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Determining the Predictive Ability of Rural-Urban Migration for Health Indicators in China

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Abstract: Over one hundred million rural Chinese residents have migrated to urban areas within China for work. In cities, these workers often lack access to health insurance and licensed healthcare. Migrants are also more likely to work in dangerous jobs and to participate in high-risk behaviors. This paper analyzes two health indicators, blood pressure and grip strength, to determine if migrant status can predict health. This paper determines that migrant status is a significant predictor for blood pressure and grip strength, albeit in models with low predictive ability. However, the length of time since a person migrated is not a significant predictor of health indicators.

Keywords: China, internal migration, health outcomes, blood pressure

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The Longitudinal Survey on Rural Urban Migration in China (RUMiC) consists of three parts: the Urban Household Survey, the Rural Household Survey and the Migrant Household Survey. It was initiated by a group of researchers at the Australian National University, the University of Queensland and the Beijing Normal University and was supported by the Institute for the Study of Labor (IZA), which provides the Scientific Use Files. The financial support for RUMiC was obtained from the Australian Research Council, the Australian Agency for International Development (AusAID), the Ford Foundation, IZA and the Chinese Foundation of Social Sciences.

I. Introduction

The aim of this paper is to study the interconnection between migration and health outcomes in China. We use a database from IZA (University of Bonn) to assess if there are observable differences in health measures between migrant workers and native-born urban residents in China. While the effects of healthcare restrictions for undocumented immigrants or foreigners have been documented in many countries, there are only a few studies that consider migrating from rural areas to urban areas within the same country. We first present a simple model to assess if migrating from a rural area to an urban area of China has any explanatory effect on health outcomes in China in 2009. In the second part of the study, we employ a probit model to determine if restrictions on healthcare access are linked to poorer health outcomes in migrants. We control for income, education, sex, and other socio-economic variables. This paper is distinguished from previous research by using a larger cross-section of migrants and urban Chinese residents and incorporating more control variables that could explain seemingly significant relationships between migrant status and health outcomes.

For most of human history, people moved to cities for greater opportunity but there faced significant health risks from disease and accidents. To restrict geographic mobility, Chinese citizens may only access education, health care, and other public benefits in the place of a household's hukou registration area. Nevertheless, due to the hardship of rural conditions many Chinese decide to migrate to urban areas for work. We might expect a variety of differences between rural migrants and urban residents: migrants likely self-select so that healthier people choose to migrate even though, once they move, their lack of access to care and likely participation in higher-risk jobs mean that their health status may decline more rapidly. There is also likely to be a selection if migrants in very poor health return home for care.

The results of this study do not contradict previous studies. Lu and Qin (2014) demonstrate that migrant workers self-select and are generally healthier than rural neighbors who stay behind. While migrants begin healthy, they are more likely to experience adverse healthcare events than their native-born urban neighbors (Chen, 2011; Lu and Qin, 2014; and Wallace and Kulu, 2014).[1] Migrants are significantly less likely to have health insurance or access to affordable health care treatment (Hesketh et al., 2008). Without access to healthcare in urban areas, some migrants that become ill decide to travel home to their rural village for treatment (Biao, 2003). But other sick or injured migrants are unwilling to return home. Therefore, due to the increased risk of workplace accidents, increased participation in high-risk behaviors, and lack of access to health care, migrant workers face many challenges to remain healthy.[2]

II. Literature Review

[1] According to Zheng and Lian (2005) rural migrants have higher propensity to experience workplace accidents because migrants are more likely to work in more dangerous conditions. This study stated that 83 percent of workplaces were deemed to have unsafe factors and 60 percent lacked any safety measures.

[2] Migrant workers are also more likely to engage in high-risk behaviors, including unprotected sex and sex with high-risk partners (Pan et al., 2013; Dai et al., 2015; and Liu et al., 2016).

In the past two decades, China has tried to increase rural residents' access to healthcare through the New Cooperative Medical Scheme (NCMS) (Qiu et al., 2011). NCMS insurance, however, only allows access for rural hukou holders to receive healthcare in their registered rural areas (Liu and Rao 2006). Due to the nature of undocumented migration, the exact number of migrants is uncertain, but the migrant population is estimated between 120 million in 2001 (Li et al., 2007) and 220 million 2011 (Wang et al., 2010). These figures suggest migrants comprise between 9 and 16 percent of the total Chinese population (Shi and Kennedy, 2016). Qin et al. (2013) establish that mass migration can have profound impacts on the health of residents in China's cities.

Latest studies show that increased participation in NCMS leads to increased utilization of preventive care, but does not improve health status (Lei and Lin, 2009). Liu, Hsiao, and Eggleston (1999) outline challenges to healthcare access following sustained economic growth. Despite increased economic growth for several decades, inequality in health care access is increasing in China. Lastly, Shaokang et al. (2002) indicate that economic growth might actually be widening the health gap because healthcare providers are more likely to demand insurance or out-of-pocket payments than in the past. While this impacts poor urban residents as well, migrants are less likely than most urban residents to have health insurance or the ability to pay high out-of-pocket costs. The combination of the discriminatory hukou system and a lack of healthcare professionals create obstacles for migrant workers to obtain healthcare in urban Chinese cities (Quyang et al, 2016). Nauman et al. (2015) find that urban migration does affect mental health status, while Miranda et al. (2011) empirically asses that migration does not uniformly impact different health risk factors.

Healthcare access for foreign undocumented immigrants is often limited or heavily restricted in many developed countries. Martinez et al. (2015) demonstrate how restrictions on immigration negatively impact mental health status of undocumented immigrant workers in the United States (Martinez et al., 2015). Larchanché (2012) finds that in France stigmatization and other social factors limits healthcare access for undocumented immigrants even when there is a government-provided right to healthcare services. Davidovitch et al. (2013) establishes that utilization of healthcare for legal immigrants in Israel, a country with universal health care access, is significantly less accessible for foreign immigrants than native-born Israelis.[3] Hansen and Donohoe (2003) evaluate health consequences from workplace hazards for migrant farmworkers in the United States and determine that migrant workers are significantly more likely to underreport medical conditions and have poor access to health treatment.

Studies about national migration on health outcomes are scarcer. Nauman et al. (2015) examine differences in health in rural-to-urban migrants in Thailand. The study finds that migrants who are now settled in urban areas are physically healthier than returning migrants

[3] According to Davidovitch et al. (2013), migrant workers underutilize heath care services because of cultural and language barriers, lack of trust in service providers, inability to miss work to receive treatment, and other bureaucratic barriers.

and rural residents. After accounting for socioeconomic effects, *a priori* physical health remains positively correlated with migration, but the relationship is no longer significant (Nauman et al., 2015). Bollini and Siem (1995) use health outcomes (perinatal mortality and accidents/disabilities) for immigrants and migrant workers to Western European countries and find that non-native-born residents were less likely to receive competent healthcare following a workplace accident or injury. This is particularly troubling because migrant workers are much more likely to work in dangerous jobs (Bollini and Siem, 1995; Zheng and Lian, 2005; and Hesketh et al., 2008). Miranda et al. (2011) analyze cardiovascular risk factors for nearly 1,000 people in Peru and their findings suggest that rural-to-urban migration is detrimental to cardiovascular health.[4] Many common explanations for health outcomes, such as age, socioeconomic status, gender, and body mass index, do not seem to explain much of the difference in cardiovascular health indicators between migrants and urban populations (Miranda et al., 2011). These results suggest that something unique about migration from rural to urban areas might have negative effects on health. What is unique about Peru's internal migration is that, unlike in China, citizens are free to move to other regions of the country and have similar access to available services in other locations.

Hesketh et al. (2008) collected data for approximately 8,500 individuals in Eastern China and find that only 19 percent of migrant workers have health insurance, compared with 58 percent of native-born urban residents. Migrants self-report excellent health, better than both urban and rural workers, but this is likely due to selection bias (Hu et al 2008). This is unusual because migrant workers in China often experience the most dangerous workplace conditions (Zheng and Lian, 2005 and Hesketh et al., 2008). Additionally, Hong et al. (2006) analyze qualitative interviews from 90 migrants and find that migrants view healthcare as too costly and unavailable. This leads many migrants to seek alternatives to high-level medical treatment, such as self-treatment or seeing an unlicensed health-care provider (Wei et al., 2010 and Peng et al., 2010).

In our study, we use two proxies for health outcomes, grip strength and blood pressure. Schooling et al. (2011) use grip strength as a measure for muscle mass and concludes that low muscle mass could be a contributing factor for diabetes in adolescents, especially in developing countries like China. Timpka et al. (2014) use hand grip strength as one of three factors to measure muscle strength and find that men with lower muscle strength in adolescence are more likely to die from cardiovascular events during their middle ages. Similarly, Mainous et al. (2016) use grip strength as a proxy for lean muscle mass and find that adults with low grip strength have higher rates of prediabetes. Blood pressure is also a known indicator for health and mortality (Sun et al., 2008; He et al., 2009; and Diaz et al., 2014). Sun et al. (2008) indicates that high blood pressure is linked with early mortality and that 44.3 percent of Han people in northeast China have prehypertension and 36.7 percent have hypertension. He et al. (2009) links hypertension with cardiovascular and cerebrovascular disease and determines that 1.27 million deaths related to hypertension or prehypertension

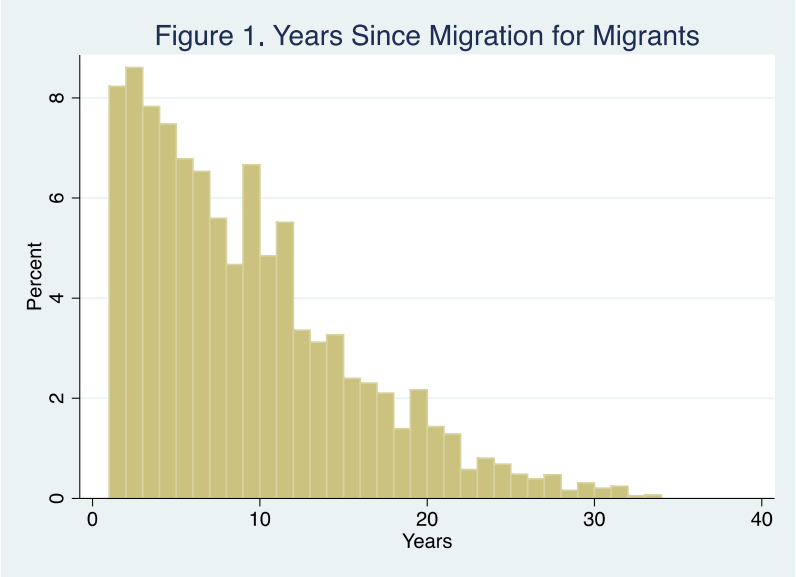
[4] Around 600 of these are migrants while the remaining 400 are nearly evenly split between rural and urban residents.

were premature. These premature deaths account for 54.5 percent of all deaths attributable to hypertension in 2005. Diaz et al. (2014) demonstrate using a meta-analysis that increased blood pressure is linked with higher rates of coronary heart disease, cardiovascular disease mortality, and stroke.

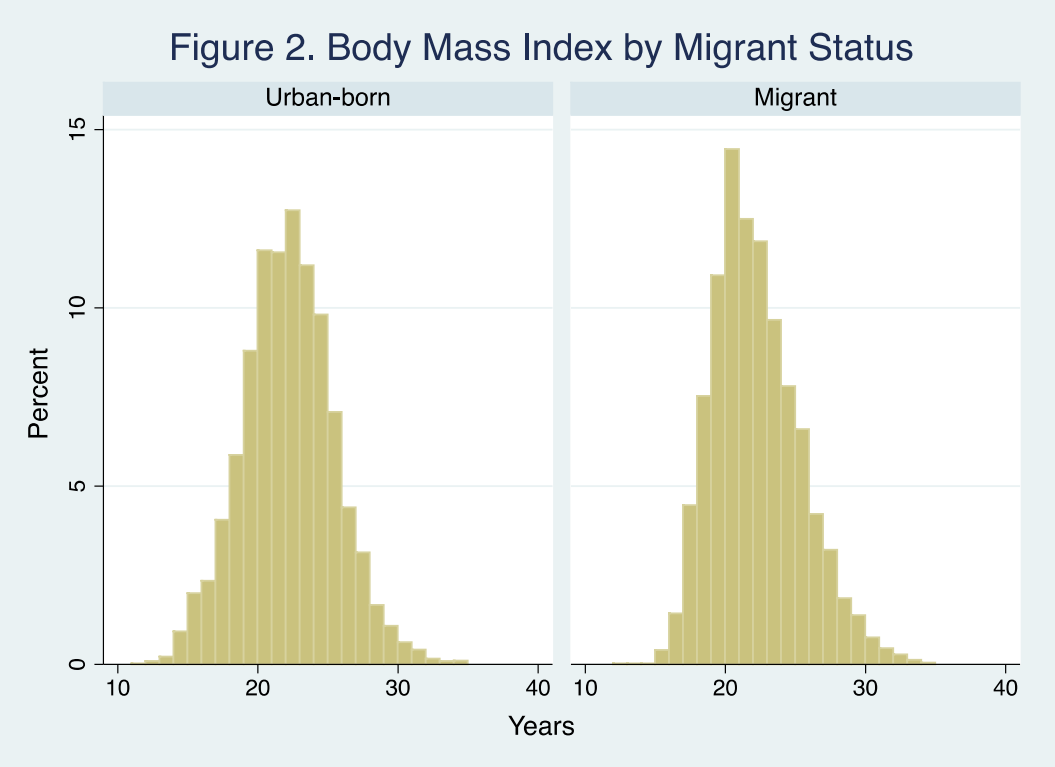
Other studies specifically analyze the relationship between migration and blood pressure. Ebrahim et al. (2010) find that rural-to-urban migration in India increases risk factors for obesity, diabetes, and high blood pressure. They also find that rural populations in India have lower blood pressure and lipid levels than urban populations, and suggest that environmental factors in urban areas increase health risks for migrants and continue to increase as a migrant remains in urban areas. He et al. (1991) examine 14,505 people in China and find that rural Yi farmers have lower blood pressure rates, and less increase in blood pressure due to age, compared with the urban populations where the Yi have migrated. Poulter et al. (1990) find that Kenyan migrants have higher blood pressure compared to their rural counterparts, and conclude that selective migration does not account for differences in blood pressure.

III. Data

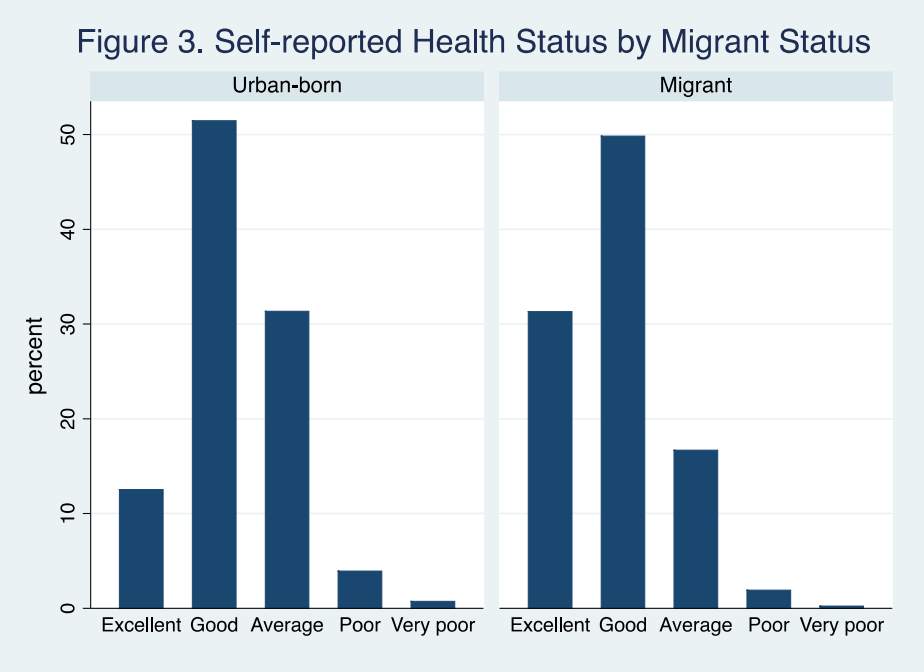
In this paper, we use survey data reported in the *Longitudinal Survey on Rural Urban Migration in China* from the Institute for the Study of Labor (IZA) at the University of Bonn. The survey collects data for 71,074 individuals (29,556 urban persons; 32,171 rural persons; and 9,347 migrants) in two waves for the years 2008 and 2009. The survey contains data on socioeconomic indicators, such as education, income, ethnicity, and hukou registration. For education, available data includes the highest level of education completed, years of formal education, and grades earned before leaving school. Separate data is reported for educational participation and attainment for children, including where the child is enrolled in school. This is especially important for migrant workers because the children of migrants are only eligible for government education where their hukou is registered. For income, data for migrants details their current income from all sources, previous incomes from other migrant jobs, and their expected wages if they remained in their home village. Data is also available for migrants indicating how many years they have been a migrant worker.



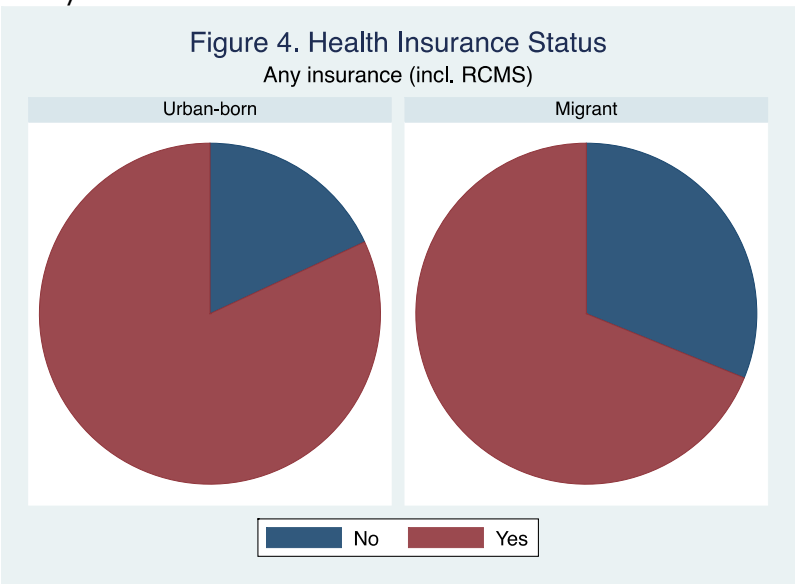
IZA survey also includes data on many health indicators and outcomes. Measurable characteristics are detailed in the survey. These include weight (kilograms), height (centimeters), dominant handedness, blood pressure, and grip strength. To reduce measurement error for blood pressure screenings, a person's blood pressure is measured three times and the average of all values is used for their blood pressure. For example, blood pressure is measured three times and the systolic pressure from each separate measurement is averaged to determine a person's systolic pressure. Similarly, diastolic pressure is calculated by averaging the diastolic pressure from each separate measurement. Grip strength is measured twice for both hands and the average for each hand is calculated from the two measurements. Instructions to measure blood pressure, grip strength, height, and weight are explicitly provided, so that different people administering a survey will obtain similar results for similar individuals. BMI is calculated by dividing the weight (in kilograms) by the height (in meters) squared. Smoking status, and number of cigarettes smoked per day, is also included in the survey. Figure 2 shows that body mass index is similar for both urban-born Chinese and migrant workers.

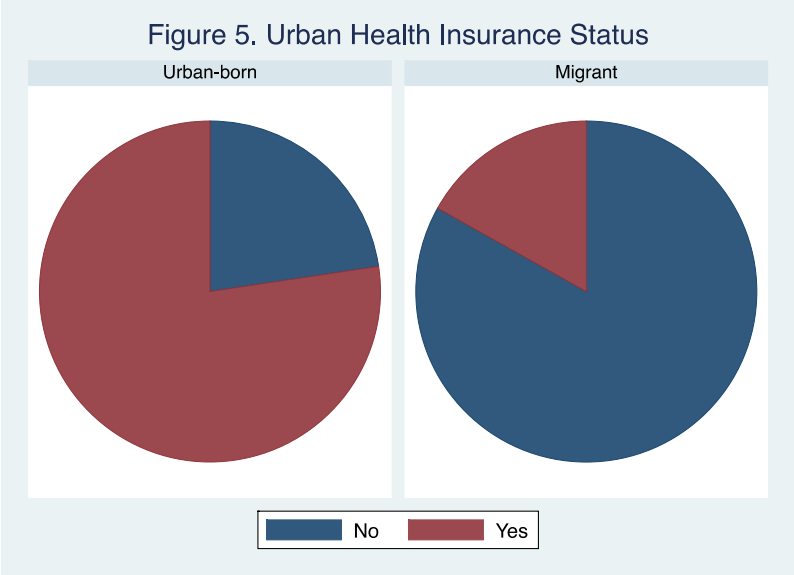


Self-reported health status is collected from respondents. Respondents rate their health on a scale from one (excellent health) to five (very poor health) compared to people of the same age. A person's disability status is included, and specifies if there is (1) no disability, (2) a disability but one that does not impact normal living, or (3) a disability that does impact living. Respondents indicate if they were sick or injured in the previous three months and, if so, to list the nature or name of that illness or injury. Importantly, a person's response to illness or injury is listed. It is detailed if a respondent: (1) did nothing; (2) rested, but did not take medicine; (3) took medicine, but did nothing else; (4) went to the doctor at a clinic; or (5) went to the doctor at a hospital. This question is particularly helpful to understand potential differences in medical choices for urban and migrant populations. The decision is likely based, in part, on health insurance status. Figure 3 illustrates that migrants are much more likely to report their health status as "excellent" than urban-born Chinese residents.



The survey includes detailed data on health insurance status. Possible responses include commercial medical insurance, government health services, employment medical care, family medical insurance, rural cooperatives medical coverage, women and children health insurance, immunization insurance, or other. The rural cooperative medical coverage (RCMS) only provides care where a person's hukou is registered, so migrants are unable to obtain coverage through RCMS in an urban city. Therefore, when calculating if migrants have health insurance coverage, respondents that indicate they only have RCMS will be considered to be without health insurance coverage. A respondent's cost for health insurance is detailed and data is also provided regarding why a person lacks health coverage. The survey also includes data on the total amount a person spends on health care in the survey year. Figures 4 and 5 illustrate that, while many migrant workers possess health insurance, most migrant workers have health insurance that can only be used in rural areas.





IV. Methodology

This paper will assess if knowing a person's migrant status helps to predict health, as measured through several proxies. If the following analyses determine that migrants and urban-born Chinese have significantly different health indicators, then we will be able to help predict health metrics based on migrant status. This paper cannot determine causal impacts and so makes no attempt to explain why rural to urban migration could cause any difference, if differences do exist, in health metrics.

First, we use a simple OLS regression for a cross-section of 24,206 Chinese migrants and native urban residents spread across urban areas and collected over a two-year period. The main objective of this regression is to test if being a migrant in an urban area has any predictive value for health outcomes, while controlling for age, education and other socio-economic variables. We use two different proxies for health outcomes as dependent variables: blood pressure and grip strength. As discussed earlier in the literature review, various research establishes these two measurements as credible proxies for health (Sun et al., 2008; He et al., 2009; Schooling et al., 2011; Timpka et al., 2014; Diaz et al., 2014; and Mainous et al., 2016). We believe that these two measures each measure a different aspect of health. Grip strength, as a measure of muscular strength, is a good indicator of current health, while blood pressure is reliable predictor for future cardiovascular diseases and early mortality. Therefore, using grip strength as the dependent variable will predict current health while using systolic or diastolic blood pressure as the dependent variable will predict future health.

A dummy variable for marriage is created and a person is considered married if they are married or remarried. Respondents that are separated, widowed, or divorced are not considered to be married. A dummy variable for cigarette is also calculated. If a person smokes

at least one cigarette per day, then they are considered to be a smoker. If a person smokes less than one cigarette per day on average, they are not considered to be a smoker.

(1) Systolic Pressure = $\beta_1$migrantdummy + $\beta_2$age + $\beta_3$insurancedummy + $\beta_i$marrydummy +β_i smokerdummy +β_i yearsofeducation+β_i gender +ε

(2) DiastolicPressure = $\beta_1$migrantdummy + $\beta_2$age + $\beta_3$insurancedummy + $\beta_i$marrydummy +β_i smokerdummy +β_i yearsofeducation+β_i gender +ε

(3) GripStrength = $\beta_1$migrantdummy + $\beta_2$age + $\beta_3$insurancedummy + $\beta_i$marrydummy +β_i smokerdummy +β_i yearsofeducation+β_i gender +ε

Second, health indicators could also be impacted by the length of time since a person migrated. Research finds (He et al., 1991 and Ebrahim et al., 2010) that a migrant's health worsens the longer they spend away from their rural village. This research suggests environmental factors, including diet, causes poorer health than in a rural village. These regressions will be repeats of the first three OLS models, but will analyze blood pressure for only the 9,347 migrants in the survey and determine if length of time since migrating causes an increase in blood pressure.

(4) Systolic Pressure =$\beta_2$age + $\beta_2$age + $\beta_3$insurancedummy + $\beta_i$marrydummy +β_i smokerdummy +β_i yearsofeducation+β_i gender + yrssincemigrating +ε

(5) DiastolicPressure = $\beta_2$age + $\beta_3$insurancedummy + $\beta_i$marrydummy +β_i smokerdummy +β_i yearsofeducation+β_i gender + yrssincemigrating +ε

(6) GripStrength = $\beta_2$age + $\beta_3$insurancedummy + $\beta_i$marrydummy +β_i smokerdummy +β_i yearsofeducation+β_i gender + yrssincemigrating +ε

Lastly, we use an OLS model to determine migrant status is a significant predictor of self-reported health status. After finding results for the previous regressions, this model will identify if migrants self-report better health than native-born urban residents. Self-reported health rating is a one to five score, where one is very poor health compared to other people of the same age and a five is excellent health.

(7) HealthRating = $\beta_2$age + $\beta_3$insurancedummy + βmarrydummy +βsmokerdummy +βyearsofeducation +βmigrant + βgender +ε

V. Results

For each model, a predicted value is listed for an unmarried migrant male smoker, without health insurance, with ten years of education, and with five years since migrating.

Regression 1, R-squared is 0.19.
Predicted value of representative worker equals 121.6. This is similar to the average value of 120.3.

systolicavg	Coefficient	Std. Error	T-score
marrydummy	-1.32	0.47	-2.80
smokerdummy	0.81	0.49	1.65
urbaninsurancedummy	0.14	0.49	0.30
yearsofeduc	-0.29	0.06	-5.17
maledummy	5.64	0.42	13.57
mgrntdummy	3.85	0.56	6.93
age	0.44	0.01	29.91
constant	100.89	1.06	95.05

Regression 2, R-squared is 0.09.
Predicted value of representative worker equals 76.8. This is similar to the average value of 76.6.

diastolicavg	Coefficient	Std. Error	T-score
marrydummy	0.82	0.29	2.80
smokerdummy	0.74	0.31	2.37
urbaninsurancedummy	-0.21	0.30	-0.68
yearsofeduc	-0.09	0.04	-2.52
maledummy	3.34	0.26	12.84
mgrntdummy	0.16	0.35	0.46
age	0.14	0.01	15.04
constant	69.21	0.67	104.05

Regression 3, R-squared is 0.04
Predicted value of representative worker equals 41.2. The average value for the entire sample is 33.7, and the average for only men is 40.0.

gripstrength	Coefficient	Std. Error	T-score
marrydummy	2.98	1.08	2.77
smokerdummy	1.72	1.13	1.52
urbaninsurancedummy	-1.21	1.12	-1.08
yearsofeduc	0.03	0.13	0.21
maledummy	10.79	0.96	11.29
mgrntdummy	2.81	1.27	2.22
age	-0.08	0.03	-2.30
constant	28.01	2.44	11.47

Regression 4, R-squared is 0.16
Predicted value of representative worker equals 121.3 and the average for migrants is 119.1.

systolicavg	Coefficient	Std. Error	T-score

marrydummy	-0.36	0.70	-0.51
smokerdummy	0.45	0.62	0.72
urbaninsurancedummy	0.74	0.69	1.07
yearsofeduc	-0.53	0.11	-5.04
maledummy	6.70	0.59	11.28
age	0.35	0.04	9.81
yrssincemigration	-0.04	0.05	-0.80
constant	109.03	1.53	71.06

Regression 5, R-squared is 0.10.
Predicted value of representative worker equals 76.5 and the average for migrants only is 75.8.

diastolicavg	Coefficient	Std. Error	T-score
marrydummy	-0.18	0.50	-0.35
smokerdummy	-0.29	0.45	-0.65
urbaninsurancedummy	0.36	0.49	0.74
yearsofeduc	-0.07	0.07	-0.88
maledummy	3.37	0.42	8.02
age	0.25	0.03	9.59
yrssincemigration	-0.04	0.03	-1.19
constant	66.88	1.09	61.19

Regression 6, R-squared is 0.42.
Predicted value of representative worker equals 42.05 and the average for migrants only is 42.9.

gripstrength	Coefficient	Std. Error	T-score
marrydummy	1.71	0.46	3.69
smokerdummy	1.02	0.42	2.45
urbaninsurancedummy	1.31	0.46	2.85
yearsofeduc	-0.01	0.07	-0.09
maledummy	13.77	0.40	34.87
age	-0.06	0.02	-2.58
yrssincemigration	0.02	0.03	0.78
constant	29.07	1.02	28.36

Regression 7, R-squared is 0.18.
Predicted value of representative worker equals 1.88 and the average for migrants only is 2.1.

healthrating	Coefficient	Std. Error	T-score
marrydummy	-0.09	0.01	-6.18
smokerdummy	-0.01	0.01	-0.56
urbaninsurancedummy	0.05	0.01	3.37
yearsofeduc	-0.02	0.00	-10.78

maledummy	-0.08	0.01	-6.73
mgrntdummy	-0.29	0.01	-19.39
age	0.02	0.00	39.57
constant	1.86	0.02	77.90

VI. Conclusion

Results demonstrate that, even when migrant status is a significant predictor of health outcomes, these models have low R-squared values and don't have much predictive value. After controlling for many independent variables, like marriage, smoker status, health insurance access, age, and gender, it is difficult to predict health indicators.

Most literature detailed above indicates that migrants should have worse health outcomes than their urban neighbors. Migrant laborers work in more dangerous jobs, are more likely to experience a workplace accident, and are less likely to practice safe sex. Migrants are also less likely to have health insurance coverage in their urban city, less likely to be able to afford health insurance or copays, and less likely to visit a licensed healthcare provider. It is possible, however, that the proxies used for overall health in this study are better predictors for *future* health than *present* health. Data from two survey waves in consecutive years would, therefore, be insufficient to demonstrate that there are negative effects from migration because the effects would not appear for years.

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APPENDIX – STATA script

```
######RURAL CLEANING
clear
use "/Users/ChristopherRick/Google Drive/grad school/CHINA/rumic_2009_data/MHSo_w2_abc.dta"
merge 1:1 id using "/Users/ChristopherRick/Google Drive/grad school/CHINA/rumic_2008_data/MHS_w1_abc.dta", keepusing(c165_1) nogenerate update
drop if missing(year)
append using "/Users/ChristopherRick/Google Drive/grad school/CHINA/rumic_2009_data/MHSn_w2_abc.dta"
rename a55_5 height
rename a55_6 weight
rename a55_7_1 systolic1
rename a55_7_2 systolic2
rename a55_7_3 systolic3
generate systolicavg = (systolic1 + systolic2 + systolic3)/3
rename a55_8_1 diastolic1
rename a55_8_2 diastolic2
rename a55_8_3 diastolic3
generate diastolicavg = (diastolic1 + diastolic2 + diastolic3)/3
rename a55_9_1 rightgrip1
rename a55_9_2 rightgrip2
generate rightgrip = (rightgrip1 + rightgrip2)/2
rename a55_10_1 leftgrip1
rename a55_10_2 leftgrip2
generate leftgrip = (leftgrip1 + leftgrip2)/2
rename a06_1 birthyear
generate age = 2009-birthyear
generate yrssincemigration = 2009-c165_1
generate mgrntdummy = 1
generate insurancedummy = 1 if a36_1 | a36_2 |a36_3 |a36_4 |a36_5 |a36_6 |a36_7 |a36_8|a36_9 == 1
replace insurancedummy = 0 if a36_10 == 1
generate urbaninsurancedummy = 1 if a36_1 | a36_2 |a36_3 |a36_4|a36_6 |a36_7 |a36_8|a36_9 == 1
replace urbaninsurancedummy = 0 if missing(urbaninsurancedummy)
generate sickdummy = 1 if a29 == 1
replace sickdummy = 0 if a29 != 1
generate righthanddummy =1 if a26_1 ==2
replace righthanddummy =0 if a26_1 ==1
generate exchealthdummy = 1 if a27 == 1
replace exchealthdummy = 0 if a27 != 1
generate goodhealthdummy = 1 if a27 == 2
```

```
replace goodhealthdummy = 0 if a27 != 2
generate avghealthdummy = 1 if a27 == 3
replace avghealthdummy = 0 if a27 != 3
generate poorhealthdummy = 1 if a27 == 4
replace poorhealthdummy = 0 if a27 != 4
generate verypoorhealthdummy = 1 if a27 == 5
replace verypoorhealthdummy = 0 if a27 != 5
rename a27 healthrating
generate maledummy = 1 if a04 == 1
replace maledummy = 0 if a04 == 2
replace c120_0 = 0 if missing(c120_0)
generate monthlyincome = c117+c120_0
replace monthlyincome = 0 if missing(monthlyincome)
rename b103 yearsofeduc
rename a35 daysmissedforsick
rename a42_1 cigarettesperday
replace cigarettesperday = 0 if missing(cigarettesperday)
generate smokerdummy = 1 if cigarettesperday > 0
replace smokerdummy = 0 if missing(smokerdummy)
generate marrydummy = 1 if a09 == 1
replace marrydummy = 1 if a09 == 2
replace marrydummy = 0 if missing(marrydummy)
save "/Users/ChristopherRick/Google Drive/grad school/CHINA/migrantcleaned.dta"


##### URBAN CLEANING
clear
use "/Users/ChristopherRick/Google Drive/grad school/CHINA/rumic_2009_data/UHS_w2_ac.dta"
generate mgrntdummy = 0
gen birthyear=int(a06/10000)
gen age = 2009 - birthyear
rename a19 height
rename a20 weight
rename a66_a diastolic1
rename a66_b diastolic2
generate diastolicavg = (diastolic1 + diastolic2)/2
rename a67_a systolic1
rename a67_b systolic2
generate systolicavg = (systolic1 + systolic2)/2
rename a68 rightgrip
rename a69 leftgrip
generate sickdummy = 1 if a32 == 1
replace sickdummy = 0 if a32 != 1
rename a37 daysmissedforsick
generate exchealthdummy = 1 if a24 == 1
replace exchealthdummy = 0 if a24 != 1
generate goodhealthdummy = 1 if a24 == 2
replace goodhealthdummy = 0 if a24 != 2
generate avghealthdummy = 1 if a24 == 3
replace avghealthdummy = 0 if a24 != 3
generate poorhealthdummy = 1 if a24 == 4
replace poorhealthdummy = 0 if a24 != 4
generate verypoorhealthdummy = 1 if a24 == 5
replace verypoorhealthdummy = 0 if a24 != 5
rename a24 healthrating
generate righthanddummy =1 if a23 ==2
replace righthanddummy =0 if a23 ==1
generate maledummy = 1 if a05 == 1
```

```
replace maledummy = 0 if a05 == 2
generate insurancedummy = 1 if a30 < 6
replace insurancedummy =0 if a30 == 6
generate urbaninsurancedummy = 1 if a30 < 6
replace urbaninsurancedummy = 0 if a30 == 6
replace urbaninsurancedummy = 0 if a30 == 1
rename c18 monthlyincome
replace monthlyincome = 0 if missing(monthlyincome)
rename a22 yearsofeduc
rename a40 cigarettesperday
replace cigarettesperday = 0 if missing(cigarettesperday)
generate smokerdummy = 1 if cigarettesperday > 0
replace smokerdummy = 0 if missing(smokerdummy)
generate marrydummy = 1 if a16 == 1
replace marrydummy = 1 if a16 == 2
replace marrydummy = 0 if missing(marrydummy)
save "/Users/ChristopherRick/Google Drive/grad school/CHINA/urbancleaned.dta"
```

```
####merge
append using "/Users/ChristopherRick/Google Drive/grad school/CHINA/migrantcleaned.dta", force
keep marrydummy smokerdummy cigarettesperday mgrntdummy healthrating yrssincemigration age height weight systolicavg diastolicavg rightgrip leftgrip insurancedummy urbaninsurancedummy exchealthdummy goodhealthdummy avghealthdummy poorhealthdummy verypoorhealthdummy daysmissedforsick monthlyincome yearsofeduc
label define migrant 1 "Migrant" 0 "Urban-born"
label values mgrntdummy migrant
label define yesno 1 "Yes" 0 "No"
label values insurancedummy yesno
label values urbaninsurancedummy yesno
generate BMI = weight / (height/100  *  height/100 )
save "/Users/ChristopherRick/Google Drive/grad school/CHINA/combinedcleaned.dta"
```

```
###### OLS and Probit
regress systolicavg marrydummy smokerdummy urbaninsurancedummy BMI yearsofeduc monthlyincome mgrntdummy
regress diastolicavg marrydummy smokerdummy urbaninsurancedummy BMI yearsofeduc monthlyincome mgrntdummy
regress rightgrip marrydummy smokerdummy urbaninsurancedummy BMI yearsofeduc monthlyincome mgrntdummy
probit mgrntdummy marrydummy smokerdummy urbaninsurancedummy BMI yearsofeduc monthlyincome
regress systolicavg marrydummy smokerdummy urbaninsurancedummy BMI yearsofeduc monthlyincome yrssincemigration
regress diastolicavg marrydummy smokerdummy urbaninsurancedummy BMI yearsofeduc monthlyincome yrssincemigration
```