Rural-to-urban moves and changes in health status among young Thai migrants: Distinguishing "true" migration effects from selection factors and secular change

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Introduction

For most of recent history, only a small minority of people resided in cities. However, a major redistribution of the world's population from predominantly rural to predominantly urban is well underway. Already, about half of the world's population lives in urban areas, and the United Nations projects that the world's population will be 70% urban by the year 2050. The world's more developed regions are further along in the urban transition than less developed countries, where the pace of urbanization is now most rapid. While the urban population of more developed regions is projected to increase slightly, the vast majority of population growth in the coming decades will be absorbed by urban areas in the developing world. Meanwhile, the size of rural populations in all regions of the world will decline.

Urbanization occurs through three interacting processes: 1) natural increase, 2) rural-to-urban migration and 3) reclassification. Natural increase is the population growth that occurs as a result of fertility being higher than mortality. It is a direct and indirect cause of urbanization. Natural increase in the rural population contributes to urban growth indirectly by driving rural-to-urban migration to alleviate overpopulation relative to the availability of opportunities in rural areas. Meanwhile, the rate of natural increase in the urban population directly impacts urban growth. Internal migration from rural to urban areas also directly contributes to a country's urban transition. Usually to a small extent, urban-bound international migrants may also contribute to urban growth. Reclassification occurs when urban status is conferred upon a formerly rural or peri-urban territory, often because the absolute population size or the population density exceeds a certain threshold. Both migration and natural increase can contribute to changes in population density that lead to reclassification.

Asia and Africa are currently experiencing the most rapid urbanization in the world, while urbanization rates have slowed in other regions. In Asia, about 2 in 5 people currently live in urban areas, and projections put the Asian population at 2/3 urban by 2050. The urban transition in Asia is particularly consequential because it is the most populous region in the world. Indeed, the United Nations projects that 54% of the world's urban population will be concentrated in Asia by 2050.

Much attention has been paid to the macro-economic and environmental effects of urbanization on communities and countries. However, the demographic processes underlying urbanization also carry important implications for the well-being of the individuals who are directly involved.

Rural-to-urban migration, in particular, can affect migrants' economic burdens and opportunities, the social and cultural context they function in, can present new environmental risks and benefits, and provide access to resources that were unavailable at their place of origin. Thus, the migration process and its consequences can impact migrants' well-being both positively and negatively.

The potential health consequences of rural-to-urban migration are the focus of this study. A substantial body of literature assesses health outcomes among immigrants to the developed world, although much less attention has been paid to the health impacts of internal migration. With the rapid urbanization underway in many developing countries, internal migration, especially rural to urban movement, is occurring on an even larger scale than international migration (IOM 2005).

Our country of focus is Thailand. In Thailand, 36% of the population currently lives in urban areas (PRB 2009), and the United Nations projects that this figure will increase to 60% by 2050 (UN 2008). At 0.6%, the rate of natural increase in Thailand is low relative to most countries in the developing world. Therefore, rural-to-urban migration has a particularly significant role in Thailand's urban transition. This warrants a better understanding of the health impacts of rural-to-urban migration.

A systematic study of the health effects of migration presents formidable challenges. Selection bias and a lack of optimal comparison groups plague much of the existing research. Since some people are more likely to migrate than others, health status may vary systematically between those who subsequently migrate and those who stay at origin. The "healthy migrant hypothesis" predicts that migrants typically constitute a healthier subset of the population, compared to the average health status of their peers at origin and destination. These selection factors impede the attribution of post-migration differences in health status to the effects of migration. To mitigate selection bias, pre-migration health status and other characteristics would ideally be measured and taken into account by employing a longitudinal study design.

Because longitudinal data are difficult and expensive to collect, most migration studies compare migrants with the receiving or sending populations using cross-sectional data collected post-migration. However, this approach does not account for potential differences between migrants and non-migrants, such as pre-migration health status, demographic characteristics and socioeconomic status, which may confound the effects of migration on health outcomes. The optimal comparison group consists of migrants' counterparts in the sending population who most closely represent what would happen to the migrants if they stayed at origin.

This study presented here addresses these potential threats to validity by employing a longitudinal design, with data collected pre- and post-migration among rural-to-urban migrants and their counterparts who stayed in the rural sending areas. The study's main objective is to ascertain the impact of rural-to-urban moves upon the health of young adult migrants, compared to those who stayed behind. Two research questions are addressed in this paper:

1. Do rural-to-urban migrants differ in *a priori* health status from their counterparts who remained at origin?

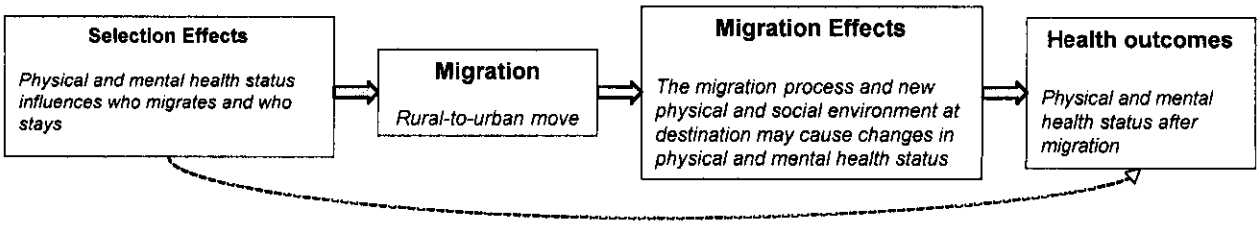
2. After controlling for baseline health status, are young adults who moved from rural areas to cities healthier or less healthy than their counterparts who remained in the rural areas?

Selection effects are evaluated by comparing baseline health status of those who subsequently migrated with the health status of those who remained at origin. To determine whether rural-to-urban migration is beneficial or detrimental to the health of young adults, health outcomes are compared between migrants and their peers in the sending areas while controlling for baseline health status. This comparison will reveal whether migrants fare better or worse on physical and mental health outcomes than those who stayed at origin.

Conceptual model

Our conceptual model depicts a two-stage relationship between health and migration. First, health status among the population at origin may influence who migrates versus who stays. This stage portrays the selection effects of health on migration. Next, the migration process and adjustment to a new physical and social environment at destination may cause changes in migrants' physical and mental health status. This stage illustrates the effects of migration on health.

Figure 1. The relationship between health and migration



Data and methods

This study employs a longitudinal survey design. Baseline data were collected in 2005 through a household-based census conducted in 100 sites in Kanchanaburi province, Western Thailand. Because migration is typically undertaken in young adulthood, the sample for this study includes the young adults (18 – 29 years old) who were enumerated in the census at the rural sites. In 2007, a follow-up census was conducted, and those who remained in Kanchanaburi province were re-interviewed. The 2914 individuals re-interviewed in the rural sites comprise the comparison group of young adults who stayed in the sending areas. Those who had moved from the village to urban destinations during the two-year period were followed-up at destination; these 234 individuals constitute the sample of rural-to-urban migrants.

The survey collected demographic and socioeconomic information, a migration history, several health status indicators, and other measures. The Short-Form Health Survey 36 (SF-36), developed by RAND Corporation and J. E. Ware, is a widely used instrument for assessing functional health and well-being. The SF-36 is particularly well-suited for this study as it was designed to detect variations in health status within generally healthy populations. Consisting of

36 questions with scaled response options, the SF-36 is an easily administered and concise way of measuring self-assessed physical and mental health status. The SF-36 comprises validated and standardized psychometric scales that measure eight separate dimensions of physical and mental health status, including: physical functioning; role limitations due to physical problems; role limitations due to emotional problems; social functioning; mental health; vitality; bodily pain; and general health perceptions. These scales are computed such that higher scores indicate better health outcomes. Two summary measures – a mental health component summary score and a physical health component summary score – are computed by aggregating data from the eight subscales.

This study uses the SF-36 to assess *a priori* differences in health status that distinguish those who subsequently migrated to urban destinations from those who stayed in the sending areas. For the rural-to-urban migrants, SF-36 measures are compared over time to reveal changes in health status from pre- to post- migration. Changes in health status over time among the comparison group are driven by secular trends in physical and mental health affecting the population of interest and are assumed to represent the health changes that migrants would have experienced had they stayed at origin.

Multivariate logistic regression models are used to assess the effect of *a priori* health status on subsequent migration while controlling for demographic and socioeconomic factors. These analyses will indicate whether those who subsequently migrated were initially healthier or less healthy than those who stayed in the origin communities. Multivariate linear regression models are used to assess the effect of migration on health outcomes while controlling for baseline health status as well as demographic and socioeconomic characteristics. The linear regression analyses will indicate whether rural-to-urban migrants end up being healthier or less healthy than they presumably would have been if they had stayed at origin.

Preliminary results

The preliminary results of this study are presented in seven tables. Socio-demographic characteristics of the rural-to-urban migrants and the comparison group of those who stayed in Kanchanaburi province are compared in Table 1. The migrants are younger, on average, than the comparison group. While the numbers of male and female migrants are nearly equal, there are more women than men in the comparison sample. The most notable difference is in marital status; while the majority of migrants were single at T_0 (before migrating), the majority of those who remained at origin were married. Overall, the migrants are more educated than their counterparts who stayed in the origin communities. There is also a much larger proportion of students among the migrants than in the comparison group. These significant differences in socio-demographic characteristics between the rural-to-urban migrants and those who remained at origin underscore the need to address potential selection bias by accounting for fundamental differences between migrants and their counterparts in the origin population.

Table 2 presents *a priori* differences in health status that distinguish those who subsequently migrated to urban destinations from those who stayed in the sending areas. Health status indicators include the eight SF-36 sub-scales and the physical component summary (PCS) and

mental component summary (MCS) scales. On average, those who subsequently migrated scored higher on the PCS scale, compared to those who remained at origin. This finding is consistent with the "healthy migrant hypothesis" which posits that migrants typically constitute a more physically robust subset of the sending population. A lower mean MCS score was observed for the migrants than for the comparison group. This may be a sign of migrants' dissatisfaction with their circumstances at origin before they moved.

In Table 3, pre- and post-migration health status indicators are compared for the group of rural-to-urban migrants. The mean MCS score increased significantly, as did the mean scores on two sub-scales that measure specific dimensions of mental health: vitality and role limitations due to emotional problems. While migrants experienced improvements in mental health, their physical health did not change significantly from pre- to post-migration.

Health status at baseline and follow-up for the comparison group is shown in Table 4. The mean PCS score decreased over time. Although the difference is statistically significant, the magnitude of change is small. In general, physical health declines gradually with age. Therefore, this slight decrease in the PCS score could be expected, because the population aged by 2 years between the two survey waves. Meanwhile, the results show a modest improvement in mental health over time. This could be due to emotional maturity that comes with age, particularly during young adulthood. External circumstances, such as economic conditions, environmental factors, and social and political changes, may also contribute to improved emotional well-being in the population.

To address the selection effects of *a priori* health status on subsequent migration, Table 5 presents odds ratios (ORs) for each health status indicator predicting migration. Individual logistic regression models were run for each health status indicator, with and without demographic control variables. The results show that the PCS score is positively associated with migration while the MCS score is inversely associated with migration. The ORs for PCS and MCS remain borderline significant when control variables are included in the models. These findings corroborate the results in Table 2 and the "healthy migrant hypothesis" by indicating that those who are more physically robust are more likely to migrate.

Socio-demographic characteristics are also key selection factors for migration. Table 6 expands upon the results summarized in Table 5 for the two logistic regression models in which PCS and MCS predict migration with socio-demographic covariates. The results show that age, marital status and education are significantly associated with subsequent rural-to-urban migration. Young adults become less likely to migrate as they get older, and those who are married are less than half as likely to migrate as single young adults. Educational attainment is positively associated with subsequent migration; those educated at the secondary level or higher are most likely to migrate. These findings are consistent with the literature on socio-demographic determinants of migration.

Finally, Table 7 presents the results of linear regression analyses assessing the effect of rural-to-urban migration on health outcomes after controlling for baseline health status. These linear regression models were analyzed with and without demographic control variables. The findings indicate that rural-to-urban migrants fare better than those who remained in the origin

communities on both physical and mental health outcomes, including: the physical component summary score, physical functioning and vitality. Because the results demonstrated that the migrants were more physically robust even before they moved, compared to their counterparts at origin, it is not surprising that migrants retained a physical health advantage after they moved to urban destinations. Rural-to-urban migrants fare better in terms of vitality – a specific dimension of mental health – compared to those who stayed in the rural areas. This may signify a revitalization experienced by migrants as they encounter the opportunities and excitement provided by the urban destination.

Discussion

To overcome selection bias, we used a longitudinal research design to assess the effects of rural-to-urban migration on physical and mental health. Measuring pre-migration health status allows us to explore the extent to which differences in health outcomes between migrants and their counterparts who stayed at origin are due to *a priori* differences rather than changes attributable to the move. Our results show that rural-to-urban migrants differ in *a priori* health status from their counterparts who stayed in the rural areas. Those who subsequently migrated were initially in better physical health than those who remained at origin, which is consistent with the "healthy migrant hypothesis."

While our results confirm what other studies have posited – that migrants are physically healthier before they move compared to those who stay at origin – pre-migration mental health status has received less attention in the literature. We find that migrants actually score lower on the mental component summary (MCS) indicator measured before the move, compared to the mean MCS score observed at baseline for the comparison group. However, we also find that, after moving to the city, the disadvantage in mental health status among migrants – vis a vis the comparison group – disappears. After moving to the city, migrants are indistinguishable from those who stayed at origin on the MCS measure. This suggests that, before moving to urban destinations, migrants may have been dissatisfied with living in the rural area. This dissatisfaction may have enticed them to migrate to urban destinations, which lead to an improvement in mental health that negates the deficiency they suffered while living in the rural areas.

Key limitations of this study include attrition and a fairly short window of time between survey waves. Some loss to follow-up is typical in longitudinal research studies, and it is particularly difficult to avoid when following migrants. To address the potential selection bias introduced through attrition, statistical analyses will be conducted comparing socio-demographic characteristics and baseline health status of those lost to follow-up with those retained in the sample for both survey waves. While a fairly short length of time between survey waves can help reduce attrition, it also limits the number of individuals who migrate within that timeframe, which restricts the statistical power of the study. Also, if some of the impacts of migration on physical and mental health manifest more slowly, the magnitude of change detected within the timeframe of the study will be minimal. To overcome the limitations of conducting this study with only two years between baseline and follow-up, a third wave of the survey was conducted in 2009. This provides longer-term information on the original sample as well as an additional sample of new rural-to-urban migrants.

Table 1. Sample characteristics at T_0 (in 2005) for those who subsequently migrated before 2007 compared to respondents who stayed in Kanchanaburi province

Characteristics	***Migrants*** *(N=234)*	***Kanchanaburi Residents*** *(N=2914)*
	Mean (Std.) or % (n)	***Mean (Std.) or % (n)***
Age* ** (years: 18-29)	21.07 (3.17)	24.18 (3.47)
Sex**		
Male	49.6% (116)	39.5% (1150)
Female	50.4% (118)	60.5% (1764)
Marital status* **		
Single	65.8% (154)	29.5% (859)
Married	31.6% (74)	67.7% (1972)
Divorced, widowed, separated	2.6% (6)	2.8% (83)
Occupation* **		
Professional	5.6% (13)	10.0% (290)
Skilled	31.6% (74)	49.0% (1429)
Manual labor	15.8% (37)	15.7% (457)
Student	37.6% (88)	5.7% (167)
Not working	9.4% (22)	19.6% (571)
Education* **(+)**		
None	1.3% (3)	8.4% (245)
Primary (1-6 yrs)	20.5% (48)	38.1% (1109)
Secondary (7-12 yrs)	57.7% (135)	41.3% (1202)
Undergraduate / masters level (13+ yrs)	20.5% (48)	12.2% (356)
Vocational / religious school	---	<0.1% (1)
Birthplace* **(+)**		
This village / tambon	71.8% (168)	59.0% (1719)
Other district / province	27.8% (65)	33.4% (974)
Other country	0.4% (1)	7.6% (220)
Ever moved from birthplace**	69.2% (162)	77.4% (2255)
Moved since July 2004*	35.9% (84)	29.1% (847)

Significance: *p<0.05, **p<0.01, ***p<0.001

(+) one value missing from Kanchanaburi residents

Table 2. Health status at T_0 (in 2005) for those who subsequently migrated before 2007 compared to respondents who stayed in Kanchanaburi province

Heath Status Indicators	***Migrants*** *(N=234)*	***Kanchanaburi Residents*** *(N=2914)*
SF-36 sub-scales	Mean score	Mean score
Physical Functioning	96.48	95.44
Role Limitations due to Physical Problems	83.23	81.37
Bodily Pain	75.35	75.23
General Health*	69.48	66.54
Vitality	69.64	68.19
Social Functioning[b]	82.19	84.24
Role Limitations due to Emotional Problems[b]	76.35	80.49
Mental Health[b]	73.06	74.87
SF-36 summary scales	Mean score	Mean score
PCS**	54.19	52.81
MCS*	46.92	48.48

Significance: [b]p<0.10, *p<0.05, **p<0.01

Table 3. Pre-migration versus post-migration health status among young adult rural-to-urban migrants, 2005 – 2007 (N=234)

Health Status Indicators	***Pre-migration 2005***	***Post-migration 2007***
SF-36 sub-scales	Mean score	Mean score
Physical Functioning	96.48	96.33
Role Limitations due to Physical Problems[b]	83.37	87.88
Bodily Pain	75.35	76.97
General Health	69.48	69.26
Vitality*	69.64	71.88
Social Functioning	82.46	84.59
Role Limitations due to Emotional Problems***	76.58	87.07
Mental Health[b]	73.06	74.87
SF-36 summary scales	Mean score	Mean score
PCS	54.30	53.85
MCS***	47.08	49.82

Significance: [b]p<0.10, *p<0.05, ***p<0.001

Table 4. Health status in 2005 versus health status in 2007 among the non-migrant comparison group of young adults interviewed in Kanchanaburi province in both years (N=2914)

Health Status Indicators	*2005*	*2007*
SF-36 sub-scales	Mean score	Mean score
Physical Functioning	95.44	95.07
Role Limitations due to Physical Problems	81.34	82.51
Bodily Pain*	75.23	74.18
General Health**	66.54	65.47
Vitality	68.21	68.35
Social Functioning***	84.34	85.98
Role Limitations due to Emotional Problems***	80.48	84.36
Mental Health	74.87	75.04
SF-36 summary scales	Mean score	Mean score
PCS***	52.77	52.22
MCS***	48.55	49.57

Significance: *p<0.05, **p<0.01, ***p<0.001

Table 5. Effect of health status at T_0 (in 2005) on subsequent migration before 2007 (N=3148)

Health Status Indicators	*Models without controls OR (p-value)*	*Models with controls OR (p-value)*
SF-36 summary scales		
PCS at T_0	**1.037 (.002)**	1.021 (.084) [b]
MCS at T_0	**.983 (.015)**	.986 (.064) [b]
SF-36 sub-scales		
Physical Functioning at T_0	1.012 (.143)	1.012 (.149)
Role Limitations due to Physical Problems at T_0	1.002 (.383)	1.001 (.637)
Bodily Pain at T_0	1.000 (.936)	.998 (.529)
General Health at T_0	**1.010 (.016)**	1.004 (.408)
Vitality at T_0	1.007 (.140)	.999 (.861)
Social Functioning at T_0	.994 (.089) [b]	.998 (.566)
Role Limitations due to Emotional Problems at T_0	.997 (.068) [b]	.997 (.146)
Mental Health at T_0	.991 (.057) [b]	.993 (.158)

Note: the migration status outcome is coded migrants = 1 and non-migrants = 0
Controls: age, sex, education, and marital status
[b] = borderline significant at p<0.10

Table 6. Effect of health status and socio-demographic characteristics at T_0 (in 2005) on subsequent migration before 2007 (N=3140)

Covariates	*Model 1 (PCS) OR (p-value)*	*Model 2 (MCS) OR (p-value)*
SF-36 summary scales		
PCS at T_0	1.021 (.084)	---
MCS at T_0	---	.986 (.064)
Socio-demographic characteristics		
Age at T_0 (continuous)	**.804 (.000)**	**.804 (.000)**
Sex (ref: female)		
Male	1.105 (.514)	1.157 (.337)
Marital status at T_0 (ref: single)		
Married	**.473 (.000)**	**.462 (.000)**
Widowed, divorced, separated	.883 (.785)	.850 (.721)
Level of education at T_0 (ref: none)		
Primary	**3.304 (.048)**	3.262 (.051)
Secondary	**5.342 (.005)**	**5.233 (.005)**
Higher	**7.109 (.001)**	**7.053 (.001)**

Note: the migration status outcome is coded migrants = 1 and non-migrants = 0
Controls: age, sex, education, and marital status
[b] = borderline significant at $p<0.10$

Table 7. Effect of rural-to-urban migration on health status at T_1, controlling for health status at T_0 and demographic characteristics

Health Outcomes at T_1	*Without demographic controls*				*With demographic controls*			
	Migration status β (s.e.)	*T_0 health status β (s.e.)*	*Constant*	*R^2*	*Migration status β (s.e.)*	*T_0 health status β (s.e.)*	*Constant*	*R^2*
SF-36 summary scales								
PCS at T_1	1.339	.192	42.078	.036	.999	.176	42.950	.047
	(.467)**	(.019)***	(1.002)		(.476)*	(.019)***	(1.049)	
MCS at T_1	.616	.254	37.240	.071	.522	.252	37.389	.073
	(.588)	(.017)***	(.820)		(.603)	(.017)***	(.881)	
SF-36 sub-scales								
Physical Functioning at T_1	1.097	.160	79.843	.021	2.411	.140	80.531	.034
	(.766)	(.019)***	(1.853)		(1.087)*	(.019)***	(1.886)	
Role Limitations due to	5.122	.120	72.779	.016	4.204	.115	74.386	.020
Physical Problems at T_1	(2.106)*	(.018)	(1.548)		(2.159)[b]	(.018)***	(1.987)	
Bodily Pain at T_1	2.776	.168	61.560	.028	1.818	.163	62.567	.035
	(1.416)[b]	(.018)***	(1.396)		(1.449)	(.018)***	(1.669)	
General Health at T_1	2.781	.341	42.768	.114	1.645	.321	44.423	.126
	(1.168)*	(.017)***	(1.186)		(1.191)	(.017)***	(1.373)	
Vitality at T_1	3.202	.231	52.575	.057	3.042	.221	52.558	.065
	(.944)***	(.017)***	(1.206)		(.966)**	(.017)***	(1.351)	
Social Functioning at T_1	-1.219	.089	78.455	.008	-.921	.089	78.451	.010
	(1.163)	(.017)***	(1.501)		(1.193)	(.017)***	(1.626)	
Role Limitations due to	3.308	.153	72.015	.027	2.622	.153	73.617	.031
Emotional Problems at T_1	(2.074)	(.016)***	(1.428)		(2.127)	(.016)***	(1.865)	
Mental Health at T_1	.359	.289	53.370	.084	.203	.283	53.090	.087
	(.907)	(.017)***	(1.300)		(.930)	(.017)***	(1.386)	

Significance: [b]p<0.10, *p<0.05, **p<0.01, ***p<0.001

Controls: age, sex, and marital status (The model for physical functioning also contains an interaction term for sex * migration status. No other interactions were significant in the models.)