“The Long Arm of Immigrant Acculturation: Does Contact with the U.S. Increase the Risk of Overweight/Obesity in Mexican Sending Communities?”

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ABSTRACT

Past research has shown that remittance from Mexico-US migration alters the health profile of those left behind in sending communities, generally in a positive way. We argue that this may be just one of the by-products of the acceleration of the epidemiological transition in sending areas brought by transnational connections brought by migration in certain health behaviors that are linked to gains in body mass. We use socioeconomic and anthropometric data from the 2000 Mexican National Health Survey matched to municipal-level migration intensity and marginalization indices from Mexico's Population Council (CONAPO). The preliminary findings suggest a significant and positive relationship between community-level migration prevalence and individual risk of being overweight net of the marginalization level in the community. In the future, we will evaluate the relationship across different community contexts; separate the contribution of remittance flows from those of migrant circulation; and include measures of individual SES and household welfare.

INTRODUCTION

In recent years, the health profile of Mexican immigrants in the U.S. has been characterized as "paradoxical". A well-established pattern of relatively advantaged health for immigrants, in spite of higher levels of socioeconomic disadvantage, has emerged across a wide range of health outcomes (Cunningham, Ruben, and Narayan 2008; Hummer, Powers, Pullum, Gossman, and Frisbie 2007; Markides and Eschbach 2005; Palloni and Arias 2004; Riosmena, Palloni, and Wong 2008; Singh and Hiatt 2006; Singh and Miller 2004; Singh and Siahpush 2002). With time in the U.S., however, the health advantage displayed by immigrants upon arrival begins to diminish (Abraído-Lanza, Chao, and Flórez 2005; Akresh and Frank 2008; Antecol and Bedard 2006; Cho, Frisbie, and Rogers 2004; Lara, Gamboa, Kahramanian, Morales, and Bautista 2005). The reasoning follows that exposure to U.S. society increases negative health behaviors (e.g. Gregory-Mercado, Staten, Ranger-Moore, Thomson, Will, Ford, Guillen, Larkey, Giuliano, and Marshall 2006) that ultimately lead to poorer health with time in the U.S. and across generations.

Just as acculturation processes unfold in immigrant communities in the U.S. (albeit slowly in places with high ethnic concentrations, see Eschbach, Ostir, Patel, Markides, and Goodwin 2004; Lee and Ferraro 2007), they may also extend back into sending areas (regarding the socio-cultural sphere, see Guarnizo 2003). The Mexican-U.S. migration flow is largely structured through the process of cumulative causation, whereby social networks are the engines perpetuating migration (Massey 1990), especially in non-metropolitan areas (Fussell and Massey 2004). Social contexts of origin communities are altered in ways that lower the costs of future migratory trips and

increase community migration prevalence. As a result, sending and destination communities become highly inter-connected.

We argue that health outcomes in migrant origin communities in Mexico may be influenced by U.S. exposure, over and beyond that caused by direct income effects from remittances. While the notion that health outcomes are affected by the migration process is not new, previous studies have mostly focused on the direct effects of remittance-related income on infant (Frank and Hummer 2002; Hamilton, Villarreal, and Hummer 2009; Kanaiaupuni and Donato 1999) and child health (Hildebrandt and McKenzie 2005; McKenzie 2005; Nobles 2007). In this paper, we evaluate whether, given the strong transnational links between Mexico and the U.S., acculturation extends back into origin communities. We accomplish this by studying the association between adult health behaviors –as expressed in body mass index (BMI) - and the U.S. migration intensity of Mexican sending communities according to their level of urbanization and socioeconomic development. In what follows, we briefly summarize previous studies and sketch the different pathways through which the aforementioned influences could be taking place, describe our data and general analytical strategy, present some preliminary results, and highlight the next steps we intend to take.

PREVIOUS STUDIES

Several studies have demonstrated a *positive* effect of individual, household and community-level U.S. migration experience on individual health outcomes (Hildebrandt and McKenzie 2005; McKenzie 2005). The majority of existing studies have focused on infant health and have shown that migration experience is significantly associated with

low birth weight and lower odds of infant mortality (Frank and Hummer 2002; Hamilton, Villarreal, and Hummer 2009; Kanaiaupuni and Donato 1999). The primary explanation is that migration to the U.S. provides protection from the risk of poor infant health partly through the receipt of remittances. Additionally, past work has shown that the migration process alters socio-cultural aspects of community life in sending areas (e.g. such as health knowledge) that lower the risk of poor infant health outcomes (Frank 2005; Hamilton, Villarreal, and Hummer 2009)}.

One interpretation of these results is that migration is contributing to the acceleration of the epidemiological transition in origin communities. As such, reductions in infant and child under-nutrition and mortality are not the *only* consequences of the epidemiological transition, just the (most) beneficial ones. In this study we address the possibility that some of the migration feedback loops (both monetary, i.e. remittances, and socio-cultural aspects) may give rise to other, more *negative* consequences of said transition, particularly in adult over-weight and obesity levels in rural areas and places with less favorable socioeconomic conditions.

We posit that there are three main mechanisms through which the proposed relationship could operate. First, community-level migration prevalence could increase the risk of obesity through a direct income effect. The increased income brought by remittances may allow people to eat higher-calorie diets. Past work has shown that remittances often alter consumption and investment expenditures in migrant-sending households (Taylor 2006). Second, income could also be used to purchase capital goods that would reduce the amount of physical effort performed by workers. This mechanism would be more relevant in a rural context. Third, migration could lead to changes in

norms regarding body habitus and food consumption habits (e.g. food types, portion sizes) that could in turn affect body size.

We expect that these influences will be clearest in places where the epidemiological transition is still on its early stages, namely rural areas and those with less favorable socioeconomic conditions. Past work in Mexico has demonstrated that overweight and obesity levels are lower in rural areas relative to urban ones (e.g. Filozof, Gonzalez, Sereday, Mazza, and Braguinsky 2001), as the lower income levels and lower calorie consumption in the former lead to poorer nutrition quality and a slower pace of the epidemiological transition (Rivera, Barquera, Campirano, Campos, Safdie, and Tovar 2006). As such, obesity in rural areas tends to be present mostly among those who can afford higher consumption; this is evidenced by the positive association between socioeconomic status and BMI levels in rural areas (Smith and Goldman 2007). As migration-related remittance flows are more sizable relative to other sources of income in rural communities (Taylor, Arango, Hugo, Kouaouci, Massey, and Pellegrino 1996), we expect that, in rural areas, migration intensity will be positively associated with BMI and that the pathway for this relationship will go beyond a simple story of reducing under-nutrition.

DATA AND METHODS

We use data from the Mexican Health Survey (hereafter, ENSA, its Spanish acronym). This study was conducted by the National Institute of Public Health between September 1999 and March 2000 and is a nationally representative, multi-stage sample of the Mexican population with a 97 percent participation rate. The data is representative at

the state and urban/rural levels, yielding 45,756 households (Barquera, Durazo-Arvizu, Lule, Cao, and Cooper 2008). Within each household, three people were selected for the survey: one adult (over 20 years old), one adolescent (between 10 and 19 years old), and one child (less than ten years old). Socioeconomic, demographic, and family history data were collected using a structured questionnaire. The sampling procedure began with the random selection of 14 counties in each state. This was followed by the selection of five Aréa Geoestadística Básicas (AGEB, analogous to a census tract) in each county with the probability of selection proportional to population size. Subsequently, three blocks within each AGEB, then seven households within each block, then one person within each age group were each selected with equal probabilities (Barquera, Carrión, Campos, Espinosa, Rivera, and Olaiz-Fernández 2007; Barquera et al. 2008). Additional details about the survey methodology are available elsewhere (Valespino, Olaiz, Lopez-Barajas, Mendoza, Palma, Velázquez, Tapia, and Sepulveda 2003).

The data contain detailed background information in addition to extensive health information. For the current work, we exploit socioeconomic, geographic, and anthropometric measures to examine the relationship between obesity and migration patterns in Mexico. Height and weight were measured to the nearest 5 mm and 0.1 kilogram, respectively (Sanchez-Viveros, Barquera, Medina-Solis, Velázquez-Alva, and Valdez 2008). Respondents were measured in light clothing and without shoes (Valespino et al. 2003). Further, heights and weights were taken by trained anthropometrists (Buttenheim, Wong, Goldman, and Pebley 2009). These data have been used to publish on smoking and obesity (Buttenheim, Wong, Goldman, and Pebley 2009), hypertension (Sanchez-Castillo, Velázquez-Monroy, Berber, Agustín, and Tapia-Conyer

2003), diabetes (Palloni, Riosmena, and Wong 2008), and other health outcomes (Rosas, Attie, Pastelin, Lara, Velázquez, Tapia-Conyer, Martinez-Reding, Mendez, Lorenzo-Negrete, and Herrera-Acosta 2005).

Overweight and obesity are categorized using BMI cut-offs created for adults 20 years old and older (http://apps.nccd.cdc.gov/dnpabmi). BMIs that fall in the range between 25-29.9 are categorized as overweight. BMIs that are 30.0 and above are categorized as obese. A little less than two-thirds of the adult sample (65.4%) is categorized as overweight and 27.5% of the sample is categorized as obese. About 7 percent of the adult sample was excluded based on missing or implausible values on the weight and height variables.

We matched the adult sample of the ENSA 2000 with two municipality-level indices constructed with 2000 Census data and published by the Mexican Population Council (CONAPO) using principal components factor analysis: a migration intensity index and a marginalization index. Our main explanatory variable, the migration intensity index, was constructed based on four measures from the international migration supplement of the 2000 census, namely the percent of households in the municipality: 1) receiving remittances, 2) with at least one member emigrating to the U.S. in 1995-1999, 3) with at least one member returning from the U.S. in 1995-1999, and 4) with at least one member circulating between Mexico and the U.S. in 1995-1999. This is the measure we use in preliminary models shown below. We will also use these measures separately in order to distinguish direct income effects (measured by remittance reception) from those brought by the degree of transnational connections in the community, net of remittance reception.

We also control for various socioeconomic characteristics in each community to avoid artificially inflating the impact of the migration intensity level with these factors. For this purpose, we use CONAPO's index of marginalization, also based on 2000 data but composed of 8 variables: the proportion of households in the municipality: 1) with dirt floors, 2) without indoor plumbing or a toilet, 3) without electricity, 4) without access to piped water, 5) with more than two people per room, as well as the proportion of adults in the municipality: 6) who are illiterate, 7) who have not completed primary education, and 8) who earn less than twice the minimum wage. Likewise, we will also attempt incorporating these measures separately.

Finally, given differences in the epidemiological transition and the operation of cumulative causation processes across rural, urban and –in particular- large metropolitan areas, we will also control for or stratify by the rural-urban-metropolitan status of the municipality of residence. We classify households as rural if their locality has less than 2,500 habitants, as non-metro urban if they are in localities with more than 2,500 but less than 100,000 habitants, and as metropolitan if they are in localities of more than 100,000 habitants.

Given our use of data at both the individual and municipal levels and our interest in reliably estimating the effects and significance of cross-level interactions, we use hierarchical linear modeling (HLM) in our analysis. Our main approach is to assess the independent effect of community-level migration intensity (and that of its different components) on the risk of being 1) overweight and 2) obese. We will include controls for socioeconomic characteristics at the individual, household, and community levels (i.e. the marginalization index or its components). Differences by rural/urban status will also

be evaluated either through separate models (if necessary) or cross-level interaction terms. All models will be run in HLM 6.0.7.

PRELIMINARY FINDINGS

Descriptives

Our sample of 45,924 is 32 percent male and has an average age of almost 42 years. Sixty-one percent of the sample is overweight and 26 percent of the sample is obese, with seven percent missing either or the height or weight information necessary to calculate BMI.

---------Table 1 around here--------

Multilevel Analysis

Table 2 presents the results from two separate multilevel models predicting overweight status (Column 1) and obesity (Column 2). Each model controls for gender and age. Future models will include a more complete set of socioeconomic and demographic controls. In the case of overweight (BMI=25-29.9), we find that higher levels of migration prevalence at the community-level are significantly associated with an increased risk of being overweight, an effect that persists once we control for community-level marginalization. As expected, greater levels of poverty at the community-level are associated with a decreased risk of being overweight. In the case of obesity (BMI=30+), migration prevalence is not a significant predictor once community level marginalization is taken into account.

---------Table 2 around here--------

These findings provide *preliminary* evidence that increasing contact with the U.S. through the process of migration increases the risk of being overweight in Mexico. This finding does not appear in the more extreme case of obesity.

NEXT STEPS

In the next few months, we will refine and extend the analyses presented in Table 2 in various ways. First and foremost, we will add measures of individual SES and household welfare. Second, we will test for the sensitivity of the use of the marginalization index as opposed to using each of its component variables individually. Third, we will use the four different components of the migration intensity index to explore if these measures independently express different aspects of the migration process as we posit above. For instance, we expect that the direct income effect of migration will be captured by the percent of households in the municipality receiving remittances.[1] Having controlled for remittance reception (albeit not the amount of remittances received), we expect that the proportion of emigrants, return migrants, and circular migrants will also be positively associated with the likelihood of obesity and overweight status, based on our expectation that acculturation processes spread across transnational communities.

Moreover, we expect that the income and the socio-cultural effects of migration will be particularly clear in rural areas, where the epidemiological/nutritional transition is at an earlier stage. We expect the income effect to be larger in rural areas given the higher relevance of remittances in rural economies. We expect "socio-cultural" effects to be

[1] In addition, an indirect income effect would be expressed in the marginalization index given the endogeneity of migration intensity and the socioeconomic level of a community.

stronger in rural and non-metropolitan urban areas as the process of cumulative causation operates less efficiently in metropolitan areas. For this purpose, we will estimate cross-level interactions between our municipal-level migration measures and rural, non-metro urban, and metropolitan residence.

Table 1. Sample Characteristics of the ENSA 2000 (N=45294)

Percent Overweight	60.80
Percent Obese	25.54
Percent Missing BMI	7.00
Percent Male	32.38
Mean Age	41.61

Table 2. Coefficients from HLM Models Predicting Overweight (Column 1) and Obesity (Column 2)

Predicting Overweight [Ref: Normal Weight]		Predicting Obesity [Ref: Not Obese]	
	Column 1		Column 2
Male	-0.283***	Male	-0.566***
Age	0.017***	Age	0.013***
Community-Level		Community-Level	
Marginalization Index	-0.283***	Marginalization Index	-0.284***
Migration Intensity Index	0.059*	Migration Intensity Index	0.043
Intercept	-0.025***	Intercept	-0.013***
N	42,123		42,123

Notes: *** p < 0.001, ** p < 0.01, * p < 0.05, + p < 0.1.

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