Title
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Publication Date
2008-12-01

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CCPR-031-08

December 2008
Latest Revised: April 2008

California Center for Population Research
On-Line Working Paper Series

Working paper:

"Health selectivity of internal migrants in Mexico:
Evidence from the Mexican Family Life Survey"

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Version: April 14, 2008

*I gratefully acknowledge funding from Fogarty D43 TW007699 (Arenas) and thank Luis Rubalcava, Graciela Teruel, Robert Mare, Anne Pebley and the Mare-Seltzer research group member for their valuable comments. This paper was presented at the April 2008 Population Association of America Conference. All opinions and errors are those of the author.

**"Health selectivity of internal migrants in Mexico:
Evidence from the Mexican Family Life Survey"**

Abstract

The present paper examines health selectivity of migrants using data from the Mexican Family Life Survey; a panel ideally suited for this as it allows a comparison of migrants with non-migrants, with measures taken prior to migration. The analysis consists of logistic regressions of whether respondents, from urban/rural origins, migrated to another locality within Mexico between 2002 and 2005. Covariates include physical assessments of health and self-reported measures. The analytical sample is comprised of 8,567 individuals aged 15-49 years. Overall I found evidence of varying selectivity depending on the age group: positive health selection is associated with migrants age 20 or older while negative health selection is associated with younger migrants. In rural areas particularly, I found positive health selection on the basis of perceived health, and negative selection on the basis of chronic conditions.

Keywords: Mexico, Migration, Health selection, Internal migration

1. Background

How migrants might be self-selected on the basis of health, skills and other characteristics with respect to non-migrants from the same place of origin stands as an open question for research, as evidenced by the burgeoning literature (Chiswick 2008; Jasso et al. 2004; Rosenzweig et al. 1988; Hanson et al. 2005). This is wholly understandable since migration bears crucial implications for sending and receiving communities alike. Given the motivations to migrate and difficulties that encompass the migration process, movers may be healthier than stayers. Analysis of health selectivity of migrants will help to improve our understanding of how health status affects the decision to migrate. With my analysis, I contribute to the literature by comparing internal migrants to non migrants from the same place of origin; I measure health using a wide variety of health-related questions, self-assessed as well as objective, using a flexible panel database, the Mexican Family Life Survey (MxFLS), rounds 1 and 2. Overall I found evidence of health selection polarity ("positive and negative") as a function of age: positive health selection is associated with migrants older than 20 years while negative health selection is associated with younger migrants age 15 to 19. In rural areas particularly, I found positive health selection on the basis of relative perceived health, and negative selection on the basis of chronic conditions.

I begin with an operative definition of positive health selection, followed by a brief overview of recent findings.

In the context of migration, positive health selection means that those who move tend to be self-selected on the basis of superior health (the so-called "healthy migrant hypothesis"). Health selection varies as a function of age in two respects: (1) in a direct way given that as a consequence of aging elderly people are unhealthier than younger people, thus their likelihood to migrate may be associated with their health condition i.e. they may move to access better health care facilities or informal care by their family. In this case a process of negative health selection might be operating (Bentham 1988; Yao Lu 2007; Patrick 1980) ; and, (2) in an indirect way given that migration of at younger ages may be related to plans to pursue better economic opportunities, further education or new employment. Healthier individuals are likely to have a higher probability of success to find and maintain a job or to achieve a higher educational attainment. Evidence in the literature suggests the existence of a causal impact of health on wages and productivity in low-income countries (for a review see Strauss and Thomas 1998); thus, individuals in good health status may be more likely to migrate.

In addition, the process of migration often involves separation from the family and adaptation to a new environment, which may be stressful for some individuals; hence, those with better health may be more likely to overcome the difficulties that such an event entails. Empirical evidence of positive health selection of young adult migrants supports this hypothesis (Norman et al. 2005; Bentham 1988; Yao Lu 2007). Nonetheless, young adults may have other motivations to migrate, for example, they may move when they get married or be following another family member. In these cases, health selection may not be operating.

The study of health selection sheds some light on the processes that lead to migration; it also provides insights into the health impact migrants have on their origin and destination communities. In general, the more favorably health selected a group is, the greater the negative impact on the origin region. Such demographic movement might increase health inequalities, and consequently also exacerbate economic inequalities.

Health selection recurrently appears as an explanation of geographical health inequality (see for example Brimblecombe et al. 2000; and Norman 2005); moreover, it also appears as an explanation of health differentials between migrant populations and the native population at destinations (Méjean et al. 2007). A well-known example in the international migration literature is the so-called "Hispanic Paradox," which refers to the fact that the health of first generation Hispanics migrants to the U.S. is superior to the health of non-Hispanic whites, an unexpected result given their differentiated socioeconomic status (Jasso et al. 2004).

Evidence on health differentials as a consequence of internal migration has also been documented; health selection of migrants affects morbidity and mortality rates. Previous research on health selectivity of migrants examines health differentials in mortality and morbidity rates between migrants and the native population in the destination after migration (Norman et al. 2005, Brimblecombe et al. 2000; Bentham 1988). However, this type of research carries an important limitation: it does not allow disentangling the effect of health on migration from the effect of migration on health, given that the new environment will affect the health of movers after migration.

As I pointed out, testing health selectivity would require the comparison of migrants' health status prior to migration with non-migrants from the same place of origin. Some studies with these characteristics are found in the literature, for example, in an analysis of health selectivity among Australian mid-age women, Larson (2004) associates migration with poor health. A study conducted in the Netherlands by Verheij et al. (1998) finds that movers are less healthy than stayers, controlling for socio-demographic characteristics, with the exception of the younger age group. All these studies use general self-reported measures of health and consider very short distance movements as migrations, e.g. movement to another postal code or to a nearby city.

Recent studies of health selection have incorporated the analysis anthropometric measures of health, which entail an advantage over other self-reported measures because they are less subject to systematic respondent error (Thomas et al. 2000). Using anthropometric and self-reported measures of health in a longitudinal framework, Yao Lu (2007) examines health selection of internal migrants in Indonesia and finds positive health selection among young movers with economic motivations and negative selection among older movers.

As a last example, and in the context of Mexican – U.S. migration, using data from MxFLS, Rubalcava et al. (2008) investigate health selectivity under a longitudinal design where anthropometric and self-reported measures of health of migrant and non-migrants are taken prior to their movement; they find weak support of positive health selection.

In sum, empirical evidence on health selection is scant due to the lack of data well suited for the study of selectivity, which requires on the one hand information of health of migrants and non-migrants prior to migration, and on the other information on the socio-economic status and other characteristics that may be associated with both, health and migration. Additional empirical evidence on health selectivity of migrants is required to verify the hypotheses proposed in the migration literature. This paper examines health selectivity of migrants in the context of internal migration in Mexico, under a longitudinal design where health status of internal migrants is compared to non-migrants. The analysis will reveal whether healthier people are more likely to migrate; however, it is important to note that this analysis will not be able to reveal if health has a causal impact on migration.

In particular, Mexico presents many attractive features characteristic of dynamic migration, such as novel patterns, destinations, and size. Migration in Mexico has experienced a dramatic transformation in patterns of internal and international movements over the last two decades. This is mainly due to the relocation of economic activities within the territory, in particular the emergence of new export oriented agro-businesses in the North of the country, attracting rural migrants (Lara 2008); internal migrants have changed their main destinations from the central to the northern states of Mexico; and the size of the migration flows have remained as an important variable: the Population National Council of Mexico (CONAPO) estimates that about 1% of the population, or 10 million individuals, annually moves to another state.

In the next sections, I present the methods used to inquire about the relationship between health and migration, as well as results followed by a brief discussion of their possible interpretations, limitations, and other areas that could be further explored as the data becomes available.

2. Methods

2.1. Data

The research utilizes the Mexican Life Family Survey (MxFLS), a large scale, multi-purpose, nationally representative longitudinal panel of individuals and households in Mexico. The baseline is a stratified, multi-staged probabilistic sample collected in 2002 that covers 8,440 households in 150 communities. Primary sampling units were selected with the purpose of getting representation at the national and urban-rural levels.

MxFLS includes socio-economic, demographic and health information on every household member. All respondents participate in a physical health assessment conducted in-home by a trained health worker. The assessment includes measurements of anthropometry, hemoglobin levels and blood pressure (Rubalcava *et al*. 2006). In addition, adult members provide self-reports of health status and detailed retrospective histories of migration. In the second wave (MxFLS-2), conducted in 2005, almost all respondents were re-interviewed including migrants to other localities, municipalities, states or countries; re-contact rates for MxFLS-2 reach 90%.

In general, past research on migrant health selectivity compares host and migrant populations at the destination (Marmot et al, 1984; Méjean et al. 2007; Bentham, 1988). Ideally we would like to compare migrants, before their initial migration, with non-migrants from their community of origin. With MxFLS data it is possible to test the health selectivity because it includes health measures of the respondents prior to their move, before the environment in the receiving community had an impact on their health.

Furthermore, the data allows controlling for demographic characteristics closely correlated with health and migration: sex, age, education, marital status, pre-migration state where respondent was living in 2002 and previous migration experience. I test health selectivity by comparing baseline health of movers between 2002 and 2005 with respect to baseline health of non-movers.

2.2. Measures

Migration

I follow three criteria when classifying respondents as migrants. First, all respondents interviewed in a different locality in 2005 with respect to their place of residence in 2002 are considered migrants. Second, respondents whose retrospective history of migration includes a movement to another locality that lasted for at least one year are also considered migrants. When individuals report more than one trip, I only considered the first one, given that health was only measured prior to that movement. Third, non-interviewed respondents who move to another locality for whom information on their new location was collected are also classified as migrants. Movements within metropolitan areas are not considered migrations[1].

I do not include international migrants in the sample, and I also excluded individuals who did not move after 2002, but were migrants who arrived one year before 2002 to the place of residence where MxFLS interviewed them for the first time. These cases constitute migrants already selected by health, so their health characteristics may differ from non-migrants in their actual place of residence.

<u>Health Indicators</u>

Health is a difficult construct to measure; its measurement requires taking into account a variety of factors that include "physical and mental well being, genotype and phenotype influences, expectations and information" (Thomas et al. 2000; Strauss et al 2007). Given the complexity in assessing health, researchers have recently opted to include different measures separately in their analysis (Thomas et al. 2000; Rubalcava et al. 2008; Yao Lu 2007; Strauss et al 1998); in my analysis I follow a similar approach.

Another innovation introduced in the study of health selectivity is the use of physical assessments to measure other dimensions of health. Physical assessments imply a key advantage over other indicators of health: they are not subject to systematic biases (Thomas et al, 2000; Strauss et al 2007; Strauss et al. 1998). Physical measures provide general information about the health and nutrition status of

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[1] My definition of Metropolitan areas coincides with that of the document "Delimitation of Metropolitan Zones of Mexico" issued by the Ministry of Social Development of Mexico, INEGI and the National Council of Population.

individuals; however, they provide little insight into the mechanisms through which health affects, or is affected by, life outcomes (Strauss et al 2007).

The analysis presented here includes three self-reported measures: general health status, relative general health status, and chronic conditions. It also incorporates four physical assessments of health: height, body mass index, hemoglobin levels and blood pressure.

Self -reported measures

- General Health Status (GHS) and Relative Health Status (RHS)

MxFLS asks respondents to rate their health in one of five categories ranging from excellent to very poor health. Responses are dichotomized and coded 1 in the cases where respondents declare to have a good or excellent health status, and 0 otherwise. GHS correlates with subsequent morbidity and mortality (Idler *et al* 1997). However, GHS has two main shortcomings: (1) perceptions of own health tend to be correlated with the level of contact between individuals and the health care system (Davies et al. 1981), and (2) respondents base their self-assessments on different reference groups, thus compromising comparability (Strauss et al. 1998). To address this issue MxFLS includes a follow-up question, i.e. to rate his or her health relative to someone of the same age and sex. I call this variable the relative health status (RHS). RHS is coded similarly to GHS. The inclusion of GHS and RHS simultaneously in the analysis corrects for the problem of interpersonal comparability (King *et al* 2004).

- Chronic Conditions

Respondents are asked to declare if they have any chronic condition such as diabetes, hypertension, heart disease, cancer, arthritis among others. I dichotomize responses and code them as 1 when respondents declare to have any condition and 0 otherwise. Self-reports of chronic conditions are likely to be underestimated in a developing country setting, given the lack of diagnosis.

<u>Physical Assessments</u>

- Height

Height is an indicator of nutritional status of children and is considered a long-run indicator of nutritional status (Strauss et al. 1998; Thomas et al, 2000). Height is also associated with lower mortality from bronchitis and heart disease and with higher mortality from cancer (Barker et al. 1990).

- Body Mass Index (BMI)

BMI also functions as an indicator of nutritional status; it is calculated as the ratio of weight (kg) to height squared (m^2); extremely low and high BMI is associated with higher adult mortality (Strauss et al. 1998). BMI is dichotomized and coded 1 for respondents with normal weight (19 $kg/m^2 \leq BMI < 23.8$ kg/m^2 for females and 20 $kg/m^2 \leq$ BMI < 25 kg/m^2 for males) and 0 otherwise (Sunquist *et al* 1998).

- Hemoglobin (Hb)

To measure hemoglobin, MxFLS takes finger-stick blood samples, and uses a HemoCue photometer at the respondent's home. Hemoglobin indicates iron levels in the body; in turn, iron is used to transport oxygen. Thus, low iron level is associated with a reduction in productivity and physical performance; it also might indicate high levels of inflammation, the presence of worms, or malaria. The most severe form of iron deficiency results in anemia (Hass 2001; Thomas et al. 2000). Following the cut offs proposed by the World Health Organization (2001) I classify respondents according to their iron level; thus males are considered to have normal levels of iron when Hb $\geq$ 130 g/L and females when Hb $\geq$ 120 g/L. Hb is dichotomized and coded 1 if respondent has normal iron levels and zero otherwise.

- Blood Pressure

High blood pressure constitutes a risk factor for heart disease, stroke, kidney disease and dementia. Although asymptomatic, it is associated with poor physical health and stress. Following the cut-offs of the American Medical Association, blood pressure is considered as normal if systolic < 140 mm Hg and diastolic < 90 mm Hg. I create a dichotomous variable coded 1 for respondents with normal blood pressure and 0 otherwise.

2.3. Sample

I use data from the MxFLS, a nationally representative sample of the Mexican population of 2002. Age-eligible respondents, adults aged 15 to 49 years old, number 17,352 individuals. I exclude people over the age of 50 years from the analysis; arguably, they have different patterns of health selection, which would require a separate analysis; additionally the sample lacks statistical power.

From the 17,352 age-eligible respondents, the sample has complete demographic and health indicators for about 50% of the cases. Furthermore, 5% of the individuals that were surveyed at baseline in 2002 were not found in 2005; thus the final analytical sample is comprised by 8,567 individuals.

I explore potential biases associated with missing data by estimating the statistical model on different sample sizes that varied as a function of the missing information[2]. From this analysis (not presented here), I find that results on health variables are robust to changes in the sample definition.

I examine attrition by estimating a multinomial logistic regression where the dependent variable includes three categories: non-movers, internal migrants and individuals not found in 2005. With controls for socio-economic status and demographic variables, I evaluate whether migrants and non-movers show systematically different health measures to individuals who MxFLS was not able to follow up on 2005. I conduct separate analyses (not presented here) for respondents from rural and urban origins. For respondents in urban areas I find that there are no significant differences between individuals who MxFLS was unable to follow up on as opposed to and migrants or non-movers. For respondents of rural areas, I find no significant differences between migrants and non-movers in all measures of health with the exception of chronic conditions. To assess the size of the bias I conducted a sensitivity analysis assuming that all the people that MxFLS was not able to find in

[2] For example, I estimated a model that included all socio-demographic characteristics and self-assessments of health in three different samples, one with complete demographic and subjective measures of health, another with complete demographic subjective and objective measures of health, and finally one with complete measures in all the variables.

2002 were internal migrants, and the results are similar. Thus, missing data or attrition is not a concern in this analysis.

Table 1 presents urban and rural rates of migration for the analytical sample, separately for urban and rural areas. Between 2002 and 2005 about 7% of respondents migrated from urban areas and 6% from rural areas. In urban areas, types of movement are similar for males and females: about 70% of the movements in urban areas are to another locality within the same municipality, about 20% are to another municipality without crossing to another state and about 10% are movements to another state. In rural areas, about 60% of the movements are inter-localities, 20% inter-municipalities and 20% inter-states. Rural females are about 1.4 times more likely to move to another municipality within the same state than rural males, and rural males are about 1.3 times more likely to migrate to another state than females. Considering only inter-state migration, about 70% of urban dwellers and about 40% of rural dwellers migrate to northern states in Mexico[3].

Table 2 shows descriptive statistics of health and socio-demographic characteristics of non-migrants and migrants by origin. Migrants from urban areas are about 1.3 cm taller than non-migrants; with respect to stayers, migrants are 4% more likely to have normal blood pressure; and they are 4% less likely to show under/overweight and to report having chronic conditions. Furthermore, urban migrants are 10% more likely to report having good or excellent health than non-migrants. Nonetheless, migrants are 1% less likely to present normal levels of iron than non-migrants and to report chronic conditions.

[3] North migration refers to inter-states movements to the following states: Baja California Norte, Baja California Sur, Sonora, Sinaloa, Chihuahua, Coahuila, Nuevo León, Tamaulipas.

The socio-demographic characteristics of the sample are reflected in the second panel of Table 2. In urban areas, about 56% of the migrants are females, 65% of migrants are married or in a union, they have on average about 9.6 years of schooling and are 29 years old. Non-migrants of urban areas are about 59% females, 67% are married or in a union, they have on average 8.7 years of schooling and are 33 years old.

Rural migrants and non-migrants are about the same height, 158 cm tall. Rural migrants are 4% more likely to have normal blood pressure, 5% less likely to show under/overweight and 2% more likely to present normal levels of iron than non-migrants. Migrants rate their health as good or excellent 3% more times than non-migrants; and, when compared to other individuals from the same age and sex, migrants rate their health as good or excellent 5% more times than non-stayers. However, rural migrants are 6% more likely to report having a chronic condition.

In rural areas, migrants are about 62% females, 56% of migrants are married or in a union, they attend about 7.4 years of schooling and have an average age of 29 years. Non-migrants are females in 59% of the cases, 72% of migrants are married; they have attained about 6 years of education and on average they are 33 years old.

In sum, the descriptive statistics suggest that overall migrants tend to be female, healthier, younger, and possessing higher education than non-migrants. However, in rural areas, chronic conditions are reported more frequently by migrants.

Table 3 and Table 4 show pair-wise correlations between each one of the health variables by urban and rural origin, respectively. In the case of urban residents, Table 3 shows significant correlations between all the health measures and GHS. The sign of the correlations are positive, implying that taller individuals with normal blood pressure, not under/overweight, who present normal iron levels and no-chronic conditions are likely to rate their health as good or excellent. Although positive and significant, most of the correlations of GHS and the rest of the measures of health are small ranging from 0.05 to 0.21.

Height shows significant and positive correlations with the other health measures with the exception of normal blood pressure, implying that taller individuals tend to rate their health as good or excellent, do not show under/overweight, have normal iron levels and do not report chronic conditions. However, height in correlated negatively with normal blood pressure. The stronger correlation between height and other health measures exist with respect GHS, and overall they range between -0.132 and 0.18.

Normal blood pressure is correlated significantly with the rest of the health variables in the model, with the exception of RHS. Positive correlations appear for individuals who reported to have good or excellent health, who are not under/overweight and who do not report chronic conditions. However, height is not significantly correlated with normal iron levels. Being not under/overweight is positively and significantly associated with rating health as good or excellent, being taller, having normal blood pressure and not presenting chronic conditions. However, being not under/overweight is not significantly associated with iron levels and RHS. Correlations of self-reports of chronic conditions are positive and significant with respect to the rest of the measures of health. The stronger correlation is of about 0.2 with respect to GHS, the rest are small ranging from 0.02 to 0.08.

Table 4 shows similar results for rural dwellers, with two main differences: (1) normal blood pressure and BMI are not associated with GHS, and (2) Normal blood pressure is negatively associated RHS, implying that people who rate their health, relative to other of the same age and sex group, as good or excellent do not have normal blood pressure.

In general, for urban residents Table 3 shows positive and significant, but small correlations among health variables, with the exception of blood pressure that correlates negatively with height and iron levels. For rural dwellers, results are similar; however, GHS is not associated with BMI and blood pressure. The small correlations observed in the data support the idea that each health measure incorporates a different dimension of health; hence all of them are included in the statistical analysis.

2.4. Analytic Strategy

The analysis is based on logistic regressions of whether respondents migrated to another locality within Mexico between 2002 and 2005. The outcome variable is dichotomized and coded 1 if individuals migrated and 0 otherwise. Self-reported and physical assessments of health measures were included as covariates. Controls for socio-demographic indicators that are likely to be correlated with health status and migration, such as age, sex, marital status, education, and previous migration history are also included (Findley 1988; Hanson et al. 2005). In previous models, I included measures of socio-economic status such as household income or household per capita expenditure; however an analysis of goodness of fit showed that the effect of adding these variables is not significant. The final model includes three control variables: (1)

age as a spline, to allow different slopes for different age groups (15-19, 20-29, 30-39 and 40-49); (2) sex coded as a dummy equal to 1 for male and 0 for females; (3) marital status, coded as a dummy variable equal to 1 when respondent was married or in a union and 0 otherwise; (4) education, measured as years of schooling; and (5) previous migration history coded 1 in the case respondents have migration experience. Standard errors were based on jackknife estimation and accounted for the clustering of the survey design.

Separate analyses are presented by urban/rural because migration and health patterns may vary by origin (Fussell 2004). Results from urban and rural migrants are shown in Tables 5 and 6, respectively. The first column of the tables presents coefficients from logistic regressions of whether respondent migrated with respect to each health variable, one at a time, without including control variables. The second column of adds controls for education, marital status, age, pre-migration state of residence and previous migration experience to each one of the regressions estimated for each health measure. The third column adds interactions[4] of health variables and age, only in the cases where interactions are significant. The fourth column presents estimates from a regression that includes simultaneously all health measures as covariates, health-age interactions and socio-demographic characteristics. The simultaneous regression shown in this column is the best fitting model that results from the comparison of an unrestricted model which includes all possible health-age

[4] In an analysis not presented here, I included interactions between health variables and sex, but none of them were significant, so final models do not include them.

interactions models, with respect to several restricted models that constrain some interactions to be zero.

3. Results

3.1. Urban

The first panel of Table 5 shows that urban migrants who perceive their health as good or excellent are more likely to migrate, and the effect remains significant after controlling for socio-demographic characteristics and after including all the health covariates simultaneously. Interactions of GHS with age are not significant (p=0.11). Taller urban dwellers are more likely to migrate, as indicated in column 1; however, after controlling for socio-demographic variables the effect becomes insignificant. Interactions between age and height are significant, which implies that as age increases taller individuals are more likely to migrate. The simultaneous equation model shows no effect of height in the likelihood of migration, net of other health measures, socio-demographic characteristics and previous migration experience; moreover, the best fitting simultaneous model shown here does not include interactions of height and age given that they become not significant in the presence of other health covariates. Normal blood pressure and BMI are not associated with the likelihood of migration and interactions with age are not significant (p=0.35 and p=.67, respectively).

Furthermore, the first column indicates no association between normal iron levels and the likelihood of migrating. This coefficient remains not significant after controlling for socio-demographic characteristics; however, after adding interactions with age, normal iron levels become significant implying that being in the age group 15 to 19 and having normal levels of iron decreases the odds of migrating, while being in the older groups and having normal iron levels increases the likelihood of migrating; and the effect persists when we include all health variables in the model.

The last health measure indicates no association between chronic conditions and the likelihood of migrating, even after adding controls for socio-demographic characteristics. Nonetheless, after including interactions with age, the coefficients become significant implying that younger individuals –age 15 to 19- without chronic conditions are less likely to migrate, while older individuals – older than 20- without chronic conditions are more likely to migrate. The effect of chronic conditions looses significance in the simultaneous model that includes all health measures; furthermore, the final model does not include interactions of chronic conditions and age because (1) they become not significant in the presence of all other health covariates and (2) as a result of an analysis of goodness of fit using likelihood ratio tests.

I calculate two tests of joint significance, one that tests if all health measures taken together[5] significantly affect the likelihood of migration and another that test considering only nutrition measures[6]; both tests were significant at the 0.05 level. In sum, results suggest there is positive health selection among urban residents older than 20 years; moreover, the strength of the selection increases with age. I also found negative health selectivity among migrants age 15 to 19 on the basis of iron level,

[5] GHS, RHS, Height, Normal Blood Pressure, BMI, Normal Iron, Normal Iron * Age, and No chronic conditions.

[6] Height, BMI, Normal Iron, Normal Iron * Age

given that their likelihood of migrate is about 60% lower than from individuals of the same age with lower levels of iron.

3.2. Rural

Table 6 shows that individuals' own perception of health has no effect on the likelihood of migration. Individuals who perceived their health as good or excellent with respect to others of the same age and sex does not seem to affect the likelihood of migration until we add age interactions and socio-demographic controls. The interactions suggest that young individuals –age 15 to 19- who rate their health as good or excellent with respect to someone of their same age and sex are less likely to migrate; by contrast, individuals over 20 years old with the same relative perception of health are more likely to migrate, and the strength of the association increases with age. The coefficients remain significant after we include all health covariates and socio-demographic controls.

For height, normal blood pressure and normal iron the same pattern follows. First, the association of each health measure and migration is not significant, even after controlling for socio-demographic characteristics; then after adding interaction with age, significant results are obtained implying that: (1) taller individuals within the ages 20 to 29 are 1.01 more likely to migrate, net of socio-demographic characteristics; (2) individuals with normal blood pressure within ages 20 to 29 are 1.78 times more likely to migrate, net of socio-demographic characteristics; (3) respondents with normal levels of iron within this same age group is 2.07 times more likely to migrate, net of socio-demographic characteristics. Second, after estimating the model that includes all the health measures simultaneously and fitting the best model, the interactions with age disappear and are not included in the final model.

The data of rural dwellers shows evidence for negative selection on the basis of chronic conditions, the unadjusted odds ratio of migrating for someone without a chronic condition are 30% lower than the odds of someone without a condition, and this percentage increases to 40% after controlling for socio-demographic characteristics, and also after adding all health measures in the regression. No significant interactions with age were found. This evidence suggests that rural areas might lack the health care facilities necessary to treat patients with a chronic condition, pushing rural dwellers out of the community seeking for health care.

The test of joint significance of all health measures taken together[7] indicates a significant association with migration at the .005 level. The test of joint significance that considers all nutrition measures[8] indicates no association between migration and health (p=.95). In sum, the analysis suggests evidence of positive health selection of adults older than 20 years on the basis of self-rated health and of negative selection on the basis of chronic conditions.

4. Discussion

The present analysis examined health selection of migrants using data from the MxFLS, a panel ideally suited for analyzing selectivity because it enables the comparison of migrants with non-migrants, with measures taken prior to migration. Multiple health indicators were used to assess the "true health" of an individual. The

[7] GHS, RHS, RHS*Age , Height, Normal Blood Pressure, BMI, Normal Iron , and No chronic conditions.
[8] Height, BMI, Normal Iron

analysis included physical assessments as well as self reported indicators. Physical assessments entail an advantage over self-reported measures of general health, in that they are less prone to systematic biases. Physical assessments allow the inclusion of other aspects of the population health status that are not necessarily reflected in self-reported measures. One example is hypertension, which is commonly asymptomatic but it is also a risk factor for heart disease, stroke, kidney disease and dementia.

The inclusion of a broad array of aspects of health is crucial to understanding health disparities among different groups that might be associated further with differences in cognitive abilities, educational levels and prospective earnings, which in turn might intensify and perpetuate inequality.

The purpose of the analysis presented here was to examine health selectivity of internal migrants in Mexico. A common hypothesis in the literature of migration is that young migrants tend to be healthier than non-migrants. I found evidence to support this hypothesis in the case of urban migrants; in particular I found that individuals older than 20 years with normal iron levels are more likely to migrate than individuals with low iron levels. This finding suggest that migrants are likely to be more productive than non-migrants, given that lower levels of iron are associated with lower productivity. Furthermore, I found significant interactions between age and iron levels, the evidence suggest that as individuals with normal iron levels age, their likelihood of migrating increase, net of socio-demographic characteristics. For younger people, age 15 to 19, we find the opposite effect: young individuals with normal iron levels are 60% less likely to migrate than individuals with lower iron levels. As suggested by previous research, I found significant interaction between some health measures and health. In particular, the results for urban migrants show that young adults age 15 to 19 are negatively health selected; while positive selection is found among adults older than 20 years.

In rural areas, I found some evidence of negative health selection on the basis of chronic conditions, i.e. propensities to migrate for rural respondents were higher for individuals who declared to have a chronic condition. In a developing setting, rural areas might lack of health care facilities to attend patients with some chronic conditions. The need for a specific treatment that is not offered in the locality of origin might be operating as a "push" factor that increases the likelihood of migrating.

By contrast, I found also some evidence of positive health selectivity in the basis of relative self-rated health; individuals who perceived their health good or excellent with respect to others of the same age and sex show higher propensities to migrate. This finding suggests that the decision to migrate may be influence by comparing one's health with, probably, other migrants of the same community.

Overall there data shows evidence of different selectivity patterns depending on the age group, while positive health selection is associated with migrants age 20 or older, negative health selection is associated with younger migrants. In rural areas, selection "polarity" (positive – negative) exists, while migrants who perceived to have a good health are more likely to migrate –positive selection-, migrants with chronic conditions also show higher propensities to migrate –negative selection. As I pointed earlier the motivation that drives the decision of migrating seems to be a crucial part of the health selection process.

This study is limited in several respects. First, I was not able to distinguish among different motivations driving migration decisions, which is crucial to test if there is a positive selection among migrants with economic motives. Second, most of the migration observed in this period in our data captures in general movements within the same municipalities - about 70% and 60% of migrations from urban areas and rural areas, respectively, was within the same municipality, about 20% was within the same state and the rest was inter-states, thus health selection processes related to longer distance movements are not strongly reflected in our results. Evidence in the literature suggests that "healthy migrant effects" may be associated with longer distance movements (Bentham 1988). Third, I considered a limited set of health indicators in the analysis; however migrants might be selected on other dimensions of health. Fourth I use GHS as a measure of health, given that it has been proved to be a good predictor of mortality; however recent evidence that compares Latinos and Non-Hispanic Whites in the U.S. shows that GHS is not a reliable measure for recent Latinos immigrants and is weak predictor of mortality (Finch 2002). It would be interest to explore if GHS is as reliable in Mexico as it is in the U.S.

There are open questions that could be easily be adopted for future research. For example, the impact of health outcomes on migration may not be a consequence of individual's own health, the health status of other family members might as well be involved in the decision process of migration. In the future I will analyze how family health status intervenes in this process. Furthermore, I would like to examine health selection processes of the elderly population, for whom selection appears to be fundamentally different. MxFLS will provide enough information to examine this population as it grows. These are but a few of the many questions that researchers could explore using this flexible data set.

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Table 1 : Rates of internal migration of males and female Mexicans aged 15 through 49 (MxFLS 2002 and 2005)

	Urban	Rural
Total	4856	3711
Internal Migration		
% moved 2002-2005	0.07	0.06
Type of movement	1.00	1.00
% Another locality	0.71	0.62
% Another municipality	0.20	0.20
% Another State	0.09	0.19
Inter-state movement		
% North [a]	0.68	0.38
% Other states	0.32	0.63

[a]North migration refers to inter-states movements to the following states: Baja California Norte, Baja California Sur, Sonora, Sinaloa, Chihuahua, Coahuila, Nuevo León, Tamaulipas

Table 2 : Descriptive statistics of sample at baseline in 2002 by origin and migration status

	Urban		Rural	
	Non-migrants	Migrants	Non-migrants	Migrants
Total	4,513	343	3,495	216
Health Status at baseline [a]				
Height (cm)	159.25	160.58	158.10	158.52
	(9.37)	(9.27)	(9.53)	(9.02)
% Normal blood pressure	0.73	0.77	0.71	0.75
	(0.44)	(0.42)	(0.46)	(0.44)
% Not under/overweight	0.25	0.29	0.30	0.35
	(0.43)	(0.45)	(0.46)	(0.48)
% Normal iron	0.85	0.84	0.83	0.85
	(0.36)	(0.36)	(0.38)	(0.36)
% GHS = good/excellent	0.56	0.67	0.47	0.50
	(0.50)	(0.47)	(0.50)	(0.50)
% RHS = good/excellent	0.37	0.36	0.29	0.34
	(0.48)	(0.48)	(0.45)	(0.47)
% Not chronic conditions	0.73	0.77	0.80	0.73
	(0.44)	(0.42)	(0.40)	(0.44)
Controls				
Male	0.41	0.44	0.41	0.38
	(0.49)	(0.50)	(0.49)	(0.49)
Marital Status	0.67	0.65	0.72	0.56
	(0.47)	(0.48)	(0.45)	(0.50)
Years of schooling	8.70	9.65	6.25	7.44
	(4.04)	(4.04)	(3.63)	(3.59)
Age	32.56	28.91	32.76	29.00
	(9.12)	(7.97)	(9.17)	(8.64)
Age distribution				
15-19	9	9	9	12
20-29	31	48	31	46
30-39	34	29	33	27
40-49	26	14	28	16

[a]Means and (standard errors)

Table 3: Correlation among health measures of urban residents (N=4,856)

	GHS = good/excellent	RHS = good/excellent	Height (cm)	Normal Blood Pressure	Not under/ overweight	Hb Normal	No Chronic Conditions
GHS = good/excellent	1						
RHS = good/excellent	0.094***	1.000					
Height	0.187***	0.037**	1.000				
Normal Blood Pressure	0.053***	-0.003	-0.132***	1.000			
Not under/overweight (BMI[a])	0.091***	0.001	0.119***	0.135***	1.000		
Normal Iron	0.059***	-0.005	0.173***	-0.072***	0.002	1.000	
No Chronic Conditions	0.217***	0.027*	0.084***	0.031**	0.065***	0.041***	1.000

***p<.005, **p<.05, *p<0.1

Source: Mexican Family Life Survey 2002

[a]19 kg/m2?BMI<23.8 kg/m2 for females and 20 kg/m2? BMI < 25 kg/m2 for males

Table 4: Correlation among health measures of rural residents (N=3,711)

	GHS = good/excellent	RHS = good/excellent	Height (cm)	Normal Blood Pressure	Not under/ overweight	Hb Normal	No Chronic Conditions
GHS = good/excellent	1.00						
RHS = good/excellent	0.127***	1.000					
Height	0.103***	0.055***	1.000				
Normal Blood Pressure	-0.026	-0.034**	-0.138***	1.000			
Not under/overweight (BMI[a])	0.019	-0.010	0.089***	0.134***	1.000		
Normal Iron	0.032**	0.000	0.129***	-0.041**	0.027	1.000	
No Chronic Conditions	0.194***	0.031*	0.088***	0.032**	0.082***	0.064***	1.000

***p<.005, **p<.05, *p<0.1

Source: Mexican Family Life Survey 2002

[a]19 kg/m2?BMI<23.8 kg/m2 for females and 20 kg/m2? BMI < 25 kg/m2 for males

Table 5: Odds Ratios From Logistic Regression of Whether Urban Respondents Migrated to another locality in Mexico from 2002 to 2005 [a]

	Unadjusted OR[b]	Adjusted OR[c]	Adjusted with age interactions OR[d]	Simultaneous OR[e]
Health in 2002				
GHS = good/excellent [f]	1.55***	1.298*		1.31*
	(0.20)	(0.18)		(0.19)
RHS = good/excellent [f]	0.984	1.014		0.99
	(0.14)	(0.15)		(0.15)
Height (cm)	1.02**	1.008	1.001	1.01
	(0.01)	(0.01)	(0.01)	(0.01)
Height * age2 (20-29)			1.01**	
			(0.00)	
Height * age3 (30-39)			1.01**	
			(0.00)	
Height * age4 (40-49)			1.01***	
Normal blood pressure [f]	1.21	1.060		1.06
	(0.16)	(0.15)		(0.15)
Not under/overweight (BMI) [f]	1.20	0.963		0.94
	(0.17)	(0.15)		(0.15)
Normal Iron [f]	0.93	0.855	0.42**	0.41***
	(0.16)	(0.15)	(0.13)	(0.13)
Norma Iron * age2 (20-29)			1.88**	1.88**
			(0.55)	(0.54)
Norma Iron * age3 (30-39)			2.25**	2.26**
			(0.83)	(0.83)
Norma Iron * age4 (40-49)			4.48***	4.56***
			(1.96)	(1.98)
No chronic conditions [f]	1.22	1.030	0.57**	0.99
	(0.15)	(0.14)	(0.16)	(0.14)
No chronic conditions * age2 (20-29)			2.00**	
			(0.53)	
No chronic conditions * age3 (30-39)			1.76*	
			(0.58)	
No chronic conditions * age4 (40-49)			2.04*	
			(0.78)	
N				4856
Pseudo R^2				0.05
Log Likelihood				-1183
$\chi 2$ Test of joint significance of all health covariates				2.74**
				0.006
$\chi 2$ Test of joint significance of nutrition health covariates				2.98**
				0.01

***p<.005, **p<.05, *p<0.1

Source: Mexican Family Life Survey 2002, 2005

Notes: GHS = General health status, RHS = Relative General health status, BMI=Body Mass Index (19 kg/m2≤BMI<23.8 kg/m2 for females and 20 kg/m2≤ BMI < 25 kg/m2 for mal

[a] Standard errors in parenthesis

[b] Unadjusted column includes each covariate added at a time.

[c] Adjusted column includes regressions for each covariate at a time, controlling for state of residence in 2002 sex, marital status, previous migration experience, education and age as a spline.

[d] Adjusted column includes separate regression for each covariate controlling for state of residence in 2002, sex, marital status, previous migration experience, education and age as a spline, and adding interactions of age and the health variables. Only statistically significant interactions are included in the regression and are shown in this column.

[e] Simultaneous column includes all health and controls for state of residence in 2002, sex, marital status, previous migration experience, education and age as a spline, and adding significant interactions of health and age.

[f] Indicator variable equal to 1 if the condition is true and 0 otherwise.

Table 6: Odds Ratios From Logistic Regression of Whether Rural residents Migrated to another locality in Mexico from 2002 to 2005 [a]

	Unadjusted OR[b]	Adjusted OR[c]	Adjusted with age interactions OR[d]	Simultaneous OR[e]
Health in 2002				
GHS = good/excellent [f]	1.12	0.95		1.00
	(0.17)	(0.16)		(0.16)
RHS = good/excellent [f]	1.26	1.16	0.33**	0.34**
	(0.30)	(0.28)	(0.14)	(0.28)
RHS * age2 (20-29)			3.45**	3.34**
			(1.59)	(1.56)
RHS * age3 (30-39)			4.12**	4.05**
			(2.33)	(2.31)
RHS * age4 (40-49)			6.52***	6.48***
			(2.94)	(2.97)
Height (cm)	1.00	1.00	0.994	1.00
	(0.01)	(0.02)	(0.02)	(0.01)
Height * age2 (20-29)			1.01**	
			(0.00)	
Height * age3 (30-39)			1.01*	
			(0.00)	
Height * age4 (40-49)			1.01	
			(0.00)	
Normal blood pressure [f]	1.22	1.08	0.809	1.09
	(0.37)	(0.29)	0.308	(0.28)
NBlood Press * age2 (20-29)			1.78**	
			(0.46)	
NBlood Press * age3 (30-39)			1.24	
			(0.42)	
NBlood Press * age4 (40-49)			1.05	
			(0.46)	
Not under/overweight (BMI) [f]	1.28	1.04		1.04
	(0.27)	(0.19)		(0.19)
Norma Iron f	1.18	1.12	0.59	1.15
	(0.22)	(0.26)	(0.22)	(0.25)
Norma Iron * age2 (20-29)			2.07**	
			(0.64)	
Norma Iron * age3 (30-39)			1.97	
			(0.85)	
Norma Iron * age4 (40-49)			2.49*	
			(1.17)	
No chronic conditions [f]	0.70**	0.61***		0.60***
	(0.10)	(0.08)		(0.09)
N				3711
Pseudo R^2				0.06
Log Likelihood				-776
$\chi 2$ Test of joint significance of all health covariates				4.77**
				0.00
$\chi 2$ Test of joint significance of nutrition health covariates				0.14
				0.93

***p<.005, **p<.05, *p<0.1

Source: Mexican Family Life Survey 2002, 2005

Notes: GHS = General health status, RHS = Relative General health status, BMI=Body Mass Index (19 kg/m2≤BMI<23.8 kg/m2 for females and 20 kg/m2≤ BMI < 25 kg/m2 for male

[a]Standard errors in parenthesis

[b] Unadjusted column includes each covariate added at a time.

[c] Adjusted column includes regressions for each covariate at a time, controlling for state of residence in 2002 sex, marital status, previous migration experience, education and age as a spline.

[d] Adjusted column includes separate regression for each covariate controlling for state of residence in 2002, sex, marital status, previous migration experience, education and age as a spline, and adding interactions of age and the health variables. Only statistically sign.interactions are included in the regression and are shown in this column.

[e] Simultaneous column includes all health and controls for state of residence in 2002, sex, marital status, previous migration experience, education and age as a spline, and adding significant interactions of health and age.

[f] Indicator variable equal to 1 if the condition is true and 0 otherwise.