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Labour migration in Indonesia and the health of children left behind

James Ng*

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Abstract: Economic research on labour migration in the developing world has traditionally focused on the role played by the remittances of overseas migrant labour in the sending country's economy. Recently, due in no small part to the availability of rich microdata, more attention has been paid to the effects of migration on the lives of family members left behind. This paper examines how the temporary migration of parents for the sole purpose of work affects the health outcomes of children left behind using longitudinal data from the Indonesian Family Life Survey (IFLS). The anthropomorphic measure of child health used, height-for-age, serves as a proxy for stunting. The evidence suggests that whether parental migration is beneficial or deleterious to child health depends on which parent moved. In particular, migration of the mother has an adverse effect on child height-for-age, reducing height-for-age Z-score by 0.5 standard deviations. This effect is not seen for father's migration.

JEL codes: I15, J01, O10

Keywords: health, labour, migration, children, families left behind

Tables are located at the end of the paper.

* Center for Digital Scholarship, University of Notre Dame, Indiana, USA; email james.ng@nd.edu

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Katajanokanlaituri 6 B, 00160 Helsinki, Finland

1 Introduction

Economic research on labour migration in the developing world has traditionally focused on the role played by the remittances of overseas migrant labour in the sending country's economy (for a survey of the empirical literature on remittances, see Adams 2011). In the last decade, more attention has been paid to migration for work and its effects on the socioeconomic outcomes of sending households, thanks in large part to the increased availability of household survey data from developing countries.[1] I contribute to this particular strain of the migration literature by examining how the temporary migration of parents for work affects the health of children left behind, using longitudinal data from the Indonesian Family Life Survey (IFLS). Parental labour migration may be expected to improve children's nutrition and healthcare through expansion of the household budget constraint from remittances. However, deleterious effects of parental absence could offset these gains.[2] The net effect of parental migration on the health of left-behind children is therefore an empirical question.

Surprisingly little attention has been paid to the relationship between migration and human capital accumulation in Indonesia. One exception is Deb and Seck (2009) who evaluate the effects of migration on an array of socioeconomic outcomes including health of children in Indonesia. This paper differs from theirs in that it focuses on children in households in which only the father or mother migrate—not the children—allowing for the isolation of the effects of parental migration without the confounding influence of child migration.

In contrast to many other studies on the relationship between child health and socioeconomic outcomes, I use anthropometric measures of child health rather than subjective health status.[3] Also, the longitudinal design of the IFLS allows for the elimination of all unobserved child- and household-level time-invariant characteristics that are correlated with the explanatory variables, removing a major source of omitted variable bias in the estimated effects of parental migration.

The results suggest that whether parental migration is beneficial or deleterious to child health depends on which parent moved. I find that migration of the mother has an adverse effect on child height-for-age, whereas migration of the father has no effect. This finding is important because of the long temporal reach of health in childhood; a plethora of empirical evidence shows that poorer health in early life leads to lower educational attainment (Almond, 2006; Case et al., 2005), lower scores in high school standardized tests (Case and Paxson, 2008), and lower earnings (Black et al., 2007).

From an intrahousehold bargaining perspective, these findings suggest a rejection of the unitary model of the household, whereby a household is assumed to act as a single economic unit, in favour of collective models of intrahousehold allocation (see Vermeulen [2002] for a survey of the collective approach and Vermeulen [2005] for a comparative analysis of the empirical validity of the two competing approaches). In households where mothers are absent due to labour migration, children may receive less care and as a consequence develop poorer health. While speculative, it is

[1] Mexico in particular has received much attention; see Antman (2012b), Antman (2012a), Antman (2011a), Antman (2011b), Antman (2010), Hildebrandt and McKenzie (2005).

[2] A number of recent works in economics has found adverse effects of parental absence on various indicators of child well-being such as cognition and school attendance; see for example Zhang et al. (2014) and Pörtner (2016).

[3] Examples of papers in development studies that employ anthropometric measures of health are Domingues & Barre (2013) for Mozambique and Brainerd (2010) for the Soviet Union.

possible that the reason for a lack of an adverse effect from father's migration is that fathers tend to be less directly involved in child rearing.

2 Data and descriptive statistics

2.1 Data

The Indonesian Family Life Survey (IFLS) is an ongoing longitudinal household survey conducted by RAND, Universitas Gadjah Mada, and Survey METRE. With an initial sample of 30,000 individuals in 1993 living in 13 of the 27 (at the time) Indonesian provinces, the IFLS is representative of over 80 per cent of the population of Indonesia. The IFLS collected information on children younger than 15. The mother, female guardian, or caretaker answered the questions on behalf of children aged younger than 11. A nurse took measures of physical health for each household member, including height and weight of children.

I use data drawn from the 2000 and 2007 waves of the IFLS. I identify children between the ages of 0 to 7 in 2000 who were re-interviewed in 2007, by which time they were aged 7 to 14. I restrict my attention to children of these ages because they had not reached physical maturity and were still very much subject to key health decisions made for them by their parents, allowing for the isolation of parental migration effects on child health.

Anthropometric indicators of health

I use two anthropometric indicators of child health: height-for-age Z-scores (HAZ) and weight-for-age Z-scores (WAZ). In each wave of the IFLS, health workers collected anthropometric data of all household members, including height and weight of children. HAZ are calculated by subtracting each child's height by the mean for a given age and sex of a reference population and dividing the result by the standard deviation of the reference distribution. WAZ are similarly computed. The reference population is an internationally accepted standard of well-nourished children; I used the 2000 United States Centers for Disease Control growth charts.[4] A HAZ of -1 indicates that—given age and sex—the child's height is one standard deviation below the mean child in that age/sex group.

Because height and weight represent unobserved nutrients and processes at the cellular level, they are appropriate proxies for child health status (Pelletier, 1994). Height-for-age is an adequate proxy of long-term nutritional status (Duggan et al., 2008). Weight-for-age can reflect both short- and long-term impediments to growth (de Onis, 2000). Following Alderman et al. (2006), I exclude children whose HAZ or WAZ were less than -6 or greater than 6 because such extreme outliers were likely the result of errors in height, weight or age data. My final dataset consists of 2,841 children interviewed in 2000 and re-contacted in 2007.

Migration measure

Migration is coded separately for fathers and mothers. In the interest of brevity let us consider mother's migration (father's migration follows analogously). A child interviewed in 2000 is said to have experienced maternal migration if the mother had migrated for the sole purpose of work at least once after the child's birth up until the time of the interview. The same child re-contacted in

[4] The CDC growth charts can be accessed at https://www.cdc.gov/growthcharts/cdc_charts.htm

2007 is said to have experienced maternal migration if the mother had migrated for work at least once since the 2000 interview. This yields four possible scenarios: 1) mother did not migrate in either period; 2) mother migrated in 2000 but did not in 2007; 3) mother did not migrate in 2000 but did in 2007; and 4) mother migrated in both periods.

Crucial to the analysis is whether there is enough variation in the migration indicator for a relationship between health and migration to be detected. Since variation in the incidence of parental migration comes from scenarios 2 and 3, it is crucial that most of the migration experiences fall under these two scenarios. This was indeed the case. Out of 80 (188) children whose mothers (fathers) migrated in 2000, (77) (181) did not experience maternal (paternal) migration in 2007. In contrast, of the 62 (117) children whose mothers (fathers) migrated in 2007, 59 (110) did not experience maternal (paternal) migration in 2000. No child in my sample had both parents simultaneously migrate for work.

2.2 Descriptive statistics

Tables 1a and 1b show the descriptive statistics for the 2,841 children included in the analysis in the year 2000 and 2007 respectively. On the whole, children were less healthy in 2007 than in 2000. To illustrate, average WAZ went from -1.05 in 2000 to -1.11 in 2007. This is consistent with findings from studies on Indonesia; for example, using nationally-representative data from the National Socioeconomic Survey, Utomo et al. (2011) report an increase in the percentage of children who were underweight between 2000 and 2005, a trend that held across all household expenditure quintiles.

Turning now to cross sectional variation by migration incidence, in the 2000 survey, children with a migrant parent had better health metrics than children whose parents did not migrate. However, the pattern is reversed in 2007; now children with a migrant parent had worse HAZ and WAZ than children whose parents stayed home.

In terms of per capita household expenditures,[5] children with migrant parents were richer in 2000 but poorer in 2007. In 2000, migrant parents were more educated than non-migrant parents, but the opposite was true in 2007. Lastly and unsurprisingly, in both years children with migrant parents were more likely to live in rural areas.

These descriptive statistics reveal significant cross-sectional differences between children based on the migrant status of their parents. How these differences would manifest themselves over time is a question that can be answered using panel data analysis. In the next section I turn to controlling for the observed characteristics discussed here to isolate the influence of parental migration in the determination of child health.

[5] In the development economics literature, consumption is widely considered superior to income as a measure of individual wellbeing in developing countries. Deaton (1997) explains that consumption is a better measure of lifetime welfare than is current income on theoretical (i.e. the permanent income hypothesis) and practical grounds (it is more reliably measureable).

3 Empirical strategy

3.1 Theoretical motivation

My empirical strategy is grounded in the assumption of a static health production function for an individual: $H = H(N; T(A, B_H, D), u)$, where H represents a vector of measured health outcomes.[6] They depend on a vector of health inputs, N. Health inputs are under the control of the individual and include for example use of health care facilities, nutrient intake, and time used for the production of health. The technology, T, or shape of the underlying health production function varies over the life course. It is determined by demographic characteristics, A, such as age and sex; aspects of family background that affect health, B_H, such as parental health and genetic endowment; and environmental factors, D.

In the case of child health production, parents can be assumed to play a role in the determination of N. Parental migration can affect N in several ways. Migration necessarily involves a prolonged or temporary absence of the parent in a child's life, which could have deleterious consequences on the quality of N. On the other hand, if migration improves household income, N could be positively impacted. The net effect of parental migration has to be ascertained empirically.

3.2 Empirical specification

I estimate the following regression equation for child i in household h at time t:

$$Health_{iht} = a\, MigrantFather_{iht} + \beta\, MigrantMother_{iht} + X_{iht}\,\delta + \mu_i + \pi_h + error_{iht}$$

I run two separate child-level regressions, one for HAZ as the dependent variable and another for WAZ. *MigrantFather* is a dummy variable indicating whether the father migrated for work up until time *t*. *MigrantMother* is analogous for mothers. X is a set of child observable characteristics that could also be correlated with child health status, namely age, parental education level, log monthly per capita household expenditures, and a dummy for whether the child resides in an urban area. I also include a dummy for 2007 to control for unobserved secular time effects that are potentially correlated with the migration decision. μ_i and π_h are child and household fixed effects, respectively. Their inclusion removes any unobserved confounding characteristics of the child and household that do not change over time.

Although the estimates of the relationship between parental migration and child health are robust to time-invariant unobserved characteristics, the data do not allow me to establish the direction of causality in the relationship. For instance, it could be that a parent migrated for better economic opportunity in response to a child's poor health. Therefore, the estimates in this paper should not be interpreted as causal.

4 Results

Estimates from the health regressions are presented in Table 3. As shown in column 1, having a mother who migrated for work is associated with a half standard deviation decrease in HAZ, statistically significant at the 5 per cent level. However, migration of the father does not exhibit

[6] See the Strauss and Thomas (2007) *Handbook of Development Economics* chapter for a treatment.

this negative effect on child health; if anything, children with migrant fathers have better HAZ, although the relationship is statistically insignificant.

This paper's finding of a negative effect of maternal labour migration on the health of left-behind children is potentially problematic in a country where a substantial number of women migrate for work with consequent long absences from the home, leaving caregiving responsibility to fathers. In a qualitative study, Lam and Yeoh (2016) considered the gendered nature of division of care in Indonesia vis-à-vis the migration of mothers away from home for work. They found that left-behind fathers still preferred migration or work to taking over the mother's traditional role of caregiver. In extreme cases, as Lam and Yeoh (2016) report, 'some father-carers also confessed […] to turning to aberrant activities such as gambling and drinking to ease their loneliness and stress.'

This has policy implications for developing economies like Indonesia where women, many of whom are mothers, make up a substantial proportion of migrant workers (according to the World Bank, roughly 80 per cent of all registered overseas Indonesian migrants are women). At the very least, economic returns should not be the only criterion by which the benefit of migration for work is measured; attention should also be paid to the unintended consequences of migration such as gendered effects on the well-being of left-behind family members, especially children.

Child WAZ is not statistically significantly correlated with either maternal or paternal migration. One possible explanation for the absence of a significant relationship between parents' migration and child weight is the composite nature of weight-for-age, which complicates interpretation; although weight-for-age is the most common anthropomorphic indicator used worldwide, it tends to conflate weight-related and height-related growth deficits or excesses (Garza and de Onis, 2007).

All estimates are robust to a logarithmic specification of age to account for potential nonlinearities in the relationship between the health scores and age. In addition, the use of the cluster-robust estimator for standard errors makes the estimates robust to heteroskedasticity within households.

It is interesting to note that the data reveal no significant difference in the health indicators between girls and boys (Tables 2a and 2b). The one exception is WAZ in 2007, where a t-test suggests that girls were significantly *healthier* than boys in that year. These patterns are consistent with previous research showing no evidence of son preference in Indonesian societies (Kevane and Levine, 2003; Levine and Ames, 2003; Mani, 2007).

4.1 Selective attrition

Attrition bias is always a potential concern with panel data. If less healthy children were more likely to drop out of the IFLS, the estimated parental migration effects would be attenuated. Out of 2,924 children aged 0–7 from the 2000 survey, 83 dropped out in the 2007 wave. This high re-contact rate (97 per cent) alleviates much of the concern about selective attrition. Nonetheless, I test for the presence of selective attrition on observables following the methodology of Fitzgerald et al. (1998). In their paper, the authors showed theoretically that a sufficient condition for the absence of attrition bias on observables is that the lagged dependent variable does not affect the probability of attrition.

I estimate a linear probability model of 2007 attrition status on the child health indicators plus all other explanatory variables from 2000: if the lagged values of health do not significantly affect the probability of attrition, it would strengthen the case against attrition bias being a concern. As shown in Table 4, neither HAZ nor WAZ is a significant predictor of the likelihood of a child to

attrite. Based on this test and the high re-contact rate, it is likely the case that attrition between the two waves of the IFLS did not bias the results of this paper.

5 Conclusion

In this paper, I present evidence that migration of the mother for work may have a net negative impact on height-for-age, a widely used anthropometric measure of health for children. On average, having a mother who migrated for work at least once between 2000 and 2007 pushed children farther below the average height for their age and sex by half a standard deviation. Coupled with the fact that the average Indonesian child is underweight relative to the global mean, this is a cause for concern. I find no evidence of such an effect on height-for-age from migration of the father. In conclusion, this study reveals the possibility that leaving a child behind for economic opportunity can have a net negative effect on the child's health if it is the mother who makes the move.

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Tables

Table 1a. Characteristics of children by migration status of parents (year 2000)

	(1) Full sample	(2) Neither parent migrated	(3) One parent migrated
HAZ	-0.65	-0.67	-0.41
	(1.65)	(1.63)	(1.81)
WAZ	-1.05	-1.07	-0.92
	(1.63)	(1.62)	(1.69)
Male	0.52	0.53	0.48
	(0.50)	(0.50)	(0.50)
Age (years)	3.90	3.98	3.21
	(2.14)	(2.13)	(2.15)
Father's years of schooling	7.78	7.71	8.41
	(3.81)	(3.81)	(3.75)
Mother's years of schooling	7.28	7.21	7.93
	(3.57)	(3.53)	(3.86)
Monthly household expenditure per capita	155760.60	154960.55	163487.31
	(198183.86)	(202018.83)	(156480.69)
Urban	0.42	0.42	0.39
	(0.49)	(0.49)	(0.49)
Observations	2841	2573	268

Note: Sample consists of children from the 2000 wave of the Indonesian Family Life Survey.

Source: Author's calculations based on Indonesian Family Life Survey microdata.

Table 1b. Characteristics of children by migration status of parents (year 2007)

	(1) Full sample	(2) Neither parent migrated	(3) One parent migrated
HAZ	-1.21	-1.20	-1.43
	(1.18)	(1.18)	(1.17)
WAZ	-1.11	-1.09	-1.36
	(1.36)	(1.36)	(1.28)
Male	0.52	0.52	0.53
	(0.50)	(0.50)	(0.50)
Age (years)	11.27	11.25	11.56
	(2.24)	(2.24)	(2.19)
Father's years of schooling	7.52	7.61	6.43
	(3.86)	(3.86)	(3.66)
Mother's years of schooling	6.98	7.12	5.01
	(3.66)	(3.67)	(2.98)
Per capita monthly household expenditure (rupiah)	352422.43	358573.25	261259.84
	(350356.01)	(358271.27)	(175927.17)
Urban	0.45	0.46	0.36
	(0.50)	(0.50)	(0.48)
Observations	2841	2662	179

Note: Sample consists of children from the 2007 wave of the Indonesian Family Life Survey.

Source: Author’s calculations based on Indonesian Family Life Survey microdata.

Table 2a. Health of children by sex (year 2000)

	(1) Female		(2) Male		(3)	
	Mean	Std Dev	Mean	Std Dev	Difference	p-value
HAZ	-0.69	1.61	-0.62	1.68	-0.07	0.25
WAZ	-1.08	1.58	-1.02	1.67	-0.06	0.34
Observations	1353		1488		2841	

Note: Sample consists of children from the 2000 wave of the Indonesian Family Life Survey.

Source: Author's calculations based on Indonesian Family Life Survey microdata.

Table 2b. Health of children by sex (year 2007)

	(1) Female		(2) Male		(3)	
	Mean	Std Dev	Mean	Std Dev	Difference	p-value
HAZ	-1.22	1.12	-1.20	1.24	-0.02	0.70
WAZ	-1.01	1.27	-1.20	1.42	0.19	0.00
Observations	1353		1488		2841	

Note: Sample consists of children from the 2007 wave of the Indonesian Family Life Survey.

Source: Author's calculations based on Indonesian Family Life Survey microdata.

Table 3. Regression results

	(1) HAZ	(2) HAZ	(3) WAZ	(4) WAZ
Mother migrated for work	-0.49**	-0.37*	-0.25	-0.03
	(0.20)	(0.20)	(0.24)	(0.19)
Father migrated for work	0.04	0.19	-0.05	0.05
	(0.15)	(0.14)	(0.16)	(0.12)
Age (years)	-1.01***		-0.69***	
	(0.06)		(0.07)	
Log age		-1.00***		-0.48***
		(0.10)		(0.10)
Mother's years of schooling:				
1-3	0.09	0.30**	0.37*	0.52**
	(0.15)	(0.14)	(0.22)	(0.23)
4-6	0.00	0.20	0.43	0.59**
	(0.18)	(0.18)	(0.27)	(0.27)
7-9	-0.00	0.32	0.35	0.58*
	(0.30)	(0.26)	(0.39)	(0.33)
10-12	0.44	0.30	0.54	0.32
	(0.41)	(0.43)	(0.50)	(0.47)
>12	0.23	0.10	0.02	-0.18
	(0.48)	(0.47)	(0.56)	(0.51)
Father's years of schooling:				
1-3	0.07	0.29	-0.17	-0.03
	(0.37)	(0.32)	(0.37)	(0.21)
4-6	0.09	0.35	-0.24	-0.13
	(0.38)	(0.33)	(0.39)	(0.21)
7-9	0.34	0.56	-0.11	-0.17
	(0.41)	(0.36)	(0.44)	(0.25)
10-12	0.09	0.20	-0.21	-0.30
	(0.43)	(0.39)	(0.46)	(0.30)
>12	-0.31	-0.24	-0.23	-0.39
	(0.46)	(0.43)	(0.48)	(0.33)
Log per capita monthly household expenditure	-0.04	-0.01	-0.03	0.02
	(0.06)	(0.05)	(0.07)	(0.06)
Urban	0.15	-0.01	0.28	0.15
	(0.14)	(0.14)	(0.20)	(0.19)
Year=2007	7.04***	0.78***	5.15***	0.73***
	(0.45)	(0.11)	(0.50)	(0.12)
Observations	3140	3064	3140	3064

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%

Standard errors are robust to clustering at the household level.

Regressions include child and household fixed effects.

The omitted category for years of schooling is 0-1 years.

Household expenditure is the sum of expenses on food, non-food items (durable and non-durable), and education, as reported by a female respondent, either the spouse of the household head or another person most knowledgeable about household affairs.

Source: Author's calculations based on Indonesian Family Life Survey microdata.

Table 4. Selective attrition

	Attrited in 2007
HAZ	-0.002
	(0.004)
WAZ	-0.002
	(0.004)
Father migrated for work	0.014
	(0.021)
Mother migrated for work	0.091*
	(0.048)
Age (years)	-0.007***
	(0.002)
Mother's years of schooling:	
1-3	0.004
	(0.008)
4-6	0.025**
	(0.010)
7-9	0.024*
	(0.013)
10-12	0.051***
	(0.017)
>12	0.026
	(0.020)
Father's years of schooling:	
1-3	0.022*
	(0.011)
4-6	0.035***
	(0.012)
7-9	0.025*
	(0.014)
10-12	0.023
	(0.015)
>12	-0.000
	(0.016)
Log per capita monthly household expenditure	0.007
	(0.005)
Urban	-0.000
	(0.008)
Constant	-0.090
	(0.062)
Observations	1804

Notes: *** significant at 1%, ** significant at 5%, * significant at 10%

Explanatory variables are from the 2000 wave of the IFLS.

Source: Author's calculations based on Indonesian Family Life Survey microdata.