Health Selectivity and SES Gradients in Mexico–U.S. Migration at the Ecological Level

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Migrants tend to have better health than the native-born population in origins (for a review and meta-study, see Cunningham, Ruben and Narayan 2008), though this advantage seems to erode with exposure to U.S. society (Antecol and Bedard 2006; Cho, Frisbie and Rogers 2004). This advantage has particularly been found for Mexican migrants in a variety of health outcomes –most notably mortality- and oftentimes even so after considering potential biases in return migration, coverage of vital statistics, or in self-reports (Hummer et al. 2007; Markides and Eschbach 2005; Palloni, Riosmena and Wong 2008).

In addition to these relatively striking differences in levels, studies have found migrants also have strikingly *weak* socioeconomic gradients in health when compared to those of U.S.-born individuals in a variety of health outcomes and at different ages (for studies specifically looking at Mexicans see Goldman et al. 2006; Kimbro et al. 2008; Turra and Goldman 2007). In particular, studies have suggested Mexican migrants import their weaker gradients from their place of origin, especially in health behaviors or health indicators with a high behavioral component, such as obesity or smoking (Buttenheim et al. 2009).

Relatively weaker social gradients at the national level in the Mexican setting are a compositional consequence of asynchronous and uneven changes in epidemiological regimes across geographies as indicated by steep rural/urban differences in both health indicators levels and socioeconomic gradients therein (Palloni et al. 2008; Smith and Goldman 2007) as well as in

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levels across regions (Barquera et al. 2003). As such, one cannot understand social gradients in migrant health without some understanding of their origin composition, which amounts to unobserved heterogeneity in analyses using nationally-representative data in the U.S.

Even if migrants were to import social gradients in health from Mexico, it is hard to conceive these gradients would remain untouched by the migration process, especially as health levels do seem to be (negatively) altered by it (e.g. Antecol and Bedard 2006; Cho, Frisbie and Rogers 2004). As one might expect acculturation to be positively associated with educational attainment, SES-health gradients would be flatter for experienced immigrants than for more recent arrivals. Furthermore, as return migration and survey coverage biases could also affect estimates based on U.S. data, these gradients should ideally be measured prior to emigration.

In this paper, we compare socioeconomic gradients in height, obesity, and self-reported global health for recent and experienced Mexico-U.S. migrants with those of non-migrants in sending areas and U.S.-born non-Hispanic Whites. We rely on nationally- and regionally-representative longitudinal data that allows us to compare the *pre-migration* gradients of individuals eventually leaving for the U.S. with those of non-migrants from the same geographies, which precludes us to avoid confounding ecological composition with weak gradients. In addition, we further contrast these pre-migration gradients with those of migrants interviewed in the U.S. to advance our understanding of how might the migration process (i.e. acculturation processes in addition to return migration artifacts and survey coverage biases) is altering gradients.

Similar to Buttenheim et al. (2009) before us, we find evidence consistent with the notion that migrants import social gradients from origins, especially after considering the urban-rural composition of migrants. However, as health gradients measured *previous* to the emigration are generally stronger than those observed posterior to the move, we also find evidence consistent with the notion that the migration process (and –to some extent- artifacts associated with it) may be weakening social gradients in health. Before presenting our results and discussing explanations potentially driving these trends, we introduce the data sources and analytical strategy used to pursue this issue.

DATA AND METHODS

We compare the pre-migration SES-health gradients of (recent) migrants and non-migrants using data from the Mexican Family Life Survey (hereafter, MxFLS) while putting these into perspective by looking at comparable gradients in foreign-born Mexicans (hereafter FB Mexicans) and non-Hispanic Whites (hereafter, NH Whites) using National Health Interview Survey data (NHIS). In this section, we first describe the MxFLS survey design and our analytical strategy and then introduce NHIS data and discuss the main differences between the measures in it and those available in MxFLS.

The MxFLS is a nationally representative longitudinal study conducted in Mexico. Baseline interviews took place in 2002 while a (first) follow-up was fielded in 2005. The MxFLS baseline –35,677 individuals in 8,440 households located in 150 different communities- is a multi-stage probability sample of the Mexican population, stratified by region with regional urban/rural conglomerates as primary sampling units (PSUs). As such, it is also representative at the regional and urban/rural levels (for a detailed description of the MxFLS sampling methodology, see Rubalcava and Teruel 2007).

As Mexico-U.S. migration flows are still heavily composed of men (despite an increasing feminization of migration flows, c.f.r. Cerrutti and Massey 2001; Donato 1993; Kanaiaupuni

2000) and as the vast majority of Mexicans migrate to the U.S. during a limited age range (Hill and Wong 2005; Riosmena 2005: Chapter 3), our working sample is composed of males ages 15 to 49. Attrition rates were reasonable for a longitudinal study of this sort: 91.4% of the 7,514 men in this age range interviewed at baseline were re-interviewed or accounted for as internal or international migrants. However, complete information in *all* our health, SES, migration, and socio-demography variables of interest was only available for 4,865 of these 6,866 individuals.[1] We use these 4,865 observations in *all* of the analyses with Mexican Family Life Survey data presented below.

We made some comparisons between the analysis sample (N=4,865), the eligible population that did not have complete data on all our working variables (described in detail below, N=2,001), and the population lost to follow up at Wave 2 (N=648). With few exceptions these differences were relatively small though some indeed were statistically significant. In sum, those lost to follow up appear to be in slightly better health, have higher educational attainment, and live in urban areas. On the other hand, those with non-response in our key variables tend to come from rural areas and the South, are not significantly different in terms of educational attainment, were slightly more likely to have emigrated to the U.S. in the inter-wave period, and were more likely to be classified as obese.[2] Given the generally small magnitude of these biases and the fact that individuals lost to follow-up tend to contribute to them in the contrary direction

[1] In other words, 35% of the baseline sample –or 29.3% of individuals tracked by wave 2- had missing information in at least one of our variables of interest (described below).

[2] The population lost to follow up was, on average about 1.3 cm (0.4 in) taller than the analysis sample; slightly more likely to be overweight (39% vs. 37%) and underweight (4.5% vs. 3.1%). Most notably individuals lost to attrition were somewhat less likely to report very bad/bad/regular health than our working sample (27% vs. 40%). Additionally, those lost to follow-up had higher educational attainment (by 1.5 years) and were more likely to be from an urban area than the analysis sample. Given that migration status is ascertained at Wave 2, this population's migration history could not be assessed. In addition, the population of males 15-49 who were not eligible for the analysis sample because of non-response in key variables were less likely to be overweight (25<=BMI<30, 34% vs. 37%) and more likely to be classified as obese (21% vs. 17%). They were slightly more likely to have emigrated to the U.S. in the inter-wave period (5.5% vs. 4.9%; though they were less likely to have ever migrated to the U.S., 6.3% vs. 7.2%). Finally, they were less likely to reside in an urban area and more likely to reside in Southern Mexico at baseline.

to those with item non-response, the *order of magnitude* of our estimated gradients may not be severely affected by these biases. Having said that, we will explore using multiple imputation techniques in our next draft to make sure this is the case.

Operationalization of measures of interest

The MxFLS survey baseline included information on self-reported health conditions as well as a short battery of biomarker and anthropometric measures obtained from an in-home physical examination. We specifically use height, obese status, and self-reported global health. Height, measured in centimeters as presented in descriptive tables (see Table 1), was centered at the national Mexican average of 166 cm in multivariate models to facilitate selectivity interpretations relative to national/group levels. We classified individuals as obese if their BMI of at least 30 kg/m^2 (17% of our sample, see Table 1). Finally, we use a five-point self-reported global health scale to compare individuals reporting unfavorable health with those reporting better health. In the case of MxFLS, this is a dichotomy between those in very bad/bad/regular health and those in good/very good health, which practically distinguishes between those individuals in good vs. regular health given that the vast majority of respondents in our working sample selected one of these two (54% and 39% respectively, see Table 1).

-TABLE 1 ABOUT HERE-

We use data from the baseline and follow-up surveys to measure inter-wave U.S.-bound migration while looking at socio-demographic characteristics and health conditions at baseline. Individuals migrating to the U.S. between waves were classified as U.S. migrants regardless of their location at Wave 2. Almost 5% of our working sample emigrated to the U.S. in the 3-year inter-wave period. All other individuals were classified as non-migrants regardless of their pre-baseline U.S. experience as we could not identify all previous U.S. migrants in the sample.[3] As shown in Table 1, migrants have slightly lower education levels, are much younger, and are less likely to live in urban areas and in the Northern region. They are almost as tall as non-migrants and slightly less likely to report good health, though they are less likely to be classified as either obese.

We use educational attainment as our measure of socioeconomic status given our interest in testing if pre-migration SES gradients are similar to those measured in a synthetic cohort of individuals with varying durations in the U.S. (see discussion in previous section). We use a measure of years of formal education calculated from the highest level and grade attained by the respondent, which enters our models in a linear fashion.[4] Our working sample has an average of 8.5 years of schooling, almost a year lower for U.S. migrants (see Table 1).

We use urban/rural and a three-region classifications as our measures of geography of residence at baseline, in both cases attempting to capture (some of) the ecological variation in health conditions and migratory traditions. Respondents are classified to have rural/urban residence if they live in a locality of less than/more than 2,500 persons (as shown in Table 1, the sample is 75% urban).[5] The Northern region (22% of the total), where health indicators tend to

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[3] Although some individuals classified as non-migrants could have pre-baseline U.S. migration experience, it is not possible to easily identify them. Although there is lifetime retrospective information on U.S. migration trips of more than one year and for the three years previous to baseline for moves of less than a year, a very small proportion of people who reported previously been to the U.S. in either was negligible: around 200 individuals would be classified as pre-2002 migrants using these variables, a gross under-estimate in our view given the history of Mexico – U.S. migration (for national-level estimates, see Hill and Wong 2005). Our results would thus not change if we assumed these numbers were accurate and eliminated these individuals from the non-migrant group.

[4] While it may be a weakness of our study to use years of education in a linear fashion (see Buttenheim et al. 2009; Kimbro et al. 2008; Palloni et al. 2008), our data lack the statistical power for more detailed comparisons beyond breaking down education groups in two categories. Our results with MxFLS data did not change considerably when treating education as a categorical variable distinguishing people on/below and above average levels of education (i.e. 0-8, 9+).

[5] This classification is the standard used by the Mexican statistical office and in a variety of nationally-representative surveys (e.g. Wong, Espinoza and Palloni 2007). Municipalities, the Mexican equivalent to U.S. counties, are generally sub-divided into localities. As (non-metropolitan) population centers tend to be concentrated on specific

be more favorable (Barquera et al. 2003) and –ironically- is under-represented in the migrant flow (i.e. 11% of recent migrants came from it), includes respondents interviewed in the states of Baja California Sur, Sinaloa, Durango, Sonora, Nuevo León, and Coahuila (the latter three along the Mexico-U.S. border). The Central region (21% of the total) is composed of individuals interviewed in the states of Guanajuato, Jalisco, and Michoacán, also with more favorable health outcomes than the Southern portion of Mexico (Barquera et al. 2003) in addition to being the traditional heartland of Mexico-U.S. migration (Durand, Massey and Charvet 2000). The larger Southern region (57% of the total) includes the wealthier, healthier Distrito Federal and neighboring Estado de México (which includes around half of Mexico City's urban sprawl) and Morelos along with the poorer Southeastern states of Yucatán, Oaxaca, Puebla, and Veracruz (the latter three with sizable migrant flows to the U.S. in recent years, see Durand et al. 2000).

Considering SES-health gradients in the U.S.

In order to compare the (pre-migration) SES gradients of Mexican migrants with those observed in the U.S. as reported in other studies, we followed a similar strategy to estimate SES-health gradients for U.S.-born non-Hispanic White and foreign-born Mexican men ages 18-49 using data from the National Health Interview Survey (NHIS).[6] The NHIS is fielded by the National Center for Health Statistics Centers for Disease and Control since the late 1950s. Each (yearly) cross-section is a nationally-representative multi-stage, stratified sample of the U.S. population (as part of the design, Hispanics are over-sampled). We pooled the 2000-2005 waves for reasons of statistical power and adjusted weights to reflect the pooling.[7] The ethnicity,

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areas of a municipality, using locality population is a more appropriate geography to classify the urban or rural character of life experienced by individuals.

[6] (Self-reported) height and weight are only collected for the adult sample of the NHIS.

[7] In this case and given that the sampling frame for all years is similar we simply divided the weight by the number of waves, thus yielding a robust snap-shot of the U.S. population around the mid-point of the period (population-wise and not necessarily in health trajectories of course).

nativity, gender, and age selection yielded sample sizes of 2,979 and 20,434 FB Mexicans and NH Whites respectively.

While we deemed the health indicators used in this paper to be overall comparable across the two datasets used, there are two major differences between NHIS and MxFLS health indicators worth noting. First, all NHIS information, including height and weight, is self-reported (as opposed to actual height and weight measures available in the MxFLS sample). Although self-reported height and weight tend to be slightly upwardly and downwardly biased when compared to actual measures, the amount of these non-random errors tends to be of no more than a +2 cm. and -4 kilos in Mexican populations (Ávila-Funes, Gutiérrez-Robledo and Ponce de León Rosales 2004; Osuna-Ramirez et al. 2006). We thus adjusted the general levels of foreign-born Mexicans assuming an over-estimation of height of 1 inch (2.56 cm, the NHIS uses inches as its original measure thus we preferred to round the figure up) and adjusted obesity levels to 1.1 times their original value in multivariate analyses. The general adjustment of these levels, however, does not change the estimated gradients in either. For the most part, these will be a bit weaker than they might really be as those with lower levels of schooling are more likely to exaggerate their height or play down their weight than those with higher levels of educational attainment (Osuna-Ramirez et al. 2006).

Second, the specific options in the self-reported global health question differ between the two surveys hereby utilized. In the MxFLS, the response options are very good, good, regular, bad, and very bad while in the NHIS they are excellent, very good, good, fair, and poor. We calculated our unfavorable health indicator in NHIS by pooling those in poor, fair, and good health together. As shown in Table 1, this classification yields comparable *levels* (if not gradients necessarily) to those of the very bad/bad/regular vs. good/very good dichotomy in MxFLS: 25%

and 38% of NH Whites and FB Mexicans in NHIS were classified as having unfavorable health whereas the number is 40% for the whole MxFLS sample (46% for 2002-2005 migrants).

Analytical Strategy

Given our main goal –to wit, to compare the pre- and post-migration SES-health of U.S. migrants in addition to those of non-migrants nation-wide and across different geographies- our basic strategy is to perform multivariate analyses regressing health indicators on the main effects and interactions between migration status, SES, and –when appropriate- geography. For instance, we test if SES-health gradients vary across migrant and non-migrants at the national level by evaluating the significance of the two-way interaction between SES and migration status (we also add main effects for each). As such, we allow both health levels and the slope of the effect of our SES variable to vary between migrants and non-migrants. Moreover, we test if SES-health gradients between migrants and non-migrants vary by region or urban/rural status (separately) based on regressions in which we include three-way interactions between SES, migration status, and level of geography (along with the main effects and all two-way interactions involving the three indicators). More specifically, we perform OLS regressions to predict deviations from the mean (national) group height and logistic regressions to predict obesity and unfavorable self-reported health (defined below). We adjust means and coefficients for sampling design in all analyses.[8]

In order to facilitate the interpretation of the results, we also estimate predicted values for deviations from mean height and predicted probabilities of being obese and of self-reporting unfavorable global health. In addition to showing some of the predicted education gradients for 2002-2005 migrants and non-migrants in different geographies and for NH Whites and FB

[8] For the most part and given that we included controls for the main stratification/cluster variables in the MxFLS in our models (namely, region and urban/rural, see Rubalcava and Teruel 2007), results from analyses with and without sampling weights did not vary considerably.

Mexicans in the U.S., we report predicted values for the inter-quartile range of the education distribution and show graphical representation showing selected education-health gradients roughly along the middle 80% of the education distribution.

RESULTS

Migrant vs. non-migrant health levels and SES gradients at the national and urban-rural levels

Table 2 shows a summary of our findings with regards to the aforementioned predicted values for our three health outcomes along the inter-quartile range of the education distribution in Mexico (i.e. 6 to 10 years). These predicted values were calculated from the multivariate models just described, shown in Appendices 1a-1c (deviation from height, obesity, and unfavorable health for MxFLS data, respectively).[9] It is important to note that, if a coefficient was not significantly different from zero with a level of significance of at least 0.10 (in a two-tailed test) we effectively assumed the coefficient was zero. We also used these numbers to estimate the average slope of the gradient in the scale of the probabilities (as opposed to the scale of the log-odds as in the case of obesity and self-reported health indicators).[10]

-TABLE 2 ABOUT HERE-

The results partially support the notion that the education-health gradients for migrants and non-migrants do not differ significantly from each other at either the national or urban/rural levels. For non-migrants, the predicted deviation in height ranges from 1.83 cm *below* to 0.26 cm *above* the national mean for those with 6 and 10 years of education respectively. Neither the

[9] All models include controls for age (centered at 30 years), age-squared, and years of formal education. Models based on MxFLS data further control for 2002-2005 migration status and (if applicable) urban/rural or geographic region along with interactions between educational attainment, migration status and, if applicable, level of geography. Models using NHIS data control for nativity/ethnicity group and allow for the effect of education to vary by ethnicity/nativity group (i.e. FB Mexicans vs. NH Whites).
[10] Said slope was calculated as the difference between the two ends of the inter-quartile range divided by the range of education levels considered (i.e. 4 in both Mexico and the U.S.).

gradients (nor the level) were significantly different for migrants (also see Model I in Appendix 1a). We found a similar pattern in obesity, where migrants' predicted values were not significantly different in level or gradient across the IQR of the Mexican educational distribution and –moreover- were practically flat according to our model. Only in self-reported health were the education gradients and levels different for migrants and non-migrants. While reports of unfavorable global health diminish from 53% to 43% between non-migrants with 6 and 10 years of education, they in fact *increase* slightly for migrants, who are also more likely to report less favorable global health (going from 71% to 72%).

For the most part, education-health gradients do not differ between migrants and non-migrants within urban and rural areas alike. Only in the case of deviations from mean height in urban areas do migrants have *steeper* gradients. Predicted deviations in mean height varied between -4.06 and 0.58 cm for migrants with 6 and 10 years of formal education leaving urban areas (or 1.16 cm per year of education) while they only increased 0.52 per year of formal education along the same range for non-migrants remaining in urban areas, going from 1.8 below the national average to 0.26 above it for those with 6 and 10 years of education respectively.

While gradients in obesity and self-reported health were not significantly different for migrants and non-migrants from urban or rural areas, two interesting patterns arise when comparing these geographic-specific figures (for migrants and non-migrants together) to national estimates. First, the flat education-obesity gradient observed at the national level is the result of a weak and negative gradient in urban areas and a strong positive gradient in rural areas (after weighing, represented by 76% and 24% of MxFLS respondents respectively, see Table 1). Individuals with 6 and 10 years of formal education have an adjusted prevalence of 28.8% and 28.1% in urban areas. In contrast, rural area residents with 6 and 10 years of educational attainment have an adjusted prevalence of obesity of 18.8% and 22.7%, or +1% per year of formal education vs. only -0.2% in urban areas. The lower levels and positive gradients in rural areas suggest their residents are yet to undergo several changes in diet and exercise activity taking place in urban areas.

Second, the difference in levels and gradients in unfavorable self-reported health between migrants and non-migrants at the national level seems to be *partially* the result of the rural/urban origin composition of migrants. 48.8% and 37.5% of men with 6 and 10 years of educational attainment residing in urban areas report unfavorable self-reported health, which implies a reduction of 2.8% in unfavorable health per year of education. Levels are higher and gradients flatter for those living in rural areas, going from 59.5% to 55.2% for those with 6 and 10 years of formal education respectively, a decrease of only 1.1% per year of education. As such, the levels and weakness of migrant gradients at the national level resemble more those of rural residents than those prevalent in urban Mexico. In fact, as shown in Table 1, U.S. migrants disproportionately come from rural areas: 37% of migrants do, a much higher proportion when compared to the 24% of the working sample residing in rural Mexico (also see Durand et al. 2000). Having said that, the gradients of migrants at the national level are flatter than those observed in rural areas (for migrants and non-migrants alike) and are in fact slightly positive (unfavorable health reports *increase* 0.3% per year of formal education). We further discuss this issue, in the context of regional gradients.

Migrant vs. non-migrant health levels and SES gradients at the national and regional levels

Table 3 shows the range of predicted values and the implied average gradients for migrants and non-migrants in three broad Mexican regions, which –as mentioned above- differ markedly according to their health profiles and U.S. migration tradition. Neither levels nor education gradients in obesity varied significantly across regions. The adjusted prevalence of 22% did not vary across regions or along the attainment distribution.

In contrast to obesity, the levels and gradients in both height and self-reported health did differ for the most part by migrant status within and, in some cases, between regions. First of all, the levels are indicative of a sharp North-South differential in height. As most migrants come from Central and Southern states, it is not surprising that selection in height at the national level is negligible. Moreover, although nation-wide gradients in deviations from mean height were not statistically different for migrants and non-migrants, they tend to be sharper for migrants than non-migrants within each region though at the same rate in all regions. This effect occurs because the (two- and three-way) interactions involving migration status and region were not significant, while the education-migration and (some of the) education-region interactions were (see Appendix 1a, Model III). As such, the gradients –but not the starting levels- in deviations from mean height are the same for non-migrants in the Central and Northern regions (at +0.45 cm per additional year of formal education). In addition, the migrant vs. non-migrant *difference* in gradients (obtained from subtracting the estimated slope for non-migrants in a given region from that of migrants in the same region) was the same across regions. This implies that the migrant gradient was +0.36 cm stronger than the non-migrant gradient regardless of region, a small but consistent difference in gradients contrary to our expectations.

-TABLE 3 ABOUT HERE-

Gradients in unfavorable health reports did not vary much across regions for non-migrants while within-region gradients of migrants vs. non-migrants differed markedly (though not in the same direction for all regions). Though the likelihood of reporting unfavorable health tends to be somewhat lower for non-migrants in the North than for non-migrants in the South and

Central regions, it is noticeable that non-migrant gradients differ little across regions (in all, unfavorable reports decreased ~2.2-2.5% for each year of additional education).

In contrast, gradients in migrant groups do not only differ noticeably from those of non-migrants living in the same region: they also vary conspicuously between migrants across regions. Most notably, the slightly positive gradient in unfavorable health reports observed in migrants at the national level is driven by the responses of Central migrants, the only group with positive gradients in unfavorable health of all migration-regional groups (and who represent 35% of the recent migrant flow, a representation 1.65 times higher than the proportion of non-migrants residing in the central region, see Table 1). These numbers imply an increase in unfavorable health reports of 4.8% per additional year of educational attainment, going from 47% to 66% for those with 6 and 10 years of education. In contrast, the gradient for migrants leaving the Southern region is slightly negative (-1.2% per year of education) while that of individual eventually leaving the Northern region is much higher and negative at 9.8% *per year* of attainment.

Differences with patterns observed in the U.S.

Table 4 shows a summary of our findings with regards to the aforementioned predicted values for our three health outcomes along the inter-quartile range of the education distribution by migrant status in Mexico as well as for non-Hispanic White and foreign-born Mexican men from NHIS data (see Appendix 2 for multivariate models NHIS figures were calculated from). As in the case of Tables 2 and 3, the range of educational attainment used for all Mexican-born individuals (regardless of their migration status or country/survey where they were interviewed) was 6 and 10 years while we calculated predicted values for non-Hispanic Whites with 12 and 16 years of education, which roughly represent similar percentile cutoffs in the education distribution of the U.S. to those used for Mexicans.

-TABLE 4 ABOUT HERE-

With the exception of height, gradients of NH Whites are steeper than those of Mexicans surveyed on either side of the border. In addition, the gradients of migrants –both as measured previous to their emigration and as reported by those interviewed in the U.S. by the NHIS- were relatively similar to but generally weaker than those of non-migrants and, especially, those of recent migrants as measured previous to their emigration (whenever they differed from those of non-migrants).

As shown in Table 4, we found no differences in education gradients in deviations from mean height between NH Whites and FB Mexicans (also see Model A in Appendix 2). Moreover, the implied slope of the effect of education is *slightly* weaker in NHIS data than for Mexicans in the MxFLS. Whereas the predicted deviation from the NH White mean height increases 0.29 cm per year of education (going from 0.04 cm below to 1.11 cm above the mean for those with 12 and 16 years of education respectively), it is 0.52 for Mexicans at the national level and ranges between 0.35 in rural Mexico (see Table 2) and 0.62 in Southern Mexico (see Tables 2 and 3).

Some interesting similarities exist in the levels and –to a lesser extent- gradients of FB Mexicans interviewed in NHIS compared with those of people from Central Mexico (the historical heartland of Mexico-U.S. migration, composing around 35% of our sample), shown in Figure 1 (note that, as discussed above, only the levels and not the gradients in this measure varied across regions as indicated in Table 3; also see Model III, Appendix 1a). These similarities, however, are more striking between Mexican immigrants interviewed in the U.S.

and *non-migrants* interviewed in the Central region than between NHIS migrants and the pre-migration gradients of those emigrating in 2002-2005.

-FIGURE 1 ABOUT HERE-

Despite patterns in deviations from mean height, obesity-education and unfavorable health-education gradients are indeed steeper for NH Whites. Figure 2 shows some of these contrasts for obesity. While the adjusted prevalence of obesity is 22.1% for NH White men with 12 years of educational attainment, it is only 16.2% for those with 16 years, which stands in sharp contrast with the flat gradients found in Mexicans of similar ages at the national level (effectively zero), with an adjusted prevalence of 23.7%. Only in urban Mexico are SES-obesity gradients significantly different from zero *and* negative (see Figure 2 or Table 2). Although they are much weaker than for NH Whites in the U.S., only reducing 0.15% per additional year of attainment from 28.8% to 28.2% between those with 6 and 10 years of education, they are most similar to those observed in Mexicans in the U.S., which decrease 0.1% per additional year of schooling. However, obesity levels in urban Mexico are substantially (~10 prevalence points or 1.5 times) higher than those of Mexican migrants interviewed in the U.S. Altogether, the low obesity levels and weakly negative gradients of migrants, more similar to rural and urban Mexico respectively, suggest this is not a simple compositional story where a given geography is over-represented in the flows and thus the gradients reflect those origins (as gradients are completely opposite in urban and rural Mexico). However, composition may be part of the story (we further deal with this issue in the Discussion section).

-FIGURE 2 ABOUT HERE-

As illustrated in Figure 3, gradients in self-reported health were also generally sharper among NH Whites than for Mexicans interviewed on either side of the border (not to mention its lower levels), going from an adjusted likelihood of reporting unfavorable health of 28.5% among those with 12 years of schooling to 12.1% for those with 16 years of education, a decrease of 4.1% per year of education. In contrast, the average nationwide gradient for non-migrants in Mexico implies a reduction in unfavorable health reports of 2.7% per year of education. This gradient is only comparable to the 2.8% reduction per-schooling-year observed in urban Mexico (which did not differ significantly for migrants and non-migrants).

-FIGURE 3 ABOUT HERE-

The education gradient in unfavorable health reports is slightly weaker for migrants interviewed in the U.S. relative to non-Hispanic Whites, where the adjusted likelihood of reporting unfavorable health drops 1.2% per year of schooling (i.e. from 38.2% to 33.4% for those with 6 and 10 years respectively). This gradient is also flatter than that observed in Mexico, especially in urban areas. More importantly, gradients and –especially- levels differ somewhat from that observed for 2002-2005 migrants at the national level as measured previous to their migration, which implies an increase of 0.3% per year of education (going from 71% reporting unfavorable health to 72%). While the positive gradient is driven by the characteristic responses of migrants leaving Central Mexico, high levels of unfavorable health reporting appear to be characteristic of migrants across all regions, but especially in the North (where, in fact, the likelihood of reporting one’s health as unfavorable is lowest of all regions, see Table 3). We summarize our main findings and discuss potential reasons for these patterns in the next and last section.

DISCUSSION

In this paper we used nationally-representative longitudinal data collected in Mexico to compare the education-health gradients in height, obesity, and unfavorable self-reported health between U.S. migrants (as measured previous to their emigration) and non-migrants across and within different geographies. We additionally used nationally-representative data collected in the U.S. to compare these gradients to those of foreign-born Mexicans interviewed in (and thus with some migration experience in) the U.S. and those of U.S.-born non-Hispanic Whites.

While we found evidence partially consistent with the notion that migrants import social gradients from their places of origin, especially once we took into account the origin composition of migrants, we also found evidence consistent with the notion that the migration process itself may be further weakening social gradients in health.

Gradients were indeed weaker in Mexico for obesity and self-reported health (but not for height) than for U.S.-born NH Whites. In addition, social gradients in height did not differ between migrants and non-migrants at the national and rural levels; gradients in unfavorable health reports did not vary at the urban and rural levels, and obesity gradients did not vary at the national, urban-rural, and regional levels.

Our results also suggest that the weak social gradients of migrants cannot be understood without dissecting said gradients across different Mexican geographies given a rather deep regional divide in levels and striking urban-rural differences in SES-health gradients. As rural areas and Central and –to a lesser extent- Southern Mexico are over-represented in the flow, health levels and SES gradients should not be merely contrasted with national-level estimates in Mexico while testing for selectivity or gradient importation. Given the size of the Mexican migrant population in the United States, surveys north of the border should attempt to collect some origin information from migrants in order to better understand their health profiles and to put selectivity and acculturation in proper context.

Notwithstanding these findings, we also found evidence consistent with the notion that the migration process –or at the very least, artifacts associated with it- may *weaken* SES-health gradients. In most instances where the pre-migration SES-health gradients of those who emigrated in the inter-wave period were significantly different from those of non-migrants they were in fact *sharper*, not flatter, than those of non-migrants evincing in some cases differences across regions of different migratory traditions. Education gradients in height were sharper for migrants than non-migrants across all regions (in the same magnitude); gradients in unfavorable health were sharper for migrants than non-migrants in the Northern and Central regions (in the latter, they were also reversed, something we cannot quite explain). These results are particularly informative when compared to the SES-health gradients of migrants interviewed in the U.S., which were generally weaker than those of non-migrants and –thus- of recent migrants.

Although the number of inter-wave migrants in the MxFLS sample is relatively small, we believe low statistical power is not driving our conclusions. We attempted estimating parsimonious models (which draw strength from the large non-migrant sample) to avoid confounding lack of statistical power with non-significant differences in the SES-health gradients of migrants and non-migrants. In addition, we looked at these non-significant effects and assumed they all estimated with sufficient precision (i.e. we assumed they were all significant, allowing for SES-health gradients to vary by migrant status and within geographies when appropriate). With the notable exception of rural areas, where migrant gradients are indeed slightly weaker than non-migrant gradients, in all other instances migrant gradients were slightly sharper than those estimated for non-migrants. Hence, our main conclusions do not seem to be driven by lack of statistical power. Moreover, although urban (and, especially, larger metropolitan areas) are under-represented in the flow, there is no evidence that urban migrants are more likely to return than rural migrants (if anything, it may be the contrary, see Lindstrom 1996). As such, the levels and weak gradients of migrants would not be a simple story of importation from rural Mexico.

As we constrained the effects of education on health to be linear, which –at worst- assume the effect of education on health is the same for all education levels or –at best- serves as a first-moment summary of these gradients, our results could be ignoring, if not masking, substantial variation in health across schooling levels as these gradients may not be strictly linear (Buttenheim et al. 2009; Kimbro et al. 2008; Palloni et al. 2008). When we performed additional analyses (with the MxFLS sample only) using education as a categorical indicator (dividing people by the middle of the Mexican schooling distribution, 0-8 and 9+ years), our results did not change substantially. In our next revision of the paper, we will perform additional tests of non-linearity with both samples.

We recognize we cannot completely rule out some potential artifacts that could also result in weaker gradients for migrants interviewed in the U.S. from those of (non-migrants and) migrants as measured previous to their emigration in Mexico. First, systematic biases in self-reported height and weight by level of education may be flattening the gradients if individuals with lower educational attainment were over-/under-reporting their height/weight more than those with higher schooling (Osuna-Ramirez et al. 2006).[11,12] Although we cannot directly measure the extent of these biases (if any), we do not believe they are the main drivers of our

[11] Note that we have 'corrected' the levels for over-reporting in our estimates but we have not attempted any systematic adjustment by educational attainment or any other variable for that matter.

[12] Although these biases could be simply being imported by migrants (i.e. non-migrants in Mexico would exhibit similar systematic over-reporting by education levels) they could be exacerbated by acculturation processes if higher acculturation –believed to increase with educational attainment- implied more accurate height reporting.

results for three reasons. First, their magnitude would need to be rather sizable to explain the flatter SES-height and SES-obesity gradients of NHIS migrants.[13] Second, we observed relatively similar patterns in unfavorable health reports, which are not subject to these differential biases (though the definitions in MxFLS and NHIS vary). And third, other studies have indeed found flatter SES-gradients in foreign-born Mexicans in the U.S. in directly-measured health indicators, most notably measured obesity (Palloni et al. 2008) and mortality (Turra and Goldman 2007).

Social gradients in health could be weakened through the migration process if (negative) acculturation operates selectively by education level (also see Discussion in Goldman et al. 2006). As acculturation is associated with changing (i.e. rising) BMI levels (Antecol and Bedard 2006), it is difficult to conceive that these changes would be equal across SES groups, especially as U.S.-born Hispanics indeed have steeper SES-health gradients than the foreign-born (Kimbro et al. 2008). The findings of studies looking at Mexican-American neighborhood concentration, which is associated with better health, seem to be consistent with this notion given that individuals with lower educational attainment are more likely to live in ethnically-concentrated neighborhoods (Eschbach et al. 2004; Lee and Ferraro 2007). Future research should look at the potential mediating effect of social gradients in acculturation in the health process.[14]

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[13] For instance, the over-reporting bias would need to be around 5 cm (roughly 2 inches) higher for those with lower attainment relative to those with higher levels of schooling to revert gradients to be as sharp as those of migrants as measured previous to their emigration. While we cannot rule this out, this figure seems somewhat implausible and, as such, biases in self-reported measures are probably not the sole driver of these differences.

[14] In the next version of this draft, we will attempt to parse out the potential effects of negative acculturation (which seems to increase with educational attainment), further distinguishing between the SES-health gradients of recently-arrived migrants in the NHIS sample with those of more experienced migrants. If the gradients of recent migrants in the NHIS (who arrived to the country in the mid-late 1990s) are still weaker than those observed in MxFLS data, we might also need to consider the possibility of cohort differences in SES-health gradients and –although less common- return migration or survey coverage biases.

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	Mexican Family Life Survey 2002, Men 15-49						U.S. NHIS 2000 - 2005, Men 18-49			
	All		Non-migrants		2002-2005 Migrants		Foreign-born Mexicans		U.S.-born NH Whites	
	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
Age	29.7	(0.2)	30.0	(0.2)	23.0	(0.6)	32.4	(0.2)	34.8	(0.1)
Height	166	(0.2)	166	(0.2)	165	(0.6)	171	(0.2)	179	(0.1)
BMI levels										
Underweight (BMI<18.5 kg/m^2)	0.024	(0.002)	0.024	(0.003)	0.023	(0.009)	0.006	(0.002)	0.009	(0.001)
Normal weight (18.5<=BMI<25 kg/m^2)	0.409	(0.010)	0.399	(0.010)	0.622	(0.039)	0.286	(0.009)	0.335	(0.004)
Overweight (25<=BMI<30 kg/m2)	0.393	(0.010)	0.400	(0.011)	0.250	(0.035)	0.447	(0.010)	0.424	(0.004)
Obese (BMI>=30 kg/m2)	0.174	(0.008)	0.178	(0.008)	0.105	(0.025)	0.262	(0.010)	0.232	(0.004)
Self-reported global health										
Very Good (MEX) / Excelent (U.S.)	0.058	(0.005)	0.058	(0.005)	0.044	(0.018)	0.302	(0.012)	0.414	(0.004)
Good (MEX) / Very Good (U.S.)	0.538	(0.010)	0.540	(0.011)	0.495	(0.040)	0.324	(0.012)	0.353	(0.004)
Regular (MEX) / Good (U.S.)	0.386	(0.010)	0.382	(0.011)	0.448	(0.040)	0.314	(0.010)	0.191	(0.003)
Bad (MEX) / Fair (U.S.)	0.018	(0.003)	0.019	(0.003)	0.011	(0.006)	0.060	(0.005)	0.043	(0.002)
Very Bad (MEX) / Poor (U.S.)	0.000	(0.000)	0.000	(0.000)	0.001	(0.001)	0.007	(0.002)	0.012	(0.001)
Unfavorable health condition (i.e. lower 3 categories)	0.404	(0.006)	0.402	(0.006)	0.460	(0.023)	0.381	(0.007)	0.246	(0.002)
Mean years of education	8.5	(0.1)	8.5	(0.1)	7.6	(0.2)	8.4	(0.1)	14.4	(0.0)
Urban residence in 2002	0.759	(0.007)	0.765	(0.007)	0.629	(0.035)	N/A		N/A	
Region of residence in 2002										
Northern	0.216	(0.007)	0.221	(0.007)	0.105	(0.018)	N/A		N/A	
Central	0.215	(0.008)	0.208	(0.008)	0.354	(0.037)	N/A		N/A	
Southern	0.569	(0.010)	0.570	(0.010)	0.541	(0.039)	N/A		N/A	
N	4,865		4,625		240		2,979		20,434	

Table 1. Means of Descriptive Statistics Used in Analysis

	A. Deviations from mean height		B. Obese (BMI $\geq$ 30 kg/m^2)		C. *Unfavorable* self-reported health$^+$	
2002 MxFLS estimates:	Predicted values along inter-quartile range	Slope of gradient	Predicted values along inter-quartile range	Slope of gradient	Predicted values along inter-quartile range	Slope of gradient
National*	(-1.83, 0.26)	0.52	(0.237, 0.237)	0.000	(0.539, 0.43)	-0.027
U.S. Migrant gradients$^{*, **}$	Same as non-migrants	N/A	Same as non-migrants	N/A	(0.71, 0.721)	0.003
Urban areas*	(-1.8, 0.26)	0.52	(0.288, 0.281)	-0.002	(0.488, 0.375)	-0.028
U.S. Migrant gradients$^{*, **}$	(-4.06, 0.58)	1.16	Same as non-migrants	N/A	Same as non-migrants	N/A
Rural areas*	(-2.75, -1.34)	0.35	(0.188, 0.227)	0.010	(0.595, 0.552)	-0.011
U.S. Migrant gradients$^{*, **}$	Same as non-migrants	N/A	Same as non-migrants	N/A	Same as non-migrants	N/A

Notes:
Estimates of height and weight are self-reported in NHIS, measured in MxFLS
$^+$ Defined as very bad/bad/regular (vs. very good/good).
* Predicted values calculated for people with 6 and 10 years of education.
**Gradients only shown if significantly different from those of non-migrants (in same geography).

Table 2. Range of predicted values in health indicators along the inter-quartile range of educational distribution by inter-wave U.S. migration status and urban-rural residence at baseline (men 15-49, MxFLS)

	A. Deviations from mean height		B. Obese (BMI $\geq$ 30 kg/m^2)		C. *Unfavorable* self-reported health[+]	
2002 MxFLS estimates:	Predicted values along inter-quartile range	Slope of gradient	Predicted values along inter-quartile range	Slope of gradient	Predicted values along inter-quartile range	Slope of gradient
National[*]	(-1.83, 0.26)	0.52	(0.237, 0.237)	0.000	(0.539, 0.43)	-0.027
U.S. Migrant gradients[*, **]	Same as non-migrants	N/A	Same as non-migrants	N/A	(0.71, 0.721)	0.003
Central region[*]	(1.46, 3.26)	0.45	(0.221, 0.221)	0.000	(0.541, 0.441)	-0.025
U.S. Migrant gradients[*, **]	(0.02, 3.25)	0.81	Same as non-migrants	N/A	(0.47, 0.661)	0.048
Northern region[*]	(3.22, 5.01)	0.45	(0.221, 0.221)	0.000	(0.374, 0.286)	-0.022
U.S. Migrant gradients[*, **]	(1.77, 5.01)	0.81	Same as non-migrants	N/A	(0.774, 0.384)	-0.098
Southern region[*]	(-4.38, -1.93)	0.61	(0.221, 0.221)	0.000	(0.541, 0.441)	-0.025
U.S. Migrant gradients[*, **]	(-5.83, -1.93)	0.98	Same as non-migrants	N/A	(0.668, 0.621)	-0.012

Notes:

Estimates of height and weight are self-reported in NHIS, measured in MxFLS

[+] Defined as very bad/bad/regular (vs. very good/good).

[*] Predicted values calculated for people with 6 and 10 years of education.

[**] Gradients only shown if significantly different from those of non-migrants (in same geography).

Table 3. Range of predicted values in health indicators along the inter-quartile range of educational distribution by inter-wave U.S. migration status and region of residence at baseline (men 15-49, MxFLS)

	A. Deviations from mean height		B. Obese (BMI $\geq 30\ kg/m^2$)		C. *Unfavorable* self-reported health[+]	
2002 MxFLS estimates:	Predicted values along inter-quartile range	Slope of gradient	Predicted values along inter-quartile range	Slope of gradient	Predicted values along inter-quartile range	Slope of gradient
National[*]	(-1.83, 0.26)	0.52	(0.237, 0.237)	0.000	(0.539, 0.43)	-0.027
U.S. Migrant gradients[*, **]	Same as non-migrants	N/A	Same as non-migrants	N/A	(0.71, 0.721)	0.003
2000-2005 NHIS estimates:						
U.S.-born NH Whites[***]	(-0.04, 1.11)	0.29	(0.221, 0.162)	-0.015	(0.285, 0.121)	-0.041
Foreign-born Mexicans[*, ++]	(2.05, 3.2)	0.29	(0.207, 0.204)	-0.001	(0.382, 0.334)	-0.012

Notes:
Estimates of height and weight are self-reported in NHIS, measured in MxFLS
[*] Predicted values calculated for people with 12 and 16 years of education.
[**] Gradients only shown if significantly different from those of non-migrants (in same geography).
[***] Predicted values calculated for people with 6 and 10 years of education.
[+] For MxFLS estimates, defined as very bad/bad/regular (vs. very good/good). For NHIS estimates, defined as fair/poor (vs. excellent/very good/good).
[++] Height and obesity *levels* corrected with simple linear transformations for over- and under-estimation respectively (see Note INSERT in text for explanation).

Table 4. Range of predicted values in health indicators along the educational distribution by inter-wave U.S. migration status and selected place of residence at baseline in Mexico (men 15-49, MxFLS), and by nativity/ethnicity group in the U.S. (men 18-49, NHIS)

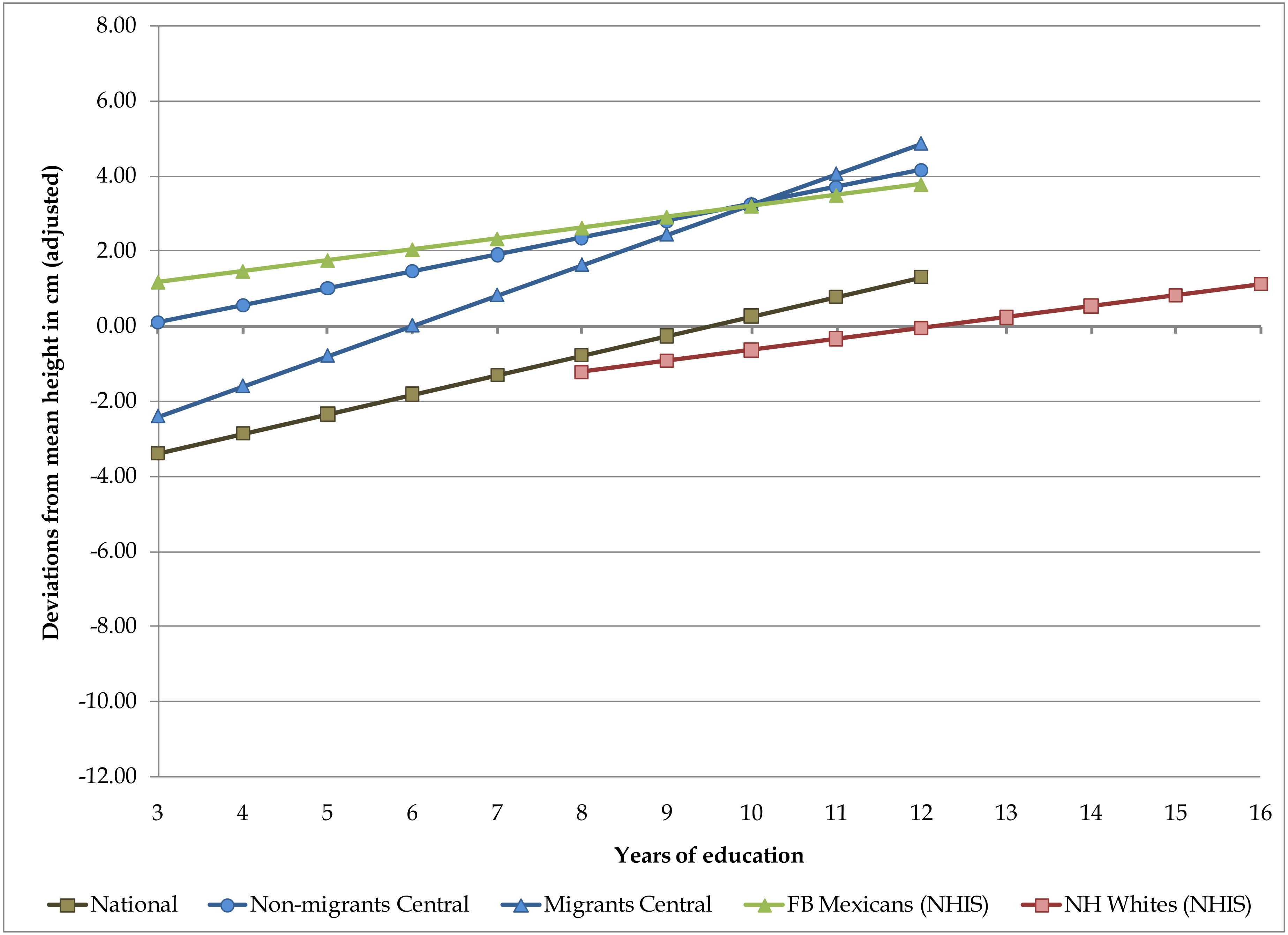

Figure 1. Predicted gradients in deviations from mean height for selected migration/geographic/ethnic groups

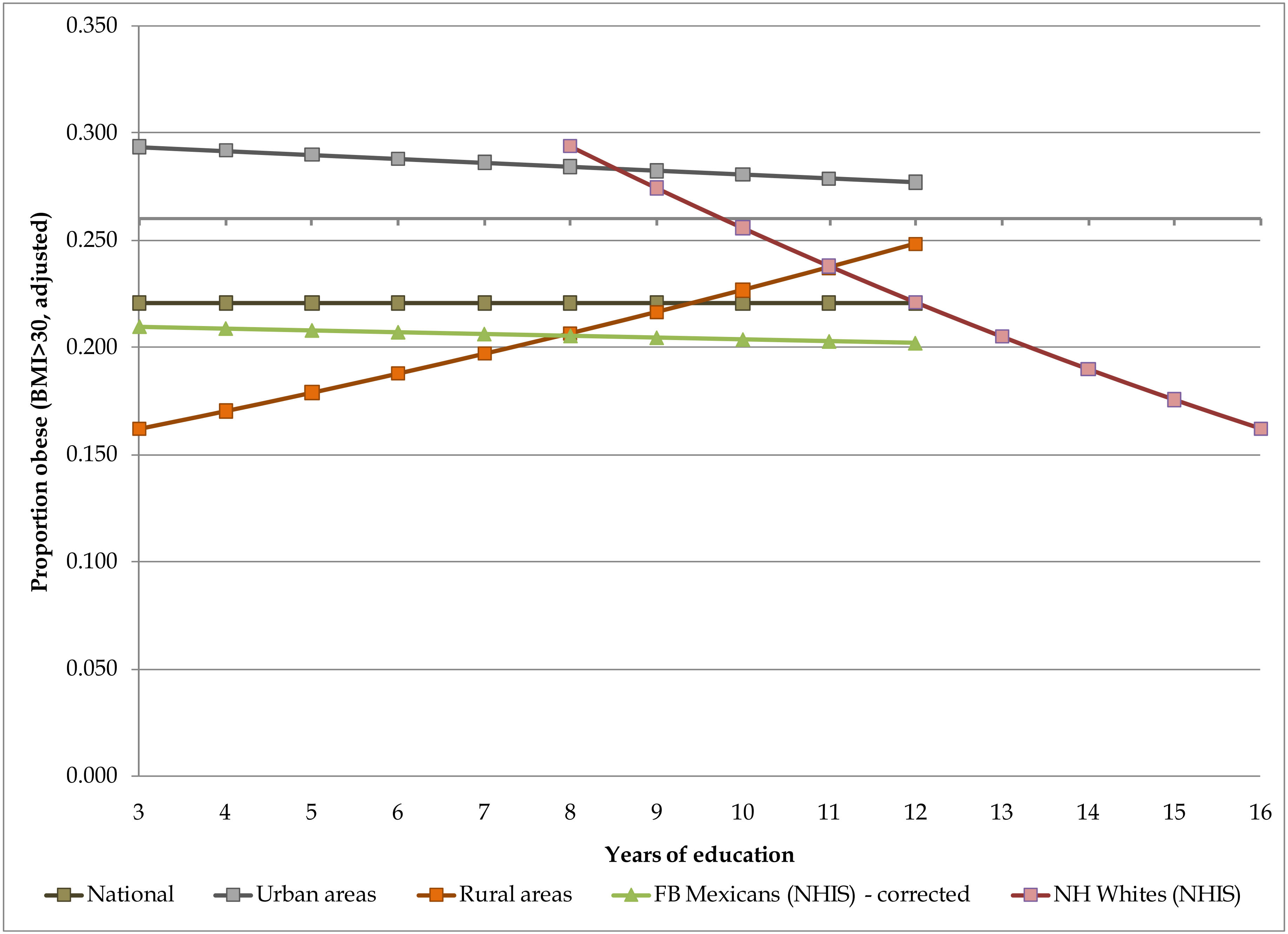

Figure 2. Predicted gradients in obesity for selected migration/geographic/ethnic groups

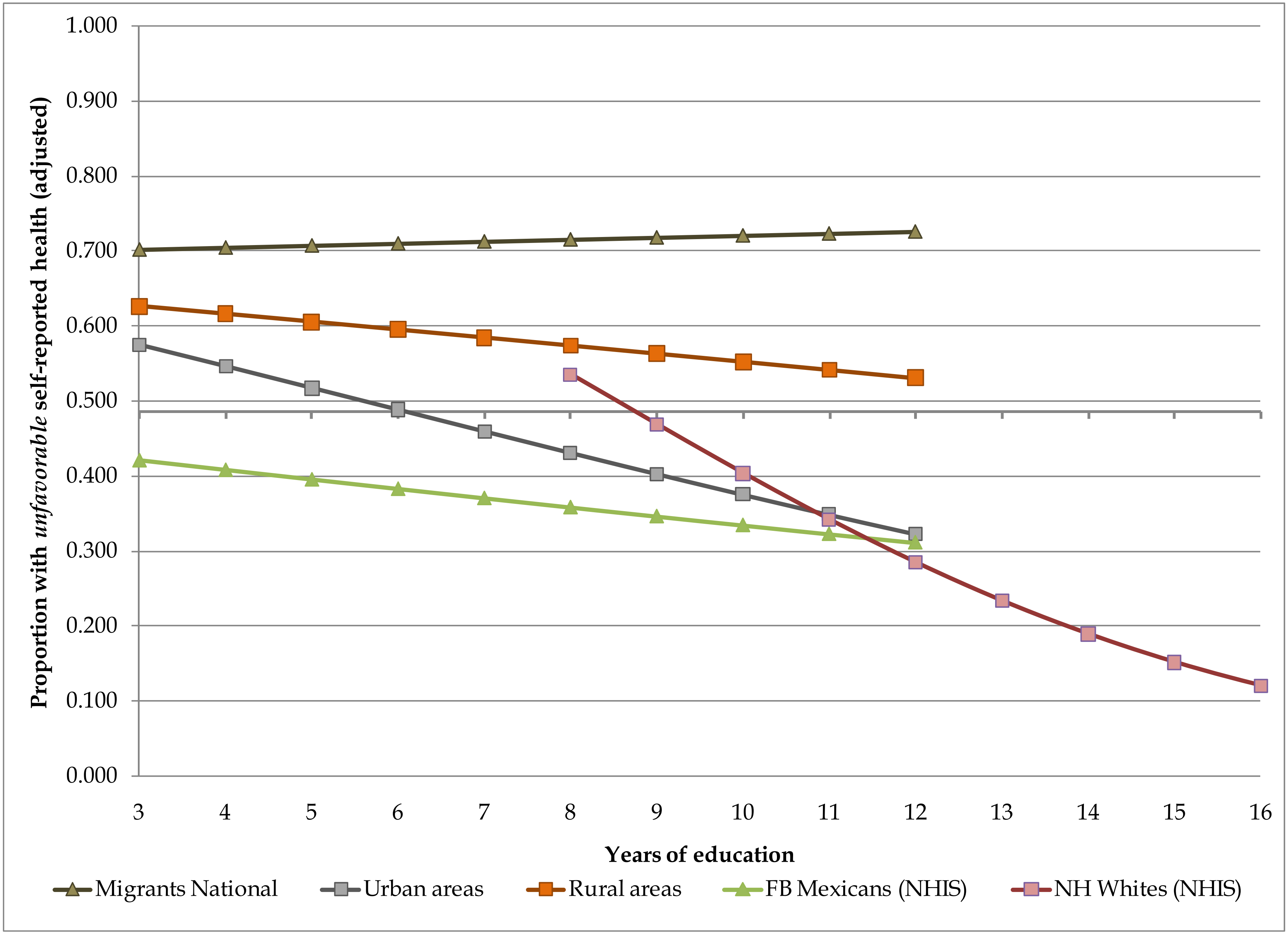

Figure 3. Predicted gradients in unfavorable health reports for selected migration/geographic/ethnic groups

	I		II		III	
	β	(S.E.)	β	(S.E.)	β	(S.E.)
Intercept	-4.952	(0.353) ***	-4.875	(0.410) ***	-1.235	(0.685) +
Age (centered on mean)	-0.107	(0.034) **	-0.107	(0.034) **	-0.103	(0.032) **
Age-square	-0.004	(0.002) *	-0.004	(0.002) *	-0.004	(0.002) **
Education (yrs.)	0.521	(0.037) ***	0.354	(0.054) ***	0.450	(0.086) ***
U.S. migrant in 2002-2005	-1.383	(1.616)	1.728	(1.486)	-3.602	(1.787) *
U.S. migrant * Education	0.115	(0.193)	-0.209	(0.208)	0.359	(0.214) +
Urban (REF = Rural)			0.235	(0.625)		
Region of residence in 2002 (REF=Central)						
Northern					1.753	(0.853) *
Southern					-6.833	(0.807) ***
Education * Urban			0.159	(0.071) *		
U.S. migrant * Urban			-6.152	(3.133) *		
U.S. migrant * Education * Urban			0.648	(0.370) +		
Education * Northern					-0.158	(0.102)
U.S. migrant * Northern					2.514	(3.635)
U.S. migrant * Education * Northern					-0.082	(0.444)
Education * Southern					0.165	(0.099) +
U.S. migrant * Southern					2.606	(2.926)
U.S. migrant * Education * Southern					-0.312	(0.341)
N	4,865		4,865		4,865	
Pseudo r-squared	0.085		0.092		0.227	
Log-likelihood	N/A		N/A		N/A	

Notes: $^{***}p<0.001$ $^{**}p < 0.01$ $^{*}p < 0.05$ $^{+}p < 0.10$

Appendix 1a - OLS regression predicting deviations from the mean height for men 15-49, MxFLS 2002-2005

	I		II		III	
	β	(S.E.)	β	(S.E.)	β	(S.E.)
Intercept	-1.172	(0.127) ***	-1.821	(0.167) ***	-1.262	(0.224) ***
Age (centered on mean)	0.058	(0.011) ***	0.059	(0.011) ***	0.059	(0.011) ***
Age-square	0.000	(0.001)	0.000	(0.001)	0.000	(0.001)
Education (yrs.)	0.016	(0.014)	0.059	(0.022) **	0.021	(0.026)
U.S. migrant in 2002-2005	-0.066	(1.022)	0.056	(0.804)	-0.677	(0.878)
U.S. migrant * Education	-0.010	(0.133)	-0.056	(0.112)	0.005	(0.126)
Urban (REF = Rural)			0.970	(0.231) ***		
Region of residence in 2002 (REF=Central)						
Northern					0.414	(0.298)
Southern					0.032	(0.285)
Education * Urban			-0.068	(0.027) *		
U.S. migrant * Urban			0.314	(1.733)		
U.S. migrant * Education * Urban			0.009	(0.220)		
Education * Northern					-0.031	(0.033)
U.S. migrant * Northern					1.088	(1.279)
U.S. migrant * Education * Northern					-0.030	(0.162)
Education * Southern					-0.002	(0.033)
U.S. migrant * Southern					1.118	(1.709)
U.S. migrant * Education * Southern					-0.056	(0.230)
N	4,865		4,865		4,865	
Pseudo r-squared	0.058		0.066		0.060	
Log-likelihood	-2,120		-2,103		-2,117	

Notes: $^{***}p<0.001$ $^{**}p < 0.01$ $^{*}p < 0.05$ $^{+}p < 0.10$

Appendix 1b - Logistic regression predicting obesity for men 15-49, MxFLS 2002-2005

	I		II		III	
	β	(S.E.)	β	(S.E.)	β	(S.E.)
Intercept	0.818	(0.113) ***	0.648	(0.130) ***	0.766	(0.199) ***
Age (centered on mean)	0.036	(0.010) ***	0.036	(0.010) ***	0.039	(0.011) ***
Age-square	0.000	(0.001)	0.000	(0.001)	0.001	(0.001)
Education (yrs.)	-0.110	(0.012) ***	-0.044	(0.017) **	-0.100	(0.024) ***
U.S. migrant in 2002-2005	-0.576	(0.454)	-0.205	(0.529)	-2.071	(0.744) **
U.S. migrant * Education	0.123	(0.056) *	0.104	(0.074)	0.298	(0.099) **
Urban (REF = Rural)			0.162	(0.200)		
Region of residence in 2002 (REF=Central)						
Northern					-0.679	(0.272) *
Southern					0.272	(0.259)
Education * Urban			-0.072	(0.023) **		
U.S. migrant * Urban			-0.961	(0.908)		
U.S. migrant * Education * Urban			0.067	(0.111)		
Education * Northern					0.002	(0.031)
U.S. migrant * Northern					5.773	(1.473) ***
U.S. migrant * Education * Northern					-0.624	(0.176) ***
Education * Southern					-0.009	(0.030)
U.S. migrant * Southern					2.309	(1.173) *
U.S. migrant * Education * Southern					-0.248	(0.145) +
N	4,865		4,865		4,865	
Pseudo r-squared	0.053		0.059		0.069	
Log-likelihood	-3,109		-3,089		-3,055	

Notes: ***p<0.001 **p < 0.01 *p < 0.05 +p < 0.10

Appendix 1c - Logistic regression predicting unfavorable health for men 15-49, MxFLS 2002-2005

	A. Deviations from mean height			B. Self-reported obesity			C. Self-reported poor/fair health		
	β	(S.E.)		β	(S.E.)		β	(S.E.)	
Intercept	-3.5094	(0.345)	***	-0.1127	(0.004)	***	2.2642	(0.005)	***
Age (centered on mean)	-0.0550	(0.008)	***	0.0484	(0.000)	***	0.0421	(0.000)	***
Age-square	0.0014	(0.001)	*	-0.0018	(0.000)	***	-0.0003	(0.000)	***
Education (yrs.)	0.2887	(0.023)	***	-0.0955	(0.000)	***	-0.2653	(0.000)	***
Ethnicity/Nativity									
Foreign-born Mexican (REF = U.S.-born NH White)	3.8226	(0.548)	***	-1.3178	(0.007)	***	-2.4267	(0.007)	***
Foreign-born Mexican * Education (yrs.)	-0.0302	(0.051)		0.0904	(0.001)	***	0.2125	(0.001)	***
N	16,074			16,074			16,074		
Log-likelihood	-53,909			-6,257,184			-6,438,059		

Notes: ***p<0.001 **p < 0.01 *p < 0.05 +p < 0.10

Appendix 2 - (a) OLS and (b-d) logistic regressions predicting various health outcomes for U.S.-born NH White and Mexican-born men 18-49, NHIS 2000-2005