the parents of children stunted in infancy were less likely to become transnational migrants, or that relatively wealthier parents (with healthier children) were more likely to decide to migrate, and that these differences are not accounted for by our measure of father's educational attainment. Moreover, the inclusion of father's education in the multivariate models effectively controls twice for the educational attainment of fathers who stay behind to look after their children, which may bias the results. More generally, our results on the effects of parental migration may be biased downwards as father's education attainment is likely to influence not only the historical occupation and earnings of a household (i.e., before the decision to migrate) but also the accumulation of wealth over the child's lifetime, including during any period of migration. Thus, using this measure as a control for selection into migration may also capture some of the hypothesized effects of migration more broadly, especially in the Philippines where fathers in transnational households were found to have significantly higher educational attainment than fathers in

non-migrant households. Nevertheless, by demonstrating both significant associations between the transnational migration of a parent and stunting for some children who stay behind, and the absence of an association for others, we have identified an important area of study that has previously been neglected.

One further limitation to the study should also be noted. The CHAMPSEA dataset does not include information on nutritional intake, and the measurement of wealth may underestimate differences in food consumption and quality; nor does the dataset allow a detailed exploration of the different pathways that might link the accumulation of wealth from overseas earnings and child nutritional status. In addition to greater food security, Filipino children of migrant fathers living in wealthier transnational households may benefit from changing attitudes to children and their care, including access to medicines and greater knowledge of appropriate treatments for ailments and illnesses (Hildebrandt and McKenzie, 2005). When a migrant mother or father actively engages in parenting, albeit from a distance, the quality of childcare may thus be improved. Certainly, we found no overall detriment for children of migrant mothers left in the care of their fathers, and little evidence of the expected care deficit. The role of carer education also requires further investigation, as does the relationship between the migrant parent and the principal carer of the child, because both are likely to be implicated in the quality of childcare provided in transnational households. It is difficult to measure the quality of childcare without observational data, and carer education, though important, may be an imperfect marker. More research is needed to understand how other dimensions of (transnational) care impact on undernutrition and stunting in childhood.

The differences between the two countries also provide some interesting pointers for future research. Could it be, for example, that the observed advantage for Filipino children of migrant fathers cared for by their mothers is related to the longer history of international labor migration from the Philippines, compared with Vietnam? Governmental and civil society support for overseas foreign workers is well developed in the Philippines and it is possible that better employment conditions combined with lower levels of debt allow migrant fathers to contribute more to the well-being of their children. In contrast, migrant parents from Vietnam may be less well placed in global employment markets and face a more restricted choice of destinations where personal and geographical ties are able to facilitate their temporary settlement. Whatever the reason, and with the possible exception of children of migrant mothers left in the care of their (better educated) fathers, our findings indicate no difference in the risk of stunting between children living in transnational and non-migrant households in Vietnam. This calls into question the presumed nutritional benefits for children of migrant parents, as well as the desirability of overseas employment as a family livelihood strategy. Further, the lack of similar relationships between living in a transnational household and the risk of stunting in middle childhood in the Philippines and Vietnam illustrates the dangers of generalizing across national and cultural groups (*see also* Graham and Jordan, 2011). Critically, this highlights that, while the Philippines may be the prototype of a labor-exporting nation and the most studied country in South-East Asia, its experiences of transnational migration should not be generalized to other countries in the region.

Implications and Conclusions

The findings of this study suggest that understandings of migrants' transnational practices could usefully be extended to include a wide range of impacts on risk and resilience for children. More needs to be done to develop theories of transnational migration which incorporate an explicit recognition of the complex interdependencies that influence outcomes for those who stay behind. As Carling (2007) noted, transnational exchanges, which involve both material practices and information transfers, are most frequently examined from the perspective of migrants. Here we have adopted the perspective of non-migrants within transnational households and provided evidence of the varying impacts of such practices on the nutritional status of children who stay behind. Further research is needed to unpack the 'migration effect' in terms of the transnational practices of which it is composed. For our study population, we expect emotional exchanges and practices of 'parenting from a distance' to play an important role, in addition to material and information transfers. We also suspect that structural factors linked to government policy and civil society are influential. This serves as a reminder that theoretical understandings of transnationalism in the context of migration must give appropriate recognition to both diversity and similarity. Transnational practices are rooted in, and reproduce, personal relationships and associated social norms. The bond between parents and young children is almost universally strong and is likely to endure geographical separation. In this respect, there are essential differences between the transnational households in the CHAMPSEA Project and other transnational family forms where, for example, relationships with migrant adult children or more distant kin are implicated in transnational practices. Thus, the constituent activities of transnational exchange, which reproduce personal relationships, will also differ. At the same time, the parent-child bond evident in the CHAMPSEA Project is common to children in both transnational and non-migrant households, albeit experienced differently. Thus, although having a migrant parent is associated with better nutritional outcomes for some children, low education levels among caregivers remains a major risk factor for all children.

Reducing childhood undernutrition is integral to the achievement of the first Millennium Development Goal which aspires to eradicate poverty and hunger (UN Millennium Project, 2005). Stunting is known to result from poverty but serious efforts are still required to reduce its prevalence in many parts of Africa and Asia (UNICEF, 2010). Children who are stunted in infancy and remain stunted, or who become stunted during childhood, are multiply disadvantaged throughout their lives, suffering from impaired cognitive function, delayed schooling and poor employment prospects (Carvalho, 2012). In addition, mothers who are themselves stunted are at greater risk of producing stunted children (Hernández-Díaz et al., 1999; Dekker et al., 2010). Transnational migration has become a livelihood strategy for millions of families in Asia, with remittances supporting those who stay behind. This study has demonstrated the advantages of such a strategy for one group of such children in the Philippines but no general advantage for children living in transnational households. Whether influenced by better nutrition, improved care, or both, the lower likelihood of stunting among our sample of Filipino children indicates that having a parent working abroad may play an important role in reducing the risk of undernutrition for

children who stay behind, even if it does not always do so. The global recession, along with political unrest in the oil rich states of the Middle East and North Africa, currently endangers the jobs of many transnational migrants. If countries of destination reduce their reliance on foreign labor without concomitant improvements in local employment prospects, stunting among school-aged children in sending countries is likely to increase. This could prove a major threat to achieving the reduction in childhood undernutrition enshrined in the United Nations Millennium Development Goals.

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REFERENCES

- Adair, Linda S. Filipino Children Exhibit Catch-Up Growth from Age 2 to 12 Year. *Journal of Nutrition*. 1999; 129(6):1140–1148. [PubMed: 10356078]
- Adair, Linda S.; Guilkey, David K. Age-Specific Determinants of Stunting in Filipino Children. *Journal of Nutrition*. 1997; 127(2):314–320. [PubMed: 9039833]
- Al-Saffar, Atheer J. Stunting among Primary-school Children: A Sample from Baghdad, Iraq. *La Revue de Santé de la Méditerranée Orientale*. 2009; 15(2):322–329.
- Berkman, Douglas S., et al. Effects of Stunting, Diarrhoeal Disease, and Parasitic Infection during Infancy on Cognition in Late Childhood: A Follow-up Study. *The Lancet*. 2002; 359(9306):564–571.
- Black, Robert E., et al. Maternal and Child Undernutrition: Global and Regional Exposures. *The Lancet*. 2008; 371(9608):243–260.
- Boyle, Michael H., et al. The Influence of Economic Development Level, Household Wealth and Maternal Education on Child Health in the Developing World. *Social Science and Medicine*. 2006; 63(8):2242–2254. [PubMed: 16790308]
- Carling, Jørgen. Dissertation. Department of Sociology and Human Geography, University of Oslo; 2007. Transnationalism in the Context of Restrictive Immigration Policies.
- Carvalho, Leandro. Childhood Circumstances and the Intergenerational Transmission of Socioeconomic Status. *Demography*. 2012; 49(3):913–938. [PubMed: 22753083]
- Crookston, Benjamin T., et al. Children Who Recover from Early Stunting and Children Who Are Not Stunted Demonstrate Similar Levels of Cognition. *Journal of Nutrition*. 2010; 140(11):1996–2001. [PubMed: 20844188]
- Daniels, Melissa C.; Adair, Linda S. Growth in Young Filipino Children Predicts Schooling Trajectories through High School. *Journal of Nutrition*. 2004; 134(6):1439–1446. [PubMed: 15173409]
- Dekker, Louise H., et al. Stunting Associated with Poor Socioeconomic Status and Maternal Nutrition Status and Respiratory Morbidity in Colombian School children. *Food and Nutrition Bulletin*. 2010; 31(2):242–250. [PubMed: 20707230]
- Desai, Sonalde; Alva, Soumya. Maternal Education and Child Health: Is There a Strong Causal Relationship? *Demography*. 1998; 35(1):71–81. [PubMed: 9512911]
- Duc, Le Thuc. The Effects of Early Age Stunting on Cognitive Achievement among Children in Vietnam. Feb.2009 Young Lives Working Paper, No. 45
- Eckhardt, Cara L., et al. The Association between Diet and Height in the Postinfancy Period Changes with Age and Socioeconomic Status in Filipino Youths. *Journal of Nutrition*. 2005; 135(9):2192–2198. [PubMed: 16140897]

- Episcopal Commission for the Pastoral Care of Migrants and Itinerant People-CBCP/Apostship of the Sea-Manila, Scalabrini Migration Center and Overseas Workers Welfare Administration (ECMI/AOS-Manila, SMC and OWWA). *Hearts Apart: Migration in the Eyes of Filipino Children*. Scalabrini Migration Center; Quezon City, Philippines: 2004.
- Esfarjani, Fatemeh, et al. Determinants of Stunting in School-aged Children of Tehran, Iran. *International Journal of Preventive Medicine*. 2013; 4(2):173–179. [PubMed: 23543188]
- Filmer, Deon; Pritchett, Lant H. Estimating Wealth Effects without Expenditure Data - or Tears: An Application to Educational Enrollments in States of India. *Demography*. 2001; 38(1):115–132. [PubMed: 11227840]
- Florentino, Rodolfo F.; Villavieja, Gracia M.; Lana, Ruby D. Regional Study of Nutritional Status of Urban Primary Schoolchildren. 1. Manila, Philippines. *Food and Nutrition Bulletin*. 2002; 23(1): 24–30. [PubMed: 11975365]
- Food and Nutrition Research Institute (FNRI). Anthropometric Survey Component. Department of Science and Technology; Taguig City, Philippines: 2008. 7th National Nutrition Survey: 2008.
- Glewwe, Paul; Koch, Stefanie; Bui, Linh N. Child Nutrition, Economic Growth and the Provision of Health Care Services in Vietnam in the 1990s. World Bank; Washington, DC: 2002. World Bank Policy Research Working Paper, No. 2776
- Graham, Elspeth; Jordan, Lucy P. Migrant Parents and the Psychological Well-Being of Left-Behind Children in South-East Asia. *Journal of Marriage and Family*. 2011; 73(4):763–787. [PubMed: 22163371]
- Graham, Elspeth; Jordan, Lucy P. Balancing Benefits and Costs?: Transnational Households and the Nutritional Status of Children Left Behind in the Philippines and Vietnam; Paper presented at The British Society for Population Studies Annual Conference; Exeter. 2010; Sep 13-15.
- Graham, Elspeth, et al. Transnational Families and the Family Nexus: Perspectives of Indonesian and Filipino Children Left Behind by Migrant Parent(s). *Environment and Planning A*. 2012; 44(4): 793–815.
- Harpham, Trudy, et al. Maternal Mental Health and Child Nutritional Status in Four Developing Countries. *Journal of Epidemiology and Community Health*. 2005; 59(12):1060–1064. [PubMed: 16286495]
- Hernández-Díaz S, et al. Association of Maternal Short Stature with Stunting in Mexican Children: Common Genes vs. Common Environment. *European Journal of Clinical Nutrition*. 1999; 53(12): 938–945. [PubMed: 10602351]
- Hildebrandt, Nicole; McKenzie, David J. The Effects of Migration on Child Health in Mexico. World Bank; Washington, DC: 2005. World Bank Policy Research Working Paper, No. 3573
- Hoang, Lan Anh; Yeoh, Brenda S.A. Sustaining Families across Transnational Spaces: Vietnamese Migrant Parents and their Left-Behind Children. *Asian Studies Review*. 2012; 36(3):307–327.
- Hugo, Graeme. The New International Migration in Asia: Challenges for Population Research. *Asian Population Studies*. 2005; 1(1):93–120.
- Jones, Laura L., et al. A Comparison of the Socio-economic Determinants of Growth Retardation in South African and Filipino Infants. *Public Health Nutrition*. 2008; 11(12):1220–1228. [PubMed: 18462561]
- Khan, Nguyen Cong, et al. Reduction in Childhood Malnutrition in Vietnam from 1990 to 2004. *Asia Pacific Journal of Clinical Nutrition*. 2007; 16(2):274–278. [PubMed: 17468083]
- Lutter, Chessa K.; Chaparro, Camila M.; Sergio, Muñoz. Progress towards Millennium Development Goal 1 in Latin America and the Caribbean: The Importance of the Choice of Indicator for Undernutrition. *Bulletin of the World Health Organization*. 2011; 89(1):22–30. [PubMed: 21346887]
- Mendez, Michelle A.; Adair, Linda S. Severity and Timing of Stunting in the First Two Years of Life Affect Performance on Cognitive Tests in Late Childhood. *Journal of Nutrition*. 1999; 129(8): 1555–1562. [PubMed: 10419990]
- Menon, Purnima; Ruel, Marie T.; Morris, Saul S. Socio-economic Differentials in Child Stunting Are Consistently Larger in Urban Than in Rural Areas. International Food Policy Research Institute; Washington: 2000. FCND Discussion Paper, No. 97

- Miller, Jane E.; Rodgers, Yana V. Mother's Education and Children's Nutritional Status: New Evidence for Cambodia. *Asian Development Review*. 2009; 26(1):131–165.
- Milman, Anne, et al. Differential Improvement among Countries in Child Stunting Is Associated with Long-Term Development and Specific Interventions. *Journal of Nutrition*. 2005; 135(6):1415–1422. [PubMed: 15930446]
- O'Donnell, Owen; Nicholas, Angel L.; van Doorslaer, Eddy. Growing Richer and Taller: Explaining Change in the Distribution of Child Nutritional Status during Vietnam's Economic Boom. *Journal of Development Economics*. 2009; 88(1):45–58.
- Paraje, Guillermo. Child Stunting and Socio-economic Inequality in Latin America and the Caribbean. *Cepal Review*. 2009; 99:41–61.
- Parreñas, Rhacel Salazar. *Servants of Globalization: Women, Migration and Domestic Work*. Stanford University Press; Stanford: 2001.
- Pasricha, Sant-Rayn; Biggs, Beverly-Ann. Undernutrition among Children in South and South-East Asia. *Journal of Paediatrics and Child Health*. 2010; 46(9):497–503. [PubMed: 20854320]
- Petrou, Stavros; Kupek, Emil. Poverty and Childhood Undernutrition in Developing Countries: A Multi-national Cohort Study. *Social Science and Medicine*. 2010; 71(7):1366–1373. [PubMed: 20691525]
- Rahmawati, Neni T., et al. Growth of General Body Size of Children in a Fishing Village in Indonesia. *Anthropological Science*. 2010; 118(1):49–55.
- Ricci, Judith A.; Becker, Stan. Risk Factors for Wasting and Stunting among Children in Metro Cebu, Philippines. *American Journal of Clinical Nutrition*. 1996; 63(6):966–975. [PubMed: 8644694]
- Santos, Dirlane S., et al. Maternal Common Mental Disorders and Malnutrition in Children: A Case-control Study. *Social Psychiatry and Psychiatric Epidemiology*. 2010; 46(7):543–548. [PubMed: 20401464]
- Semba, Richard D., et al. Effect of Parental Formal Education on Risk of Child Stunting in Indonesia and Bangladesh: A Cross-sectional Study. *The Lancet*. 2008; 371(9609):322–328.
- Semyonov, Moshe; Gorodzeisky, Anastasia. Labor Migration, Remittances and Household Income: A Comparison between Filipino and Filipina Overseas Workers. *International Migration Review*. 2005; 39(1):45–68.
- Senbanjo, Idowu O., et al. Prevalence of and Risk Factors for Stunting among School Children and Adolescents in Abeokuta, Southwest Nigeria. *Journal of Health, Population and Nutrition*. 2011; 29(4):364–370.
- Skrbis, Zlatko. Transnational Families: Theorising Migration, Emotions and Belonging. *Journal of Intercultural Studies*. 2008; 29(3):231–246.
- Stewart, Robert C. Maternal Depression and Infant Growth - A Review of Recent Evidence. *Maternal and Child Nutrition*. 2007; 3(2):94–107. [PubMed: 17355442]
- United Nations Children's Fund (UNICEF). *Progress for Children: Achieving the MDGs with Equity*. No. 9. United Nations Children's Fund; New York: Sep. 2010
- United Nations Children's Fund (UNICEF). *Tracking Progress on Child and Maternal Nutrition*. United Nations Children's Fund; New York: 2009.
- United Nations Children's Fund (UNICEF). *The Effects of Parent's Migration on the Rights of Children Left Behind in the Philippines*. United Nations Children's Fund; New York: 2008.
- United Nations Children's Fund (UNICEF). *Strategies of Improving Nutrition of Children and Women in Developing Countries*. United Nations Children's Fund; New York: 1990.
- United Nations (UN) Millennium Project. *Investing in Development: A Practical Plan to Achieve the Millennium Development Goals*. United Nations Development Programme; London, UK: 2005.
- Victora, Cesar G., et al. Maternal and Child Undernutrition: Consequences for Adult Health and Human Capital. *The Lancet*. 2008; 371(9609):340–357.
- Von Laer Tschudin, Letizia, et al. Risk Factors for Under- and Overweight in School Children of a Low Income Area in Kolkata, India. *Child Nutrition*. 2009; 28(5):538–542.
- Waters, Hugh, et al. Weight-for-age Malnutrition in Indonesian Children, 1992-1999. *International Journal of Epidemiology*. 2004; 33(3):589–595. [PubMed: 15155707]

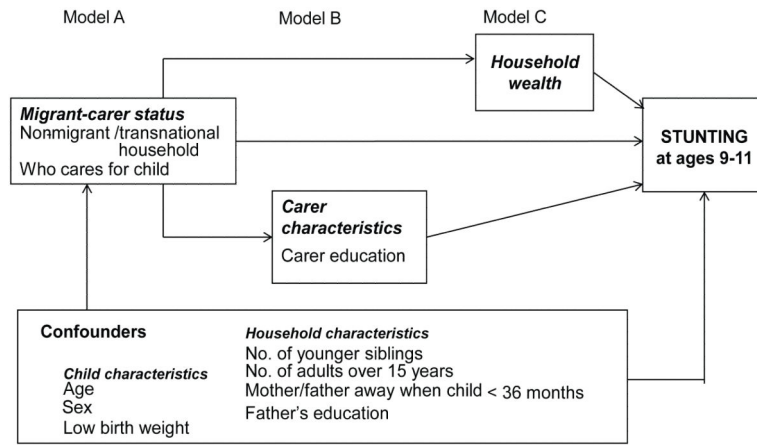


FIGURE 1. Conceptual Framework for the Analysis of Associations between Parental Migration and Child Stunting

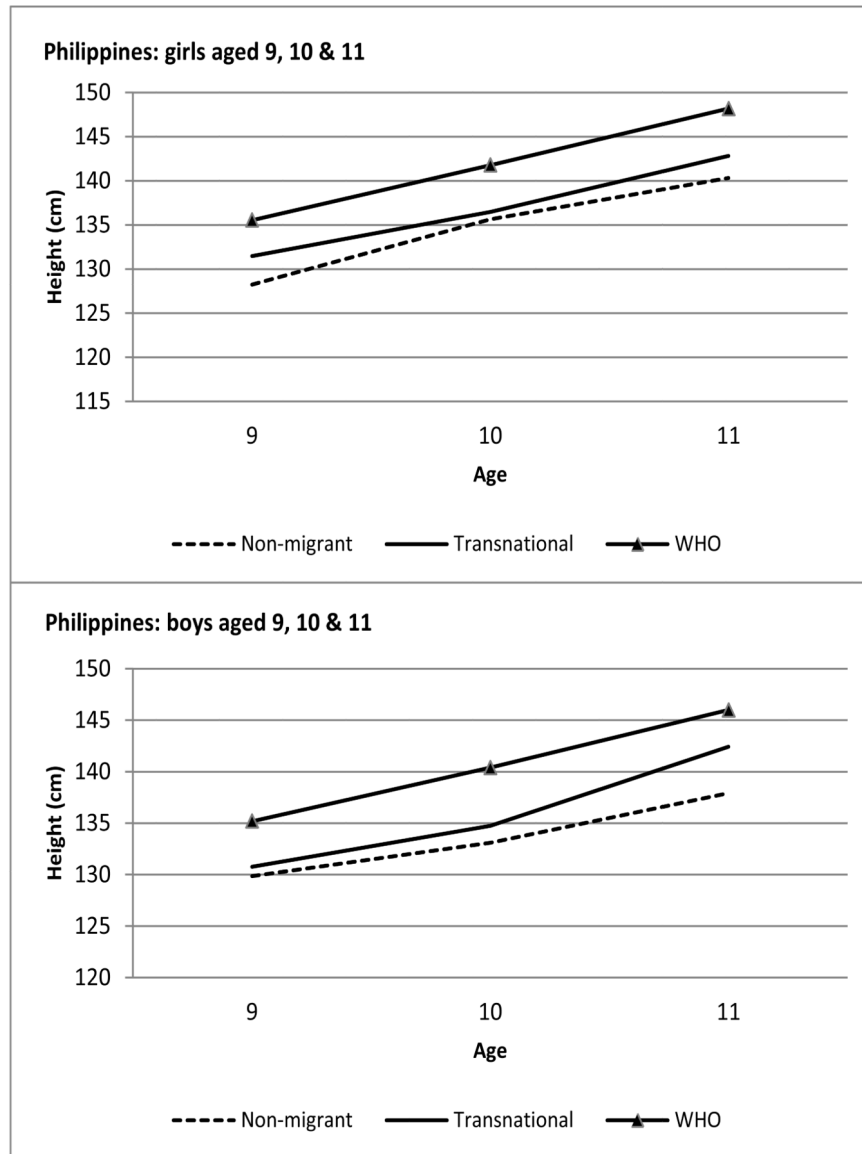


FIGURE 2. Philippines Sample - Mean Height of Girls and Boys Compared to WHO-Reference
 WHO mean is for 6th month of given year

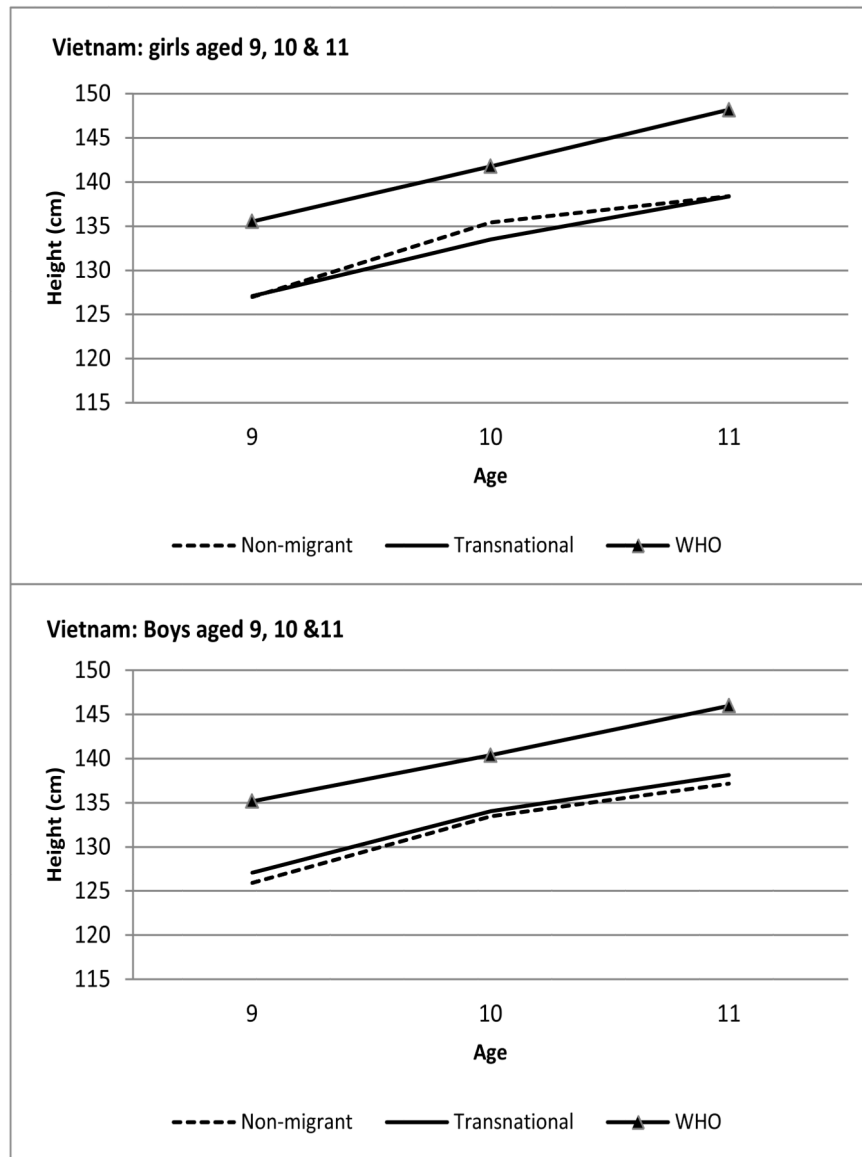


FIGURE 3. Vietnam Sample -Mean Height of Girls and Boys Compared to WHO-Reference
 WHO mean is for 6th month of given year

TABLE 1
Composition of Analytical Samples by Household Migration Status and Country

Migration status of household	Number of children aged 9, 10 & 11	
	Philippines	Vietnam
Non-migrant	243	227
Transnational: Father migrant	171	86
Transnational: Mother migrant	66	169
Total	480	482

TABLE 2
Prevalence of Stunting Among Children Aged 9-11 Years by Country and Non-migrant vs. Transnational Household

	Philippines		Vietnam	
	N	%	N	%
Non-migrant households	54	22.22	42	18.50
Transnational households	22	9.28	41	16.08
All households	76	15.83	83	17.22

TABLE 3
Multivariate Logit Models Predicting Stunting in Children Aged 9, 10 & 11 Years in the Philippines

	n=480								
	Model A			Model B			Model C		
	OR	95%	CI	OR	95%	CI	OR	95%	CI
Migrant carer-status									
<i>Non-migrant</i>	1.00			1.00			1.00		
Father-migrant/mother-carer	0.33***	0.17	0.61	0.47 [^]	0.20	1.10	0.59	0.24	1.46
Mother-migrant/father-carer	0.36 [^]	0.12	1.07	0.43	0.07	2.49	0.66	0.10	4.52
Parent-migrant/other-carer	0.41	0.14	1.22	0.34	0.07	1.72	0.55	0.10	3.17
Child characteristics									
<i>Male</i>	1.00			1.00			1.00		
Female	1.17	0.71	1.93	1.19	0.70	2.01	1.19	0.70	2.02
<i>9 years</i>	1.00			1.00			1.00		
10 years	0.87	0.48	1.57	0.77	0.42	1.43	0.75	0.41	1.40
11 years	1.47	0.78	2.76	1.26	0.65	2.46	1.21	0.62	2.37
<i>Not low birth weight</i>	1.00			1.00			1.00		
Low birth weight	1.09	0.40	3.01	1.12	0.39	3.20	1.09	0.38	3.14
Carer education									
<i>Upper secondary or more</i>				1.00			1.00		
Lower secondary				1.03	0.27	3.98	0.91	0.23	3.57
Primary or less				2.29**	1.23	4.24	2.05*	1.10	3.81
Household characteristics									
Number of younger siblings				1.21	0.95	1.54	0.91	0.52	1.59
Number of adults				0.85	0.68	1.07	0.85	0.68	1.07
Father's education									
<i>Upper secondary or more</i>				1.00			1.00		
Lower secondary/primary or less				2.16*	1.19	3.91	1.71 [^]	0.92	3.19
Parental absence 1st 36 mos. of child's life									
<i>Mother not away</i>				1.00			1.00		
Mother away				1.03	0.22	4.88	1.24	0.23	6.76
<i>Father not away</i>				1.00			1.00		
Father away				1.27	0.50	3.22	1.34	0.51	3.51
Household wealth									
<i>High</i>							1.00		
Medium							1.64	0.52	5.10
Low							3.04 [^]	0.96	9.66
Log likelihood	-200.23428			-186.61321			-183.80224		

p<0.001

**
p<0.01

*
p<0.05

$\hat{p} < 0.1$

TABLE 4
Multivariate Logit Models Predicting Stunting in Children Aged 9, 10 & 11 Years in Vietnam

	n=482								
	Model A			Model B			Model C		
	OR	95% CI	CI	OR	95% CI	CI	OR	95% CI	CI
Migrant-carer status									
<i>Non-migrant</i>	1.00			1.00			1.00		
Father-migrant/mother-carer	0.94	0.47	1.85	1.12	0.37	3.38	1.10	0.37	3.31
Mother-migrant/father-carer	0.58	0.31	1.09	0.82	0.24	2.77	0.88	0.25	3.03
Parent-migrant/other-carer	1.08	0.50	2.35	1.20	0.36	4.02	1.17	0.34	3.98
Child characteristics									
<i>Male</i>	1.00			1.00			1.00		
Female	1.67 [^]	1.01	2.75	1.66 [^]	0.99	2.79	1.68 [^]	1.00	2.82
9 years	1.00			1.00			1.00		
10 years	0.36 ^{**}	0.19	0.68	0.36 ^{**}	0.19	0.68	0.36 ^{**}	0.19	0.69
11 years	0.68	0.37	1.24	0.68	0.37	1.24	0.69	0.38	1.26
<i>Not low birth weight</i>	1.00			1.00			1.00		
Low birth weight	3.30 ^{**}	1.34	8.09	3.30 ^{**}	1.34	8.09	3.30 ^{**}	1.35	8.09
Carer education									
<i>Upper secondary or more</i>				1.00			1.00		
Lower secondary				2.51 [^]	0.98	6.38	2.40 [^]	0.94	6.15
Primary or less				5.60 ^{**}	1.88	16.71	5.31 ^{**}	1.77	15.99
Household characteristics									
Number of younger siblings				1.12	0.72	1.74	1.06	0.68	1.66
Number of adults				0.71 [*]	0.52	0.97	0.69	0.51	0.94
Father's education									
<i>Upper secondary or more</i>				1.00			1.00		
Lower secondary/primary or less				0.83	0.43	1.60	0.78	0.40	1.51
Parental absence 1st 36 mos. of child's life									
<i>Mother not away</i>				1.00			1.00		
Mother away				1.73	0.58	5.16	1.72	0.57	5.23
<i>Father not away</i>				1.00			1.00		
Father away				2.25 [^]	0.92	5.53	2.28 [^]	0.93	5.59
Household wealth									
<i>High</i>							1.00		
Medium							1.65	0.78	3.52
Low							1.72 [^]	0.79	3.72
Log likelihood	-200.80371			-200.80371			-199.70239		

p<0.001

**
p<0.01

*
p<0.05

$\hat{p} < 0.1$