Estimating the effects of migration from Mexico to the US on self-rated health and mortality: The Hispanic paradox revisited.

Adina Zeki Al Hazzouri, [1] Lanyu Zhang, [1] Audrey R. Murchland, [2] Leslie Grasset, [1] Jacqueline M. Torres, [2] Richard N Jones, [3] M Maria Glymour[2]

[1] University of Miami; [2] University of California, San Francisco; [3]Brown University

Short abstract:

Much of the available evidence on the health effects of migration to the US is derived indirectly by comparing migrants residing in the US with US-born individuals, but few studies compare migrants to non-migrants who remained in the country of origin. Merging harmonized and nationally representative datasets from Mexico and the US – the Mexican Health and Aging Study (MHAS, N=18,302) and the Health and Retirement Study (HRS, N=924), we estimated cumulative probability of migration and calculated stabilized inverse probability treatment weights (IPTW). We estimated effects of migration on self-rated health at study enrollment (mean age=60.8), using logistic regression, and on incident mortality, using Cox proportional hazards regressions, with and without IPTW. In demographic-adjusted models, migration predicted less fair/poor self-rated health (OR=0.87, 95% CI: 0.80, 0.96) but the association with mortality was inconclusive (HR=0.92, 95%CI: 0.83, 1.02). After accounting for migration selection forces, migration appeared to benefit self-rated health but not mortality.

Extended abstract:

Background: Evidence on the relationship between migration from Mexico to the US and self-rated health and mortality is mostly inconsistent.[1-6] Most evidence on the health effects of migration to the US compares migrants residing in the US with US-born individuals. The relevant counterfactual for migrants, however, corresponds better with non-migrants who remained in the country of origin. Regardless, such comparisons may be biased if childhood socioeconomic status (SES) or other lifecourse experiences influence migration and also predict later life health. Thus, the aim of this paper is two-fold: first, to quantify, for the first time, the selection forces of migration from Mexico to the US in the form of a propensity score. Second, to examine the effect of migration on self-rated health and mortality, with and without accounting for selective migration.

Methods: We merged harmonized data from two nationally representative datasets in Mexico and the US – the Mexican Health and Aging Study (MHAS) and the Health and Retirement Study (HRS), respectively. MHAS includes Mexicans living in Mexico who never migrated to the US as well as Mexicans who migrated to the US but later returned back to Mexico. HRS includes Mexican-born migrants living in the US. Since our exposure of interest is 'migrating', our exposed group (n=2,479) includes migrants who returned to Mexico (return migrants) and US-residing migrants while our unexposed group (n=16,747) includes MHAS-never migrants.

To calculate the propensity score to migrate from Mexico to the US, we used participant reported information on years of education, age of life events (marriage, divorce or widowhood, entry into the labor force, and smoking initiation) to construct a lifecourse data set in which each participant contributed an observation for each year beginning birth (age 0) till either age at migration to the US (applicable to MHAS-return migrants and HRS- US residing migrants) or age at last observed study interview (applicable to MHAS-never migrants). For example, an HRS- migrant who migrated at the age of 20 years had 21 rows of data, a row for each year of age. As predictors of migration, we included the following time-invariant covariates: gender, height, mother's and father's education and the following time-varying predictors: years of education completed to date, marital status, smoking status, and job status. The time-dependent variables were updated at each year of age beginning year 0 (birth). Because height is not established until late adolescence but we only have information on height at study enrollment, we coded height as missing/unknown until age 17, at which point we coded it as equal to adult height.

To estimate the migration propensity score, we fit a discrete time survival model with a logistic model predicting migration at each year of life. The probability of migration, among those who had not yet migrated and given the individuals' past and current covariate values, was predicted for each person in the cohort for each year of age. The cumulative probability of migrating by the age of study entry was calculated by accumulating probabilities ($1 - \prod_{j=0}^{\max age} \Pr(do\ not\ migrate\ at\ age\ j)$) across all years of age up to the age of migration or last age at which the person was known to have remained in Mexico. Weights were calculated as the inverse of the probability of receiving the treatment (migrate or do not migrate) that the person actually received. To reduce the influence of extreme weights, weights were stabilized and trimmed at the 99th percentile.

Our outcomes of interest are the prevalence of fair/poor self-rated health at baseline (defined as the participant's first visit) and incidence of mortality through 2012. We compared migrants to non-migrants

using logistic regression for self-rated health and using Cox proportional hazards models for mortality. Our models were adjusted for age, sex, year of birth, and parental education. An additional set of models accounted for selective migration using the IPTWs.

Results: Mean age at baseline was 62 years (SD=8.9) in migrants and 61 years (SD=9.0) in non-migrants; 32% of migrants and 56% of non-migrants were female. In age, sex and birth year adjusted models, compared to non-migrants, fair/poor self-rated health was less common among migrants to the US (OR=0.91, 95% CI: 0.84, 0.99). Adjusting for parental education (OR=0.97; 95% CI: 0.88, 1.06) attenuated this advantage. Adjusting for selective migration from Mexico to the US, compared to non-migrants, fair/poor self-rated health was less common among migrants to the US (OR=0.87, 95% CI: 0.80, 0.96). Further, compared to non-migrants, migrants to the US had lower mortality hazard, though not significant (fully-adjusted model HR=0.92; 95% CI: 0.83, 1.02).

Conclusion: Mexico-US migration for these cohorts was strongly patterned by covariates that occurred prior to migration. After accounting for selection forces, migration was associated with lower fair/poor self-rated health but was not associated with mortality.

Figure 1. Propensity score across migration category (A=0 'non-migrant', A=1 'migrant').

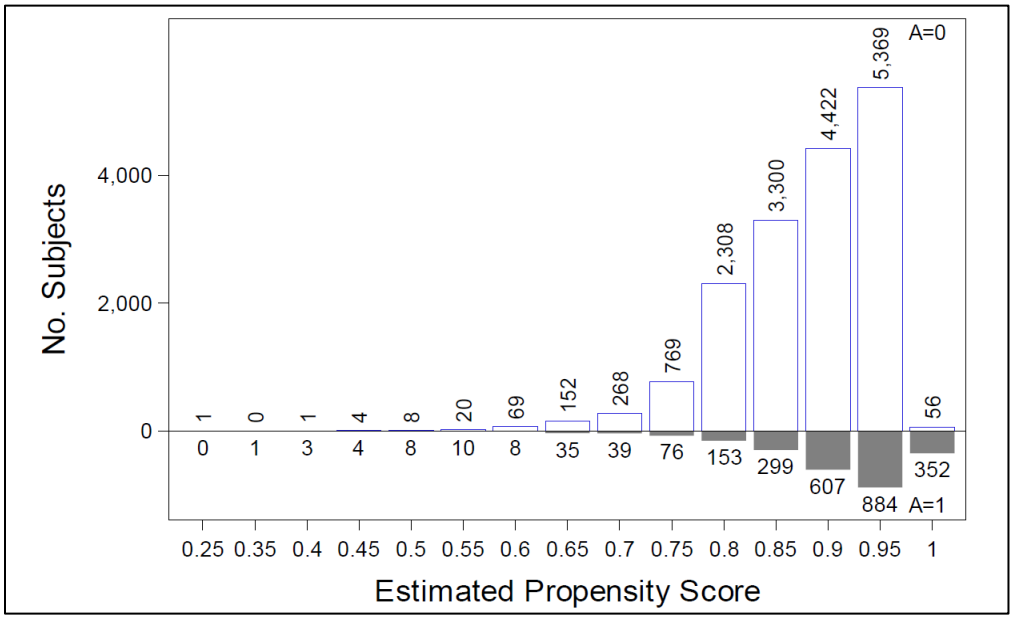

Figure 2. Prevalence of poor/fair self-rated health at baseline and incidence of mortality through 2012, by migration category

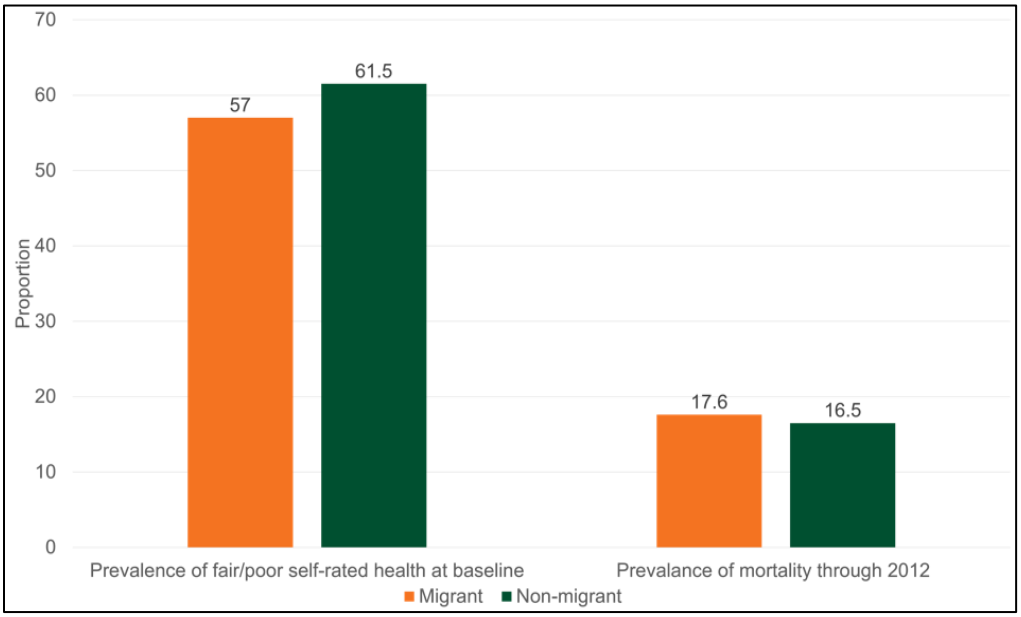

Table 1: Predictors of migration at each year of life, beginning from birth till migration or last observed interview, using a logistic regression model.

	OR (95%CI)
Sex	2.70 (2.42, 3.01)
Education, years	0.99 (0.98, 1.00)
Mother's education	
None	Ref
Some primary (<6 years)	1.27 (1.13, 1.43)
Primary (6 years)	1.49 (1.25, 1.77)
More than primary (>6 years)	2.37 (1.93, 2.90)
Father's education	
None	Ref
Some primary (<6 years)	0.89 (0.79, 1.03)
Primary (6 years)	0.87 (0.73, 1.03)
More than primary (>6 years)	0.84 (0.69, 1.03)
Marital status (Married vs. single)	1.09 (0.99, 1.19)
Job status (Employed vs unemployed)	0.39 (0.35, 0.43)
Smoking status (Smoker vs. non-smoker)	1.60 (1.46, 1.75)

Table 2: Associations of migration with baseline SRH and mortality.

	Fair/poor self-rated health	**Mortality**
	OR (95%CI)	HR (95%CI)
Model 1[a]		
Never migrant	Ref	Ref
Ever migrant	**0.91 (0.84, 0.99)**	0.91 (0.82, 1.01)
Model 2[b]		
Never migrant	Ref	Ref
Ever migrant	0.97 (0.88, 1.06)	0.92 (0.83, 1.02)
Model 3[c]		
Never migrant	Ref	Ref
Ever migrant	**0.87 (0.80, 0.96)**	0.92 (0.83, 1.02)

[a]Model 1 adjusts for age, sex, and birth year.
[b]Model 2 additionally adjusts for parental education.
[c]Model 3 additionally adjusts for stabilized IPTWs.

References

1. Fenelon A, Chinn JJ, Anderson RN. A comprehensive analysis of the mortality experience of hispanic subgroups in the United States: Variation by age, country of origin, and nativity. *SSM Popul Health.* 2017;3:245-254.
2. Lee S, Schwarz N. Question context and priming meaning of health: effect on differences in self-rated health between Hispanics and non-Hispanic Whites. *Am J Public Health.* 2014;104(1):179-185.
3. Eschbach K, Stimpson JP, Kuo YF, Goodwin JS. Mortality of foreign-born and US-born Hispanic adults at younger ages: a reexamination of recent patterns. *Am J Public Health.* 2007;97(7):1297-1304.
4. Antecol H, Bedard K. Unhealthy assimilation: why do immigrants converge to American health status levels? *Demography.* 2006;43(2):337-360.
5. Palloni A, Arias E. Paradox lost: explaining the Hispanic adult mortality advantage. *Demography.* 2004;41(3):385-415.
6. Rodriguez F, Hastings KG, Hu J, et al. Nativity Status and Cardiovascular Disease Mortality Among Hispanic Adults. *J Am Heart Assoc.* 2017;6(12).