Intergenerational Effects of Internal Migration on Health Outcomes in Indonesia

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Abstract

We aim to explore how internal migration flows might influence chronic conditions at older ages in Indonesia. Within the major changes that might influence life history is the transition from agricultural to urban societies. Internal migration has significant short-term effects on health behavior, educational outcomes, and labor market outcomes. We know little about the long-term health effects of migration and urbanization in later life. Data sets capable of addressing this question are scarce. We overcome this obstacle by taking advantage of waves of the Indonesian Family Life Survey – IFLS (1993/1994, 1997, 2000, 2007/2008, and 2014/2015). Based on the fourth wave of IFLS, preliminary results related to people with at least 40 years of age indicate lower chances of experiencing chronic conditions among migrants (rural-urban, urban-rural, rural-rural) and non-migrants in rural areas, compared to non-migrants in urban areas. These effects are even stronger for people with diabetes.

Keywords

Internal migration. Rural. Urban. Health. Chronic condition. Indonesia.

1. Introduction

We aim to explore how internal migration flows influences health outcomes that are observed at younger ages and how these results might affect chronic conditions at older ages in Indonesia. Our proposal aims to investigate how later life health trajectories may be associated with early life experiences, as well as with economic and demographic changes. The development of obesity and diabetes at older ages —and their relationship with later life chronic diseases and cognitive health— might be influenced by intergenerational transmission of habits and diseases.

We will analyze five waves of the Indonesian Family Life Survey (IFLS), which is a nationally representative panel that covers a period characterized by rapid social, economic, and demographic changes. This activity will break new ground by providing data to analyze how internal migration flows affect intergenerational health outcomes. We will deal with the long-run effects of internal migration flows on health that go beyond a direct influence on adults and children. More specifically, we are concerned with how migration flows influence health outcomes across generations, in relation to the incidence of non-communicable diseases (NCD), body mass index, height for age, weight for height, and birth weight.

2. Background

Development has a significant influence on NCDs and can be transmitted across generations.[1] Connections between development and epigenetic inheritance have been investigated in studies about cancer.[2] However, the relationships between epigenetic mechanisms and risks of other NCDs are still unclear. An intergenerational approach with a focus on early lifestyle interventions is necessary in order to understand the long-term effects of economic and demographic transitions on NCDs. In developing countries, changes towards Western diet habits and sedentary activities are linked to an increase in obesity.[3] A central argument is that both genetics and developmental plasticity contribute to the evolution of human life history.[4, 5]

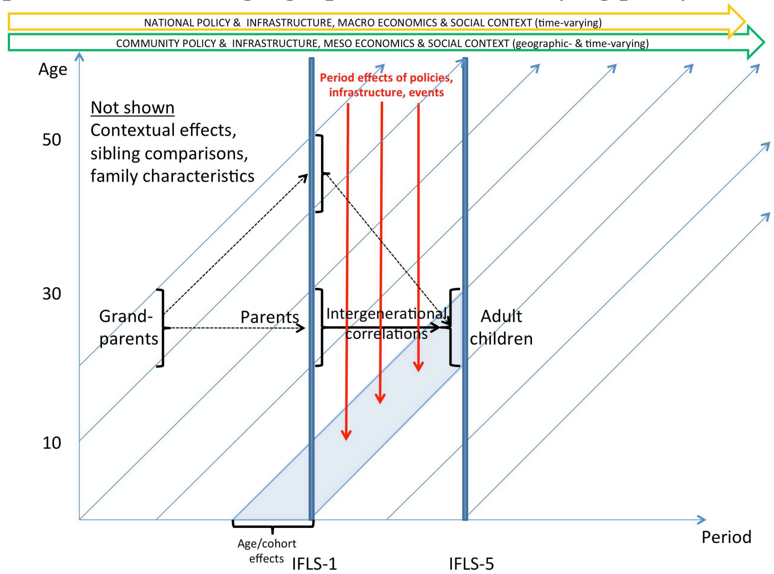
Within these major changes that might influence life history is the transition from agricultural to urban societies, which brings up the importance of internal migration to understanding long-term intergenerational health outcomes. Several studies emphasize the association between rural-urban migration with economic development and growth.[6-11] Internal migration has significant short-term effects on health behavior[12-19], educational outcomes[20], and labor market outcomes.[21, 22] The study of internal migration dates back to classical economic development theory, where migration is considered to be a mechanism that establishes regional spatial-economic equilibrium.[23, 24] Environmental, demographic, and economic "push-pull" factors drive migrants away from their places of origin and attract them to new places of destination.[25-27] Intervening obstacles (such as distance and physical barriers), as well as personal factors also influence migration flows.[28-30] However, we know little about the long-term health effects of migration and urbanization in later life. Immigrant populations from low-income to high-income countries are experiencing higher rates of obesity than non-migrants, with stronger effects among the second generation of migrants.[31-33] We aim to explore how rural-urban migration influences health outcomes (chronic conditions) at older ages.

3. Data and methods

Analyses about long-term intergenerational effects of migration are rare, particularly in developing countries, because data sets capable of addressing this question are scarce.[34-36] We overcome this obstacle by taking advantage of the five waves of the IFLS (1993/1994, 1997, 2000, 2007/2008, and 2014/2015). This longitudinal dataset represents 83% of the Indonesian population with information related to 13 of the 27 provinces in the country. In IFLS4, there were over 30,000 individuals interviewed. The IFLS is one of the few existing nationally representative datasets in the developing world with both large sample sizes and a long-term follow-up of individuals across generations. IFLS data are a significant research resource that are freely available at no charge via the RAND website. The site includes a bibliographic repository of over 210 papers and dissertations. There are over 7,000 registered IFLS data users around the world.

Despite these strengths, the IFLS has not been widely used to study long-term or intergenerational demographic effects, due to difficulties in linking individuals and households across waves. For instance, only one study has investigated the effects of internal migration on socioeconomic outcomes of adults, as well as on health and educational outcomes of children by looking at the first three waves.[37] The fourth and fifth waves provide a longer time span that will allow us to capture information on up to three generations (parents, children, and grandchildren). We will investigate the effects of individual-level variables on our outcomes, as well as the influences of community-level variables related to health services. The conceptual framework in Figure 1 guides our analysis, drives the choice of variables included in the empirical models, and explicitly recognizes the interplay of societal and individual-level influences on health outcomes.

Figure 1. Lexis diagram with the proposed framework to capture intergenerational correlations, period effects, and geographic- and time-varying policy and social contexts



Source: Diagram elaborated by Narayan Sastry (University of Michigan & RAND Corporation).

Our study will increase the rigor with which the association between migration flows and health outcomes has been explored by integrating novel methodological procedures. The availability of health services, schools, and jobs in sending and receiving areas influences internal population streams. Because of these reverse causality issues[38], migration cannot be utilized as an independent variable when estimating health, educational, and labor outcomes. Previous studies using the IFLS dealt with this endogeneity by estimating gravity models, which include distances between areas as an exogenous instrument for migration flows.[39-42] Distances from the center of each Indonesian province to important migration destinations within the country were used as instrumental variables for the appropriate estimation of effects of internal migration on health and labor outcomes.[37] In order to improve gravity models, we will add information about population trends in areas of origin and destination over time. The idea behind these models is that distance is constant over time, but population growth affects the out- and in-migration trends of different regions.[43] We will integrate these previous methodological procedures in an intergenerational analysis, utilizing distance as an instrumental variable[37, 39-42] and inserting information about population size in the areas of origin and destination.[43] We will avoid the binary classification of population flows (migrant/non-migrant) and capture the complexity of migration streams (rural-urban, urban-rural, rural-rural, urban-urban, non-migrant in rural areas, non-migrant in urban areas).[37] We will consider the possibility that people might migrate more than once through time, and that population movement might happen for the first, second, and/or third generations within the same family. Thus, we will contribute to the internal migration literature by developing and testing a new methodological approach that deals with issues of reverse causality, considers the complexity of migration streams, and estimates intergenerational influences of population flows.

4. Preliminary results

At this moment, we present preliminary results based on data from the fourth IFLS wave (2007/2008), which has information on chronic conditions for people with at least 40 years of age. We analyze the association between internal population flows and a series of chronic conditions reported by this survey.

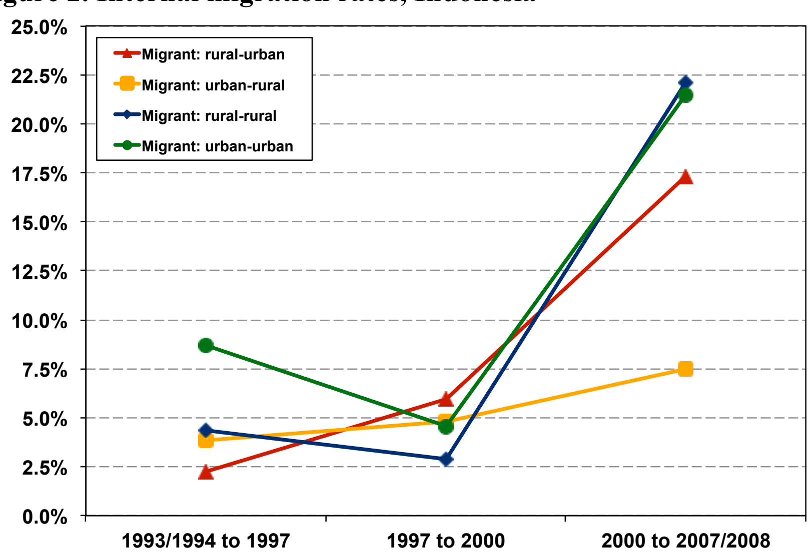
Table 1 and Figure 2 illustrate the increase of migration rates within Indonesia after the 1997 Asian financial crisis. There is higher incidence of flows within rural areas (rural-rural) and within urban areas (urban-urban) in the country, compared to rural-urban flows. Urban-rural flows have the lowest levels in the most recent period.

Table 1. Internal migration and non-migration rates (%), Indonesia

Rates	1993/1994 to 1997	1997 to 2000	2000 to 2007/2008
Migrant: rural-urban	2.22	5.96	17.32
Migrant: urban-rural	3.82	4.80	7.45
Migrant: rural-rural	4.36	2.87	22.08
Migrant: urban-urban	8.69	4.57	21.46
Non-migrant: rural	93.42	91.17	60.60
Non-migrant: urban	87.49	90.64	71.09
Number of observations	11,677	17,272	19,279

Source: Indonesian Family Life Survey (IFLS).

Figure 2. Internal migration rates, Indonesia



Source: Indonesian Family Life Survey (IFLS).

The association between internal migration flows and the incidence of any chronic condition in Indonesia is illustrated in Table 2. These estimates relate to data from the fourth wave of IFLS (2007/2008), which collected information about chronic conditions for people with at least 40 years of age. Results indicate that migrants (rural-urban, urban-rural, rural-rural) and non-migrants in rural areas are less likely to experience chronic conditions than non-migrants in urban areas.

When we control for gender, age, and marital status, the results remain the same (models 2 to 9). Married people are less likely to have chronic conditions, but this association loses significance when controlling for gender and age (models 8 and 9). Men are less likely to experience chronic conditions, while older people are more likely to have these diseases. Since women tend to live longer than men, we control for the interaction between gender and age (model 9). Associations or gender and age with chronic conditions remain in the same direction. Within each gender, older people are more likely to experience chronic conditions than younger groups. Within each age group, women are more likely than men to report having at least one chronic condition.

We also estimated the association of migration flows with each one of the chronic conditions (Table 3). The first model reports the same results as model 8 in Table 2. We verify that the same negative associations of migrants (rural-urban, urban-rural, rural-rural) and non-migrants in rural areas, compared to non-migrants in urban areas, remain for specific chronic conditions (hypertension, diabetes). These effects are considerably stronger for people with diabetes, i.e. rural-urban, urban-rural, and rural-rural migrants, as well as non-migrants in rural areas, have even lower chances of experiencing diabetes than non-migrants in urban areas. Other interesting results are the higher chances of experiencing asthma, other lung problems, arthritis/rheumatism among migrants from rural to rural areas, compared to the reference category.

The next steps of this analysis aim to better understand the association between migration flows and chronic conditions: (1) inclusion of all five IFLS waves; (2) estimation of intergenerational correlations; (3) inclusion of data on national policies, infrastructure, community policies, characteristics of schools and health services, which vary by geographical location and time; and (4) estimation of gravity models to deal with selection bias and reverse causality issue of migration. This project will result in a clean database linking the five waves of the IFLS and an analysis of the relationship between migration flows and intergenerational health outcomes. Our studies will also offer useful information to local, provincial, and national governments about how internal migration has been influencing long-term health outcomes and which policies should be addressed to deal with these issues.

Table 2. Odds ratios and exponentials of standard errors estimated with logistic regression models for the dependent variable "incidence of any chronic condition," Indonesia, 2007/2008

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Constant	0.628***	0.767***	0.340***	0.841***	0.415***	0.896**	0.390***	0.404***	0.428***
	(0.0211)	(0.0294)	(0.0191)	(0.0431)	(0.0245)	(0.0464)	(0.0285)	(0.0296)	(0.0361)
Migrant: rural-urban	0.825**	0.824**	0.830**	0.826**	0.829**	0.825**	0.831**	0.829**	0.829**
	(0.0669)	(0.0672)	(0.0685)	(0.0672)	(0.0689)	(0.0673)	(0.0687)	(0.0689)	(0.0689)
Migrant: urban-rural	0.696**	0.686***	0.719**	0.683***	0.707**	0.679***	0.713**	0.709**	0.704**
	(0.0985)	(0.0976)	(0.103)	(0.0971)	(0.102)	(0.0968)	(0.103)	(0.103)	(0.102)
Migrant: rural-rural	0.786***	0.795***	0.792***	0.792***	0.802***	0.798***	0.795***	0.801***	0.805***
	(0.0555)	(0.0564)	(0.0569)	(0.0560)	(0.0579)	(0.0566)	(0.0571)	(0.0578)	(0.0582)
Migrant: urban-urban	1.013	1.017	1.053	1.012	1.057	1.016	1.051	1.057	1.064
	(0.0818)	(0.0826)	(0.0866)	(0.0819)	(0.0875)	(0.0826)	(0.0865)	(0.0876)	(0.0883)
Non-migrant: rural	0.720***	0.723***	0.697***	0.726***	0.700***	0.727***	0.701***	0.699***	0.701***
	(0.0351)	(0.0355)	(0.0346)	(0.0355)	(0.0350)	(0.0357)	(0.0349)	(0.0350)	(0.0351)
Non-migrant: urban	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Male		0.637***			0.630***	0.675***		0.624***	
		(0.0266)			(0.0267)	(0.0295)		(0.0280)	
Age 40–44			ref.		ref.		ref.	ref.	
Age 45–49			1.448***		1.453***		1.443***	1.454***	
			(0.0989)		(0.0997)		(0.0986)	(0.0998)	
Age 50–54			2.091***		2.098***		2.068***	2.104***	
			(0.147)		(0.148)		(0.145)	(0.149)	
Age 55–59			2.413***		2.461***		2.375***	2.472***	
			(0.181)		(0.186)		(0.179)	(0.188)	
Age 60+			2.822***		2.837***		2.698***	2.869***	
			(0.174)		(0.176)		(0.171)	(0.184)	
Married				0.687***		0.793***	0.855***	1.037	0.990
				(0.0342)		(0.0415)	(0.0449)	(0.0579)	(0.0561)
Female 40–44									ref.
Female 45–49									1.610***
									(0.143)
Female 50–54									2.218***
									(0.205)
Female 55–59									2.241***
									(0.229)
Female 60+									2.472***
									(0.211)
Male 40–44									0.598***
									(0.0602)
Male 45–49									0.747***
									(0.0748)
Male 50–54									1.164
									(0.118)
Male 55–59									1.642***
									(0.171)
Male 60+									2.007***
									(0.170)
Observations	10,498	10,498	10,498	10,498	10,498	10,498	10,498	10,498	10,498

Note: Exponentials of robust standard errors in parentheses. *** Significant at p<0.01; ** Significant at p<0.05; * Significant at p<0.1.
Source: Indonesian Family Life Survey (IFLS).

Table 3. Odds ratios and exponentials of standard errors estimated with logistic regression models for the dependent variable "incidence of specific chronic conditions," Indonesia, 2007/2008

Variables	All conditions	Hyper-tension	Diabetes	Tuber-culosis	Asthma	Other lung	Heart problems	Liver	Stroke	Cancer, tumor	Arthritis, rheumatism	Uric acid, gout	Depression
Constant	0.404***	0.182***	0.0160***	0.0061***	0.0253***	0.0141***	0.0135***	0.00731***	0.00667***	0.0098***	0.0570***	0.0726***	0.00332***
	(0.0296)	(0.0166)	(0.00388)	(0.00271)	(0.00490)	(0.00347)	(0.00338)	(0.00302)	(0.00266)	(0.00418)	(0.00714)	(0.00991)	(0.00222)
Migrant: rural-urban	0.829**	0.766***	0.384***	0.360	1.267	0.633	0.808	0.305	0.665	1.837	1.254*	0.761*	1.283
	(0.0689)	(0.0786)	(0.0984)	(0.265)	(0.256)	(0.206)	(0.199)	(0.223)	(0.254)	(0.774)	(0.154)	(0.114)	(0.839)
Migrant: urban-rural	0.709**	0.687**	0.300**	1.218	0.793	1.019	0.544	1.981	0.584	2.898*	0.763	0.551**	1.321
	(0.103)	(0.125)	(0.153)	(0.900)	(0.337)	(0.476)	(0.280)	(1.064)	(0.423)	(1.606)	(0.189)	(0.161)	(1.384)
Migrant: rural-rural	0.801***	0.863*	0.330***	1.018	1.383*	1.541**	0.737	0.523	0.476*	0.486	1.274**	0.522***	0.603
	(0.0578)	(0.0746)	(0.0767)	(0.416)	(0.238)	(0.314)	(0.163)	(0.254)	(0.181)	(0.302)	(0.136)	(0.0771)	(0.464)
Migrant: urban-urban	1.057	1.075	0.828	0.947	1.037	0.880	0.971	1.394	0.633	0.956	1.262*	1.079	0.845
	(0.0876)	(0.105)	(0.158)	(0.466)	(0.233)	(0.259)	(0.230)	(0.534)	(0.256)	(0.526)	(0.159)	(0.146)	(0.651)
Non-migrant: rural	0.699***	0.680***	0.221***	0.518*	0.820	0.848	0.585***	0.678	0.457***	0.815	1.116	0.525***	0.565
	(0.0350)	(0.0415)	(0.0363)	(0.178)	(0.114)	(0.143)	(0.0908)	(0.197)	(0.110)	(0.275)	(0.0854)	(0.0497)	(0.288)
Non-migrant: urban	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Male	0.624***	0.503***	0.934	2.300***	1.361**	1.680***	0.733**	1.863**	0.963	0.268***	0.572***	0.699***	1.105
	(0.0280)	(0.0281)	(0.114)	(0.699)	(0.165)	(0.256)	(0.100)	(0.483)	(0.208)	(0.0966)	(0.0401)	(0.0584)	(0.481)
Age 40–44	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.	ref.
Age 45–49	1.454***	1.515***	2.166***	0.632	0.780	0.666	1.536*	0.874	0.856	1.132	1.811***	1.376**	1.114
	(0.0998)	(0.134)	(0.530)	(0.302)	(0.159)	(0.182)	(0.386)	(0.304)	(0.432)	(0.447)	(0.224)	(0.184)	(0.789)
Age 50–54	2.104***	2.075***	4.851***	1.132	1.034	1.288	2.139***	1.090	3.011***	0.930	2.671***	2.068***	2.653
	(0.149)	(0.185)	(1.099)	(0.487)	(0.208)	(0.314)	(0.527)	(0.379)	(1.215)	(0.407)	(0.325)	(0.269)	(1.634)
Age 55–59	2.472***	2.289***	3.810***	1.468	1.208	1.692**	3.468***	0.958	3.414***	0.575	3.221***	1.907***	0.865
	(0.188)	(0.218)	(0.934)	(0.633)	(0.253)	(0.414)	(0.834)	(0.378)	(1.417)	(0.332)	(0.406)	(0.271)	(0.752)
Age 60+	2.869***	2.794***	3.962***	1.009	2.021***	1.962***	3.178***	0.482*	4.615***	0.951	3.736***	1.822***	1.209
	(0.184)	(0.227)	(0.892)	(0.399)	(0.326)	(0.404)	(0.706)	(0.188)	(1.708)	(0.379)	(0.416)	(0.227)	(0.786)
Married	1.037	1.074	1.275	0.621	0.847	0.830	1.280	0.928	0.824	0.832	1.007	1.013	0.534
	(0.0579)	(0.0703)	(0.197)	(0.221)	(0.123)	(0.153)	(0.215)	(0.330)	(0.198)	(0.270)	(0.0805)	(0.101)	(0.259)
Observations	10,498	10,498	10,498	10,498	10,498	10,498	10,498	10,498	10,498	10,498	10,498	10,498	10,498

Note: Exponentials of robust standard errors in parentheses. *** Significant at p<0.01; ** Significant at p<0.05; * Significant at p<0.1.
Source: Indonesian Family Life Survey (IFLS).

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