



HHS Public Access

Author manuscript

Int Migr Rev. Author manuscript; available in PMC 2020 January 02.

Published in final edited form as:

Int Migr Rev. 2019 ; 53(2): 571–601. doi:10.1177/0197918318775924.

Undocumented and Unwell: Legal Status and Health among Mexican Migrants

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In efforts to combat undocumented immigration over the past thirty years, the U.S. government has militarized the border, heightened the internal surveillance of undocumented migrants, and assembled a complex legal infrastructure to curtail their access to rights and benefits (Massey, Durand and Malone 2002; Nevins 2010). These punitive measures have raised questions about their influence on the wellbeing of undocumented migrants. Scholars have drawn attention to the traumas and abuses faced by undocumented immigrants across several dimensions, including at the border (Cornelius 2001; Eschbach et al. 1999; Nevins 2010); in the labor market (Massey and Gentsch 2014; Passel and Cohn 2015; Rivera-Batiz 1999); and in contact with the authorities (Menjivar and Abrego 2006; Hagan, Rodriguez and Castro 2011; Phillips, Hagan and Rodriguez 2006). Research has also detailed undocumented immigrants' exclusion from mainstream institutions, including difficulties accessing healthcare Cavazos-Rehg et al. 2007; Kullgren 2003; Sullivan and Rehm 2005). Owing to a scarcity of reliable data, however, less is known about their actual health outcomes.

This study examines the consequences of legal status for the health of Mexicans who have migrated to and returned from the U.S. Returned migrants, the focus of this study, make up a significant, albeit selective, share of the broader Mexican migrant population. Prior to the escalation of border enforcement in the late 1980s, undocumented migration was overwhelmingly seasonal and circular. Between 1965 and 1985, an estimated 86% of undocumented entries were offset by departures (Massey and Singer 1995). Increased border enforcement in the 1990s and 2000s, however, reduced return migration to zero (Massey, Durand, and Pren 2015), and net migration turned sharply negative during the Great Recession of 2007–2009, during which some one million immigrants left the country. Since 2009, net migration from Mexico has been zero or negative, with few migrants either departing for the U.S. or returning home (Chort & de la Rupelle 2016; Gonzalez-Barrera 2015).

We use data from the Mexican Migration Project (MMP), which provides unique insight into the health trajectories of Mexican migrants, both documented and undocumented, as well as non-migrants. We build upon earlier research on migrant health, including Ullman, Goldman and Massey (2011), who used MMP data to compare the early-life and adult health of returned Mexican migrants and their non-migrant counterparts. They found that migrants

DECLARATION OF CONFLICTING INTERESTS

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

had better early-life health compared to non-migrants, but reported a greater health decline after returning from the U.S. The authors, however, did not take into account legal status, cumulative migratory experience, or the total number of U.S. trips, factors which we explicitly examine here.

Our analytical strategy comprises two parts: Before being able to make claims about the impacts of migration and legal status on health, it is necessary to first account for possible health selection into both documented or undocumented migration and return migration. We address this issue by estimating an event history model to determine whether self-reported early-life health is associated with the likelihood of becoming a documented or undocumented migrant in the first place. We then estimate a series of cross-sectional models to investigate whether health reports are influenced by health selection into return migration, among other potential sources of measurement bias. After finding evidence that documented and undocumented migrants are equally positively selected with regards to early-life health into taking a first trip to the U.S. and finding little evidence for the return migration of sicker migrants, we then investigate the short- and long-term health effects of migration and legal status for returned migrants compared to non-migrants. We do so by estimating a series of cross-sectional models to track changes in self-reported health across three key periods: 1) from just prior to the first migration to just after the latest return to Mexico (to measure *immediate* changes in health for returned migrants); 2) from just after the latest return to Mexico to the survey date (to measure *continued* changes in health for returned migrants); and 3) from early life at age 14 to the survey date (to measure *overall* changes in health, comparing returned migrants and non-migrants).

UNDOCUMENTED STATUS AND HEALTH

Undocumented status potentially undermines health in two ways: by creating legal barriers to the receipt of adequate healthcare and by exposing migrants to greater health risks. With respect to legal barriers, the U.S. government prohibits access to public social services, health insurance, and non-emergency medical care not only for undocumented immigrants but also under certain circumstances, even for legal residents (Kullgren 2003; Ortega et al. 2007; Wallace et al. 2013). Undocumented migrants are ineligible for government-sponsored health insurance and tax credits under the 2010 Affordable Care Act, which maintains, and in some respects raises, the barriers to medical care first institutionalized with the 1996 Personal Responsibility and Work Opportunity Act (Mulligan and Castañeda 2017). Although undocumented migrants are free to purchase health insurance from private vendors, the cost is prohibitive for most. Furthermore, fears of apprehension and deportation discourage contact with healthcare providers and insurance companies. Surveys, for example, show that undocumented migrants exhibit lower rates of insurance coverage, fewer physician visits, and less access to usual care providers than documented migrants or citizens (Bustamante et al. 2010; Chavez 2012; Gelatt 2016; Ortega et al. 2007).

In addition to creating formal barriers to healthcare, unauthorized status undermines health by differentially channeling immigrants into hostile contexts of reception, particularly in the labor market (Portes and Rumbaut 2006). The 1986 Immigration Reform and Control Act drove the practice of undocumented hiring underground, relegating the undocumented

workforce to jobs with higher risks of injury, disability, and psychological trauma (Cho and Smith 2013; Hall and Greenman 2015; Orrenius and Zavodny 2009; Passel and Cohn 2015; Phillips and Massey 1999; Walter, Bourgois, and Loinaz 2004). With no legal recourse to unfair treatment, undocumented workers are uniquely exposed to employment abuses (Fussell 2011; Bernhardt, Spiller, and Polson 2013; Lee 2014). They earn significantly lower wages than their legal counterparts, especially in sectors where undocumented workers are prevalent (Hall, Greenman, and Farkas 2010; Massey and Gentsch 2014; Rivera-Batiz, 1999).

Illegality also pushes immigrants into segregated, poorly resourced, and dangerous neighborhoods. Hall and Stringfield (2014), for instance, have shown that a greater prevalence of undocumented migrants in new destination areas predicts higher levels of Mexican segregation. Across U.S. metropolitan areas more generally, Hispanic segregation is strongly predicted by animus against undocumented migrants (Rugh and Massey 2014).

Lastly, the everyday challenges of managing the stigmatization and risk of living without documents put considerable strain on mental health. Qualitative studies have illustrated how the specter of deportation provokes fear, uncertainty, helplessness, stress, marginality, and a diminished sense of self-worth among undocumented migrants (Chavez 2012; Coutin 2000; De Genova 2004; Menjivar and Kanstroom 2013). The repercussions of mass deportation reverberate through family and social networks, separating and traumatizing households and communities (Brabeck and Xu 2012; Dreby 2012; Menjivar 2006). Taken together, these multiple forms of exclusion and risk suggest considerable potential for undocumented immigrants to display negative health outcomes.

IMPLICATIONS OF MIGRANT HEALTH SELECTION

Several methodological issues complicate the task of validating the connection between undocumented status and poor health using survey data, the first of which is the likely positive selection of people into migration on the basis of health. The “healthy immigrant effect” is a common explanation for the paradox that immigrants—particularly those of Latino, and especially Mexican, origin—display lower mortality and morbidity rates than non-Hispanic Whites despite lower levels of education and socioeconomic attainment. While early research found limited or no support for the healthy migrant effect (Abraido-Lanza et al. 1999; Akresh & Frank 2008; Rubalcava et al. 2008), more recent work has detected a positive association between good health and likelihood of U.S. migration (Martinez, Aguayo-Tellez, and Range-Gonzalez 2015; Riosmena, Kuhn, and Jochem 2017; Riosmena, Wong, and Palloni 2013; Ullman, Goldman and, Massey 2011). Using the MMP’s life history data, we not only account for potential health selection into migration but also assess whether this selection differs by legal status.

A second methodological issue is potential selectivity into return migration. The “salmon bias” hypothesis, another explanation for the Hispanic mortality paradox, posits that unhealthy migrants no longer able to work are compelled to return home to receive medical treatment, seek family support, and perhaps die. Some previous research does indeed link poor health with return migration (Arenas et al. 2015; Palloni and Arias 2004; Riosmena,

Wong and Palloni 2013; Turra and Elo 2008; Ullman, Goldman, and Massey 2011). If the salmon bias were to hold true for our sample, this could result in an overestimation of any deleterious effects of migration and legal status that we might find on the health of Mexicans who returned home. We explore potential health selection in return migration, along with other potential sources of measurement bias, using cross-sectional MMP data.

Lastly, migrants who participated in the MMP are those who survived the migration experience and lived to the survey date, creating another source of potential selection bias. If we assume that the sickest migrants die earlier than others, either in the U.S. or at home, then returned migrants' estimated health may be biased upwards, which is in a conservative direction with respect to our hypotheses.

DATA AND METHODS

Despite these issues, MMP data are well-suited in other ways to investigating connections among migratory experience, documentation, and health over the life course, since they allow for the construction of health and mobility trajectories for both legal and unauthorized migrants, as well as for persons who never left Mexico. Beginning with four community surveys in 1982, the MMP has since 1987 annually surveyed representative samples of three to five Mexican communities and their U.S. branch settlements. Using semi-structured interviews, field workers gather detailed information on the characteristics and behaviors of households and their members, including data about each person's first and last trips to the U.S., and aggregate information about the community itself. While the survey is cross-sectional, interviewers compile yearly life histories of household heads, which include complete international migration and border-crossing histories.

Questions about the health of household heads were incorporated into the MMP in 2007. Household heads' health is retrospectively reported for the following points in their lives, which we use to construct the dependent variables for this analysis: early life at age 14; just prior to their first U.S. trip (for migrants); just after their last trip to the U.S. (for returned migrants); and at the time of the survey (including both migrants and non-migrants). At each time point, health is rated as either "poor," "regular," "good," or "excellent." Owing to small frequencies, we collapse "poor" and "regular" responses into a single category henceforth labeled "poor," producing a three-level ordinal rating for quality of health.

Before proceeding with our analysis, we flag three potential sources of measurement error that come with using the MMP's retrospective health reports, the first being recall bias due to memory lapses. Several investigations into self-rated health's merits have concluded that, despite its subjective basis, it is a remarkably accurate predictor of mortality (Bound 1989; DeSalvo et al. 2005; Jylha 2009; Idler and Benyamini 1997; Mossey and Shapiro 1982; Schnittker and Bacak 2014). Retrospective evaluations, however, are vulnerable to recall error—especially among the elderly and those who migrated or returned well before the survey date (Schuman and Presser 1981). Furthermore, perceptions of past health may be endogenous to current health status.

The second potential source of error arises from relying on estimations of the household head's health by another household member—who, in the MMP, is typically the spouse when the household head is not available to be interviewed. This is the case for 54.3% of the sample. Upon approaching each household, enumerators inquire as to who is the household head, with the goal of soliciting him or her to respond to the MMP questionnaire. For instances in which the household head is not available, another household member is asked to act as the informant. It is usually the wife within the household who is administered the survey when the identified head is not available, since the majority (85.1%) of households in the sample are male-headed and since males are more likely to be outside the house during the daytime. Ayalon and Covinsky (2010), using nationally representative longitudinal data of elderly married couples, found that spouse-rated health is just as strong a predictor of mortality as self-rated health. However, spouses could have limited purview of their partners' health conditions in the past, particularly for couples with shorter common histories or if significant time was spent apart due to migration.

Third, migrants and non-migrants may be evaluating their health vis-à-vis different reference populations, compromising the comparability of their health ratings. Informants with migration experience may measure health in relation to other U.S. migrants or native-born Americans, whereas non-migrant informants would presumably be more likely to use fellow Mexicans as their reference group. Regrettably, data limitations prevent us from conclusively determining systematic differences in standards along which health is compared or other considerations that go into the subjective process of reporting on one's own or another person's quality of health.

We explore how recall length and informant status may affect health ratings in a series of multinomial logistic regressions described below. To preview our findings, we find that recall length and informant status do appear to influence health reports, and thus control for these factors in our study's main analyses.

Our final sample consists of 8,067 household heads from 46 Mexican communities surveyed between 2007 and 2016 who migrated at the age of 15 or older between 1940 and 2015. These 8,067 household heads contribute 248,929 person-years of information to the event history file. Of these, 228,290 were contributed by 6,235 non-migrants observed from age 15 to the survey date. An additional 16,790 person-years were contributed by 1,542 undocumented migrants and 3,849 by 290 documented migrants, both observed from age 15 up to the year of their first U.S. trip.¹ Our cross-sectional file contains 6,235 non-migrants, 249 returned documented migrants, 1,283 returned undocumented migrants, 41 documented migrants still in the U.S., and 259 undocumented migrants still in the U.S. After investigating health selection and before analyzing the health effects of migration and legal status, we restrict our sample to non-migrants and migrants who had returned to Mexico by the survey date, thus excluding the 300 migrants still in the U.S. at the survey date.

¹25 household heads reported initially migrating with temporary documents (such as an agricultural worker or tourist visa) but then took their last trip to the U.S. without valid documents. Given that they eventually became undocumented, with the possibility that these respondents could also have overstayed their visas during their initial trip, we coded their first trip as undocumented in the event history file, thereby comparing migrants who ultimately

Our analytical strategy comprises the following parts, the first two questions dealing with health selection and the remaining questions concerning the short- and long-term consequences of migration and legal status for health: 1) *Investigating possible healthy migrant effects*: Among Mexicans, is early life health associated with initial selection into documented or undocumented migration to the U.S.? 2) *Investigating possible salmon bias*: Does health after migration predict later selection into returning to Mexico? 3) *Immediate health effects of migration and legal status*: Among returned migrants, is undocumented status associated with an increase in the likelihood of reporting poor or worsened health from just before the first U.S. trip to just after the last U.S. trip? 4) *Continuing health effects of legal status*: Among returned migrants, is undocumented status associated with an increase in the likelihood of reporting poor or worsened health from just after the last U.S. trip to the survey date? 4) *Overall changes in health, comparing returned migrants and non-migrants*: Holding early-life health constant, is prior documented or undocumented migration experience associated with a greater likelihood of reporting worse health at the survey date compared to non-migrants?

To determine the degree to which respondents are selected into U.S. migration on the basis of early-life health, we create a retrospective event history file. Drawing from the MMP life history module, we construct a longitudinal dataset following each household head year by year from age 15 to the year of the first U.S. trip or to the survey year if no trips were reported. We estimate a multinomial logistic regression equation to predict whether in any given person-year a household head departed for the U.S. with valid documents, without valid documents, or not at all, given self-reported health at age 14 and other predictors.

We control for the health risk factors of height in centimeters, weight in kilograms, and whether the respondent ever smoked. Short height is taken to indicate poor nutrition and stunting during early childhood (Hizli et al. 2007) and is a harbinger of being overweight later in life (Popkin, Richards, and Montiero 1996), a condition that independently undermines health (Weitoft, Eliasson, and Rosén 2008). Smoking's deleterious effects on health and mortality are widely known (US Department of Health and Human Services 2004). These variables are time-invariant and reflect the respondent's condition at the time of the survey and thus admittedly constitute imperfect controls for health risk factors experienced over the life course. We also control for gender since, despite the feminization of migration from other parts of the world, men continue to be more likely than women to migrate to the U.S. from Mexico (Passel, Cohn and Gonzalez-Barrera 2012). There are also considerable gender disparities in health in Mexico, with females displaying higher life expectancies than males (79.4 versus 74.5 years of age in 2015) (World Bank 2018).

We control for the time-varying risk factors of age, years of education, household wealth, and municipal population. The risks of morbidity and mortality vary strongly with education, with more educated people having a greater likelihood of adopting healthier behaviors and thus achieving healthier outcomes (Cutler and Lleras-Muney 2010). Home ownership, a measure of household wealth, is a dummy coded as 1 if the respondent had acquired at least one residential property during or prior to a given person-year and 0 otherwise. Urban versus rural residence is measured by the natural log of the population in the respondent's municipality. Municipal population figures come from the decennial

Mexican censuses of 1950 through 2010, with intercensal years estimated using linear interpolation.²

Given that migrant network connections are among the strongest predictors of migration (Massey and Espinosa 1997; Massey and Aysa-Lastra 2011), we control for two measures of social capital. The U.S. migration of at least one parent or sibling by the person-year in question is included as a dummy variable. Migration prevalence is indicated by the ratio of community members with U.S. migrant experience to the total number of community members alive in any given person-year (Massey, Goldring, and Durand 1994). Finally, we include a dummy variable for whether the household head was the informant.

After assessing whether selection into U.S. migration differs by early-life health, we assess whether our findings will be biased by selective return migration, among other factors that may lead to measurement error. The rest of our analyses rely on cross-sectional data from the MMP. In these analyses, we define documented migrants as those who took both their first and last U.S. trips with valid papers; undocumented migrants are those who took either their first or last U.S. trip without valid documentation; and non-migrants as those who never migrated to the U.S. Among undocumented migrants, 87.5% were undocumented on both trips or took only one trip, 10.8% were undocumented on their first trip but documented on their last trip, and 1.6% were documented on their first trip but undocumented on their last trip. Thus, the vast majority of undocumented migrants spent all their time in the U.S. in undocumented status, and 12.4% spent at least some of their time in the U.S. without documents. Since a portion of those who are ultimately coded as having a history of being unauthorized were at some period of time protected from illegality's risks and harms, it is reasonable to assume that any findings about the deleterious impacts of unauthorized status in this study are conservative.

Using the full cross-sectional dataset, we estimate multinomial logistic regressions predicting health for each juncture measured in the MMP—early life at age 14, just prior to the first trip, just after the latest return (or during the latest trip for household heads still in the U.S. when surveyed), and at the survey date—using “good health” as the reference category. For the models predicting health just before the first departure to the U.S., health just after return from the last trip (or during the latest trip for migrants still in the U.S.), and current health, we include a dummy variable for whether the respondent is still in the U.S. at the survey date. We also control for informant status for all models, along with the number of years that have elapsed since each time point for which health is measured (excluding the model for health at the survey date since recall bias is no longer a factor then). We include the same controls as the model predicting selection into migration, as well as a factor variable for migrant status to compare non-migrants (reference group) with documented and undocumented migrants. In preliminary analyses, we estimated annual aggregate probabilities of taking a first undocumented U.S. trip and returning from a last undocumented trip and included them as time-varying covariates to control for possible

²Years from 1940 to 1949 are estimated using linear interpolation backward from 1950 to 1960, and years from 2011 to 2016 are estimated using linear interpolation from 2000 to 2010.

changes in the selectivity and nature of undocumented migration over time; but these variables proved to be insignificant and were dropped from subsequent analyses.

As we elaborate on in the results section, we find little evidence of the salmon bias and therefore restrict subsequent analyses to the impacts of migration and legal status for *returned* documented and undocumented migrants versus non-migrants. However, we do find evidence that recall length and informant status have an influence on health reports.

Concerning informant status, self-rated reports of health at age 14 and at the survey date are more conservative than other-rated health reports, with household head-informants being less likely to report excellent as opposed to good early-life and current health (Tables 3 and 6). Conversely, being an informant is associated with a higher likelihood of reporting excellent health before migration (Table 4) but is not a significant predictor of health status after migration (Table 5).

As for recall length, number of years since the time interval in question is associated with more favorable health reports. Likelihood of reporting excellent early-life health increases with years elapsed since age 14 (Table 3). Likelihood of reporting excellent pre-migration health increases with years since departure to the U.S, which corresponds with a decrease in the likelihood of reporting poor health prior to migration (Table 4). A similar trend persists for health after migration, with years since return predicting a lower likelihood of reporting poor health (Table 5). We therefore control for informant status and years elapsed since the time point in question in our models to control for these sources of measurement error.

After inquiring into potential selection and measurement biases, we turn to our main inquiry into the links between migration, legal status and health, based on cross-sectional MMP data that are limited to non-migrants and migrants back in Mexico at the survey date. To examine the links between undocumented status and health from pre- to post-migration (immediate effects) and from post-migration to the survey date (continuing effects), we estimate two models for each time interval: a simple logistic regression equation predicting whether reported health worsened over time and an ordered logistic regression model predicting health at the end of the interval given health status at its beginning. The latter model enables us to infer the directionality and size of migration's effect on health by observing changes in health relative to a clear baseline. Finally, we estimate an ordered logistic regression model for all respondents to predict health at the survey date given health at age 14, to assess overall changes in health.

As in the event history analysis, the cross-sectional models control for the risk factors of height, weight, smoking, age at the end of the time interval, gender, education, and the natural log of the municipal population. We also control for the total number of U.S. trips taken and cumulative years of U.S. experience to estimate of the degree to which different "dosages" of migration yield divergent health outcomes. These variables, which are moderately collinear ($r^2 = 0.50$), assess two distinct risks to migrant health: exposure to the specific health risks of undocumented border crossing, and exposure to the more general health risks of life in the U.S.

Models predicting health at the time of the survey include three indices of material wellbeing at the survey date, which are likely strongly influenced by savings and remittances generated through migration. The first is a 0–14 count of the following amenities or goods present in the household: a non-dirt floor, running water, sewage facilities, stove, refrigerator, washing machine, sewing machine, radio, television, stereo, telephone, cellphone, internet, and computer. The second is a dummy variable indicating whether or not the household's current dwelling is owned. As a measure of household density or crowding, we include the ratio of the number of household members to the number of rooms in the home.

Finally, in addition to controlling for informant status for all models, we adjust for recall bias by controlling for the number of years that have elapsed since both the first departure and latest return for models investigating the period from before to after migration and for the number of years since the latest return for the models investigating the period from after migration to the survey date.

Means and standard deviations for event history and cross-sectional datasets (both including and excluding migrants still in the U.S. at the survey date) are presented in Table 1. We use the Amelia II package in R to multiply impute missing values (Honaker, King, and Blackwell 2011). Information about the frequency of missing data for each variable is provided in the Appendix. Compared with list-wise deletion, multiple imputation produces results with less biased estimates and smaller standard errors. We create 10 complete datasets across which observed values are held constant, with missing values imputed using the “expectation-maximization with bootstrapping” algorithm developed by Honaker and King (2010), thereby generating distributions that reflect uncertainty with respect to missing data.

In our analyses of health outcomes, we exclude observations for which the dependent variable was missing. Although all health variables are included in the imputation model, we do not use imputed Y values at the analysis stage. This practice produces more efficient point estimates, smaller standard errors, and smaller confidence intervals than if observations with imputed Y values were included in the model (von Hippel 2007). As indicated in the Appendix, only 0.3 percent of cases were missing health at the survey date, 1.4 percent were missing pre-migration health, and 1.3 percent were missing post-migration health values. The exclusion of cases with missing dependent variables explains the small differences in sample size across the cross-sectional models. The post-imputation deletion step is not necessary in the event history model because we observed no missing values in the dependent variable. We produce our analyses using the Zelig package in R, which estimates results within each of the 10 imputed datasets and then combines them according to Rubin's rules (Rubin, 1987).

As shown in Table 1, the cross-sectional summary statistics (including migrants in the U.S. at the survey date) offer prima facie evidence that migrants are indeed self-selected on the basis of health. Whereas only 34% of non-migrants reported their health at age 14 to be excellent, the figure was 46% for undocumented migrants and 49% for documented migrants, $\chi^2(4, N = 8,067) = 94.966, p < 0.001$. In addition, migrants were taller on average

than non-migrants, with respective heights of 167.3cm and 167.4cm for undocumented and documented migrants, respectively, compared with 164.7cm for non-migrants. However, this apparent initial health advantage is offset somewhat by the cumulative effects of smoking over the life course, as around 39% of undocumented and 36% of documented migrants reported having ever smoked, compared to just 30% of non-migrants.

Focusing on returned migrants, the cross-sectional data also offer prima facie evidence for a greater decline in health among undocumented compared to documented migrants after having lived and worked in the U.S. For returned undocumented migrants, the share reporting excellent health falls from 45% at age 14 to 17% post-migration. In contrast, the share reporting excellent health among documented migrants fell from 51% to 25% over this interval. At the survey date, around one-third of respondents in each group reported poor health, though documented migrants evinced the highest proportion reporting excellent health at 15%, compared to undocumented migrants at 11% and non-migrants at 8%. Chi-square values for cross-tabulations between migration status and each health measure are statistically significant.

The greater decline in health among returned undocumented migrants occurred despite their having accumulated 0.6 years fewer years living in the U.S., on average, than those who had valid documents (around 5.9 versus 6.5). Both returned documented and undocumented migrants had accumulated just over 6.5 years of education, lower than non-migrants who reported 7.2 years on average. Non-migrants were more likely than migrants to live in urban areas, with a mean municipal population size of 143,366. In contrast, documented migrants' municipalities had a mean population size of 81,453, while undocumented migrants were most likely to come from smaller communities, with a mean population size of 49,530. At the survey date, returned documented migrants were older (57.2 years) than returned undocumented migrants (47.5 years) and non-migrants (50.7 years).

In terms of material well-being, returned migrants were much more likely to be homeowners than non-migrants, as one would expect given their greater earning power. Whereas only 67% of non-migrants owned homes at the time of the survey, the figures were 81% and 72% for returned documented and undocumented migrants, respectively. Likewise, the average number of consumer goods and amenities possessed at the time of the survey was greatest for returned documented migrants (9.9), followed by returned undocumented migrants (9.6) and non-migrants (9.3). Household density was greatest for returned undocumented migrants (an average of 1.4 persons per room) compared with non-migrants (1.2 persons per room) and returned documented migrants (1.1 persons per room).

Means computed across person-years in the event history file generally replicate the patterns observed at the survey date, while providing additional information about respondents' migration-facilitating social capital. Unsurprisingly, both documented and undocumented migrants reported greater access to migrant networks than non-migrants. Whereas in the average person-year, only 7% of non-migrants reported having a parent or sibling with U.S. experience, the figure was 12% for undocumented and 11% for documented migrants. Similarly, across person-years, the average non-migrant lived in a community in which only 8.4% of all persons had been to the U.S., while 11.3% of undocumented migrants'

community members had been north of the border, compared with 10.7% for documented migrants.

HEALTH SELECTIVITY, POTENTIAL BIAS, AND MIGRATION

We first assess whether migrants and non-migrants systematically differ with regard to early-life health and whether there is differential selectivity by legal status among migrants. Table 2 presents the results of a discrete time event history analysis that used multinomial regression to predict the likelihood of departing for the U.S. in documented or undocumented status given health at age 14, health risk factors, and other controls. Consistent with prior research (Akresh and Frank 2008; Ullman, Goldman, and Massey 2011), our estimates indicate that U.S. migrants are positively selected with respect to health. Reporting excellent health at age 14 increases the odds of a documented departure by 50% ($\exp(0.408)=1.503$) compared to those reporting good or poor health at that age ($p < 0.01$). Likewise, excellent early-life health increases the odds of undocumented departure by 37% ($\exp(0.316)=1.362$, $p < 0.001$). These two values are not statistically different from one another, suggesting that documented and undocumented migrants are equally well-selected with respect to health.

As other studies have found (Massey and Espinosa 1997; Massey and Aysa-Lastra 2011), migrants to the U.S. are negatively selected with respect to age and positively selected with respect to social capital from kinship ties to migrants, and a high prevalence of migrants in the community. However, whereas education is negatively associated with taking a first undocumented trip (in keeping with prior studies—see Massey and Espinosa 1997), it does not predict the likelihood of taking a first documented trip.

Having determined that documented and undocumented migrants are equally selected into migration on the basis of health, we turn to assess potential sources of bias in the reporting of health itself. As shown in Table 3, in reporting health at age 14, there are two potential sources of error: misreporting by informants and recall bias from memory lapses. While the likelihood of poor as opposed to good health is unaffected by who provided the health assessment or time since the assessment's target date, we see that reporting excellent health is significantly less likely when the assessment was made by an informant rather than by the household head and it grows significantly more likely as the amount of time since the target date of 14 increases, suggesting the potential for both informant bias and recall bias.

Among U.S. migrants, reports of health prior to the first trip likewise may be biased owing to informant error and recall error. As shown in Table 4, we see that informants are indeed more likely to report excellent health before the first trip than household heads, indicating potential informant bias. In addition, the likelihood of reporting excellent health rises with years since the date of departure and the likelihood of reporting poor health falls with years since this date, again suggesting possible recall bias. Reports on health by migrants may also be influenced by the salmon bias. If migrants with poor health are more likely to return to Mexico, we might expect those still in the United States to report systematically better health than those who have returned. Although migrants still in the United States at the time of the survey are in fact more likely to predict excellent as opposed to good health, they are

also significantly more likely to report poor as opposed to good health. Moreover, the sizes of the two coefficients are not significantly different from each other. Thus we do not see systematic evidence for the salmon bias in reports of pre-migration health.

Reports of post-migration health are likewise potentially influenced by informant bias, recall bias, and salmon bias. As shown in Table 5, however, we do not see any evidence of informant bias in assessments of post-migration health. Moreover, being in the United States at the time of the survey is unrelated to the likelihood of reporting poor post-migration health and only marginally related to the likelihood of reporting excellent post-migration health ($p < 0.10$). In addition, the effect is in the opposite direction (negative) than one would expect if a salmon bias were influencing health assessments. Thus we do not see much evidence of informant bias or salmon bias. We do see, however, that the likelihood of reporting poor post-migration health significantly decreases with time since the date of the return trip, suggesting the potential existence of recall bias.

Finally, reports of health at the survey date are obviously not threatened by recall bias but might be subject to either informant bias or salmon bias. As shown in Table 6, we do find evidence for the former, as informants are more likely to report poor health and less likely to report excellent health than household heads. The evidence for salmon bias is mixed. Although those migrants still in the United States are neither more nor less likely to report excellent health (and the effect is negative, contrary to the salmon bias hypothesis), they are significantly less likely to report poor health ($p < 0.05$), which is consistent with the potential existence of a salmon bias.

In summary, we have shown that documented and undocumented migrants are equally positively selected into migration on the basis of excellent health at age 14 and that health reports at different times in the past are potentially influenced by informant bias and recall bias, prompting us to include controls for informant status and time since health assessment in subsequent models. Evidence for the influence of salmon bias brought about by the selective return of migrants with poor health and the selective U.S. settlement of migrants with excellent health is less compelling, however. The health status of migrants who are still in the U.S. on their last trip is not significantly different from the health status of those who have returned from their last trip ($p > 0.05$). We therefore move forward with our assessments of changes in health before and after migration to the United States among migrants who have returned to Mexico, which is the subject of the next section.

HEALTH EFFECTS OF U.S. MIGRATION BY LEGAL STATUS

The left-hand columns of Table 7 present the results of a logistic regression equation predicting whether a decline in health occurred from just before the first U.S. trip to just after the last trip given migrant status, total number of trips, cumulative years of U.S. experience, and relevant controls. Like Ullmann, Goldman, and Massey (2011), we find that migration to the U.S. is bad for one's health; but we also detect a dosage effect in which more U.S. trips and years of U.S. experience increase the likelihood of a decline in health from pre- to post-migration. With each successive trip, the odds of a decline in health rise by around 12.7% (determined here and thereafter by taking the exponent of the regression

coefficient). Each year of U.S. experience is associated with a 5.4% increase in odds of experiencing worsened health during this interval.

Holding constant the number of trips and years of U.S. experience, we find that returned undocumented migrants are more likely than returned documented migrants to experience worsened health, with the odds of reporting poorer health after migration being 2.1 times greater for the former compared to the latter. Thus, not only does health decline as result of migration to the U.S. generally, worsening with each successive trip, but the odds of experiencing a decline in health are greater for the undocumented. Beyond these effects, a decline in health is also predicted by greater age upon returning from the U.S. and having a history of smoking.

The right-hand columns show results of an ordered logit model predicting migrants' health upon returning from the last trip, given pre-migration health, legal status, number of trips, U.S. experience, and controls. Consistent with the prior model, the likelihood of poorer health is significantly predicted for all migrants depending on the number of total trips taken, with worsened health significantly more likely for undocumented migrants. The odds of experiencing poorer health increase by 12.4% with each successive U.S. trip, and by 5.0% with each successive year spent in the U.S., and are 80% greater for undocumented than documented migrants. As one would expect, worsened health is also predicted by greater age upon return from the U.S., ever having smoked, and marginally by greater weight; and worsened health is negatively predicted by greater height and years of education.

We now investigate whether legal status continues to have a negative effect on migrants' health between coming back to Mexico and the survey date. The left-hand columns of Table 8 show results of a logistic regression predicting the likelihood of a decline in health from just after the final U.S. trip to the survey date, controlling for height, weight, smoking, gender, age, education, and the natural log of the municipal population size. This model additionally controls for home ownership, amenities, household density, years since return from the U.S., and informant status. Unlike the prior regressions, this model reveals no significant effects of legal status on the likelihood of a decline in health once migration has ended, and the number of trips is only marginally related to worsened health ($p < 0.10$). The likelihood of reporting a decline in health increases with age, as well as with the number of years since returning from the U.S. Greater number of amenities, an indicator of material wealth, is negatively related to a decline in health.

The right-hand columns of Table 8 present an ordered logistic model predicting health at the survey date among returned migrants, given health immediately after the last U.S. trip, legal status, total number of trips, total U.S. experience, and controls. In accordance with the previous model, returned undocumented migrants are no more likely to be in poor health at the survey date compared to documented returned migrants. In contrast to the previous model, however, years of U.S. experience are negatively related to poorer health, with the likelihood of experiencing worse health decreasing by 1.8% with each additional year spent in the U.S., though the effect is only marginally significant ($p < 0.10$). A negative effect of U.S. experience on health is not entirely unexpected. In earlier work, Kanaiaupuni and Donato (1999) found that the immediate effect of U.S. migration was to worsen health but

that over the long-term it increased household resources in ways that improved health. Consistent with the suggestion that U.S. migration might improve long-term health by providing additional resources to support health, the ordered logit equation shows that the odds of experiencing worse health decrease by 11.0% with each increment in the number of household amenities owned. As before, age and greater number of years since returning from the U.S. are also associated with a higher likelihood of reporting poor health at the survey date.

Table 9 completes our analysis by showing results from an ordered logistic regression assessing the health of returned documented and undocumented migrants relative to non-migrants at the survey date. The likelihood of experiencing a shift toward poor health between age 14 and the time of the survey is significantly lower for returned documented migrants than for returned undocumented migrants and non-migrants. For all migrants, health is more likely to worsen as trips increase, rising by 9.6% for migrants with each trip taken. Consistent with the prior set of models, there is suggestive evidence that greater U.S. experience lowers the likelihood of being in poor health at the survey date by improving the material wellbeing of households. In addition, the likelihood of reporting poor health at the survey date is greater for women and smokers and rises with increasing weight and age. The odds of poor health fall with increasing height, years of education, municipal population size, and number of amenities.

SUMMARY AND CONCLUSION

Unauthorized status relegates migrants to the most disadvantaged segments of the U.S. social structure, within which they face exclusion from most public social services and heightened risks of discrimination, arrest, and deportation. Our analyses suggest that unauthorized status has strong negative consequences for migrants' health as well. After controlling for possible informant bias and recall error in our data and discounting the possibility of a significant salmon bias among returned migrants, our analysis yields the following key conclusions:

1. Mexican migrants to the U.S. are positively selected on the basis of health, and the degree of health selectivity does not vary by legal status.
2. Over the course of a migratory career, health steadily deteriorates, declining with each successive U.S. trip and each additional year spent in the U.S.
3. The decline in health is greater for undocumented than documented migrants, holding constant the number of trips and years of U.S. experience, suggesting that a lack of legal status itself increases the risks to health.
4. After retiring from active migration, the health of migrants continues to deteriorate depending on the number of U.S. trips taken, but neither the likelihood nor amount of the health decline differs by legal status.
5. When the health of documented and undocumented migrants is compared with that of non-migrants at the survey date, we find that the health of migrants is worse than non-migrants and grows worse with each successive U.S. trip.

6. The negative health effects of U.S. migration are less for documented than undocumented migrants and are mitigated by the accumulation of household assets financed by U.S. earnings.

In sum, our work shows that migrating to the United States is bad for one's health, and that it is especially bad for migrants who lack legal documents, worsening as migratory careers lengthen and trips accumulate. No analysis is perfect, however, and ours carries several caveats. First, our findings are estimated for returned migrants and cannot necessarily be generalized to the broader population of undocumented migrants still in the U.S. Second, the MMP's method of soliciting health reports are vulnerable to multiple sources of measurement error, including relying on proxy informants, recall bias due to memory lapses, and possible differences in standards to which migrants and non-migrants are comparing health. Third, reports on past health may be influenced by perceptions of current health, leading to endogeneity bias. Fourth, while we find little support for the salmon bias, it is possible that the MMP does not fully capture the mortality of sick migrants.

Although we cannot identify the specific mechanisms by which poor migrant health is generated, the 2016 U.S. elections validated political positions in favor of fortifying physical and legal barriers to integration and augmenting the hostile context of reception for immigrants. This study reinforces the need for recognition of the direct public health consequences of immigration policy (Castañeda et al. 2015). The deterioration of immigrants' health—especially among those who are undocumented—represents yet another indication of the disjunctures of the U.S.'s restrictive and exclusionary immigration policies. Measures such as lowering the legal and financial barriers to health insurance for migrants and other policy changes informed by the recognition of access to healthcare as a basic human right regardless of legal status, will be needed to safeguard the welfare of undocumented immigrants and their children, a growing fraction of whom are native-born U.S. citizens.

Acknowledgments

FUNDING

The author(s) received the following financial support for the research, authorship, and/or publication of this article: Research reported in this publication was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the National Institutes of Health under Award Number P2CHD047879 and Award Number R01HD035643. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

APPENDIX

Table A.

Percentage of data missing before multiple imputation.

Variable	Cross-Sectional	Event History
Health at 14	0.003	0.004
Pre-Migration Health	0.014	-
Post-Migration Health	0.013	-

Variable	Cross-Sectional	Event History
Current Health	0.003	-
Health Worsened Pre- to Post-Migration	0.014	-
Health Worsened Post-Migration to Survey Date	0.013	-
Health Worsened Age 14 to Survey Date	0.004	-
Migrant Status	0.000	-
Whether a Trip was Taken in the Person-Year	-	0.000
Number of Trips	0.000	-
Years of U.S. Experience	0.000	-
Height	0.012	0.013
Weight	0.040	0.043
Ever Smoked	0.002	0.001
Amenities	0.018	-
Household Density Ratio	0.004	-
Owned Home	0.003	0.000
Municipal Population	0.000	0.001
Age at Survey Date	0.000	-
Age of First Trip	0.000	-
Age of Return from Last Trip	0.000	-
Years Since First Departure to U.S.	0.000	-
Years Since Return from U.S.	0.000	-
Currently in U.S.	-	0.000
Informant	0.000	-
Age in Person-Year	-	0.000
Female		0.000
Years of Education	0.006	0.007
Relative Ever Migrant	-	0.000
Community Migration Prevalence	-	0.000
Observations After List-wise Deletion	7,374	234,750
Observations After Multiple Imputation	8,067	248,929

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Table 1.

Sample means and standard deviations of variables used in analysis of migrant health.

	<u>Non-Migrants</u>		<u>Undocumented</u>		<u>Documented</u>	
	Mean	SD	Mean	SD	Mean	SD
EVENT HISTORY DATA						
Health at Age 14						
Poor	0.03	0.18	0.03	0.16	0.04	0.19
Good	0.61	0.49	0.55	0.50	0.49	0.50
Excellent	0.36	0.48	0.42	0.49	0.47	0.50
Risk Factors						
Height (cm)	163.73	9.53	166.54	8.36	166.18	9.89
Weight (kg)	72.66	13.30	75.72	12.29	74.86	12.35
Ever Smoked	0.30	0.46	0.36	0.48	0.30	0.46
Controls						
Age	36.25	15.36	23.43	8.33	25.59	10.02
Female	0.21	0.41	0.04	0.20	0.14	0.34
Years of Education	6.20	4.56	6.16	3.60	6.03	4.40
Relative Ever Migrant	0.07	0.26	0.12	0.32	0.11	0.31
Migration Prevalence Ratio	8.41	9.40	11.34	11.29	10.66	11.34
Owns Home	0.54	0.50	0.21	0.41	0.25	0.43
Ln of Municipal Population	10.18	1.43	9.71	1.06	9.90	1.31
In the U.S. at Survey Date	0.00	0.00	0.19	0.39	0.14	0.35
Informant	0.47	0.50	0.41	0.49	0.47	0.50
Number of Person-Years	228,290		16,790		3,849	
CROSS-SECTIONAL DATA, INCLUDING MIGRANTS IN THE U.S.						
Health at Age 14						
Poor	0.03	0.18	0.03	0.17	0.03	0.18
Good	0.63	0.48	0.51	0.50	0.48	0.50
Excellent	0.34	0.47	0.46	0.50	0.49	0.50
Pre-Migration Health						
Poor	---	---	0.05	0.21	0.05	0.23
Good	---	---	0.69	0.46	0.62	0.49
Excellent	---	---	0.26	0.44	0.33	0.47
Post-Migration Health						
Poor	---	---	0.16	0.37	0.14	0.35
Good	---	---	0.67	0.47	0.63	0.48
Excellent	---	---	0.16	0.37	0.23	0.42
Health at Survey						
Poor	0.35	0.48	0.29	0.45	0.34	0.47
Good	0.57	0.50	0.60	0.49	0.52	0.50
Excellent	0.08	0.27	0.11	0.32	0.14	0.35
Health Worsened						

	<u>Non-Migrants</u>		<u>Undocumented</u>		<u>Documented</u>	
	Mean	SD	Mean	SD	Mean	SD
From Pre- to Post-Migration	---	---	0.19	0.39	0.16	0.36
From Post-Migration to Survey	---	---	0.21	0.41	0.33	0.45
Age 14 to Survey	0.47	0.50	0.49	0.50	0.50	0.50
Risk Factors						
Height (cm)	164.65	9.42	167.25	8.39	167.44	9.45
Weight (kg)	73.54	12.91	76.47	12.51	75.29	12.34
Ever Smoked	0.30	0.46	0.39	0.49	0.36	0.48
Migration History						
Number of Trips	0.00	0.00	2.03	1.90	2.21	1.96
Years of U.S. Experience	0.00	0.00	8.02	8.85	7.80	11.98
Controls						
Informant	0.46	0.50	0.45	0.50	0.46	0.50
In the U.S. at Survey	0.00	0.00	0.17	0.37	0.14	0.35
Age at Survey	50.66	15.79	47.24	13.12	55.64	18.07
Age at First U.S. Trip	---	---	24.85	8.50	27.39	10.78
Age at Return from Last U.S. Trip	---	---	35.55	11.65	38.14	15.47
Years Since 1 st Departure for U.S.	---	---	22.39	12.89	28.24	19.38
Years Since Return from U.S.	---	---	11.69	11.90	17.49	19.35
Female	0.18	0.38	0.04	0.19	0.11	0.31
Years of Education	7.19	4.64	6.64	3.61	6.84	4.77
Migration Prevalence Ratio	10.31	8.56	17.57	11.35	17.67	10.29
Relative Ever Migrant	0.14	0.35	0.34	0.47	0.23	0.42
Ln of Municipal Population	10.48	1.54	9.87	1.27	10.01	1.39
Owns Home	0.67	0.17	0.69	0.46	0.79	0.41
Amenities	9.25	2.62	9.71	2.31	9.89	2.74
Household Density	1.24	0.91	1.40	0.96	1.11	0.83
Number of Individuals	6,235		1,542		290	
CROSS-SECTIONAL DATA, EXCLUDING MIGRANTS IN THE U.S.						
Health at Age 14						
Poor	0.03	0.18	0.03	0.17	0.03	0.16
Good	0.63	0.48	0.52	0.50	0.47	0.50
Excellent	0.34	0.47	0.45	0.50	0.51	0.50
Pre-Migration Health						
Poor	---	---	0.04	0.21	0.05	0.22
Good	---	---	0.73	0.45	0.64	0.48
Excellent	---	---	0.23	0.42	0.31	0.46
Post-Migration Health						
Poor	---	---	0.15	0.36	0.11	0.32
Good	---	---	0.68	0.47	0.63	0.48
Excellent	---	---	0.17	0.38	0.25	0.43
Health at Survey						

	<u>Non-Migrants</u>		<u>Undocumented</u>		<u>Documented</u>	
	Mean	SD	Mean	SD	Mean	SD
Poor	0.35	0.48	0.30	0.46	0.34	0.47
Good	0.57	0.50	0.59	0.49	0.51	0.50
Excellent	0.08	0.27	0.11	0.32	0.15	0.36
Health Worsened						
From Pre- to Post-Migration	---	---	0.15	0.36	0.10	0.31
From Post-Migration to Survey	---	---	0.25	0.43	0.33	0.47
Age 14 to Survey	0.47	0.50	0.49	0.50	0.51	0.50
Risk Factors						
Height (cm)	164.65	9.42	167.46	8.42	167.42	9.50
Weight (kg)	73.54	12.91	76.42	12.29	75.24	12.61
Ever Smoked	0.30	0.46	0.41	0.49	0.38	0.49
Migration History						
Number of Trips	0.00	0.00	2.04	1.90	2.14	1.94
Years of U.S. Experience	0.00	0.00	5.90	6.18	6.48	10.75
Controls						
Informant	0.46	0.50	0.45	0.50	0.49	0.50
Age at Survey	50.66	15.79	47.49	13.41	57.15	17.75
Age at First U.S. Trip	---	---	24.61	8.19	27.45	10.79
Age at Return from Last U.S. Trip	---	---	33.44	10.48	36.78	14.70
Years Since 1st Departure for U.S.	---	---	22.88	12.92	29.70	19.37
Years Since Return from U.S.	---	---	14.05	11.71	20.37	19.43
Female	0.18	0.38	0.03	0.17	0.12	0.32
Years of Education	7.19	4.64	6.57	3.59	6.55	4.78
Migration Prevalence Ratio	10.31	8.56	16.66	11.09	16.87	10.01
Relative Ever Migrant	0.14	0.35	0.34	0.47	0.21	0.41
Ln of Municipal Population	10.48	1.54	9.92	1.27	10.03	1.38
Owns Home	0.67	0.17	0.72	0.45	0.81	0.39
Amenities	9.25	2.62	9.58	2.28	9.88	2.74
Household Density	1.24	0.91	1.42	0.96	1.11	0.82
Informant	0.46	0.50	0.45	0.50	0.49	0.50
Number of Individuals	6,235		1,283		249	

Table 2.

Multinomial discrete time event history model predicting documented versus undocumented first trip to the U.S. (reference=non-migrant).

Independent Variables	First Trip Documented		First trip Undocumented	
	B	SE	B	SE
Health at Age 14				
Good	----	----	----	----
Poor	0.047	0.349	-0.122	0.054
Excellent	0.408**	0.123	0.316***	0.155
Risk Factors				
Height	0.023**	0.008	0.001	0.004
Weight	-0.004	0.006	0.005*	0.002
Ever Smoked	0.041	0.126	0.097 ⁺	0.054
Controls				
Age	-0.044***	0.006	-0.070***	0.003
Female	-0.484 ⁺	0.215	-1.758***	0.141
Years of Education	-0.007	0.014	-0.034***	0.007
Relative Ever Migrant	0.577**	0.170	0.980***	0.069
Migration Prevalence Ratio	0.039**	0.005	0.045***	0.002
Owens Home	-0.157	0.151	-0.104	0.069
Ln of Municipal Population	-0.024	0.050	-0.001	0.022
Informant	0.150	0.123	0.147**	0.053
Constant	-9.227***	1.329	-3.948***	0.568
Person Years	248,929			

⁺ p<0.10

* p<0.05

** p<0.01

*** P<0.001

Table 3.

Multinomial logistic regression predicting reported health at age 14 (ref: good health).

Independent Variables	Excellent Health		Poor Health	
	B	SE	B	SE
Potential Sources of Error				
Informant	-0.276 ^{***}	0.051	0.023	0.135
Years since Age 14	0.021 ^{***}	0.002	0.005	0.005
Migrant Status				
Non-Migrant	----	----	----	----
Documented	0.462 ^{***}	0.129	-0.120	0.358
Undocumented	0.513 ^{***}	0.065	-0.247	0.183
Risk Factors				
Height	0.032 ^{***}	0.003	-0.008	0.009
Weight	-0.007 ^{**}	0.002	-0.004	0.006
Ever Smoked	0.228 ^{***}	0.052	0.231 ⁺	0.138
Controls				
Female	0.929 ^{***}	0.079	0.118	0.208
Years of Education	0.027 ^{***}	0.006	-0.002	0.017
Relative Ever Migrant	0.282 ^{***}	0.064	0.226	0.165
Owns Home	-0.353 ^{***}	0.056	-0.221	0.147
Migration Prevalence Ratio	0.010 ^{**}	0.003	0.048 ^{***}	0.007
Ln of Municipal Population	-0.042 [*]	0.019	0.031	0.052
Constant	-5.955 ^{***}	0.558	-2.419 ⁺	0.146
Number of Observations	8,036			

⁺ p<0.10^{*} p<0.05^{**} p<0.01^{***} P<0.001

Table 4.

Multinomial logistic regression predicting reported health prior to the first US trip.

Independent Variables	Excellent Health		Poor Health	
	B	SE	B	SE
Potential Sources of Error				
Currently in U.S.	0.861 ***	0.152	0.667 *	0.306
Informant	0.383 **	0.123	-0.082	0.281
Years since 1 st Departure to U.S.	0.024 **	0.008	-0.048 **	0.014
Legal Status				
Undocumented	-0.418 **	0.161	-0.309	0.358
Risk Factors				
Height	0.018 *	0.008	-0.025	0.018
Weight	0.000	0.005	0.000	0.012
Ever Smoked	0.031	0.120	-0.447	0.296
Controls				
Age	-0.012	0.008	0.024 †	0.014
Female	0.087	0.275	-0.583	0.668
Years of Education	-0.007	0.017	-0.009	0.038
Relative Ever Migrant	0.056	0.128	0.724 **	0.271
Owns Home	-0.398 **	0.131	0.009	0.302
Migration Prevalence Ratio	0.023 ***	0.006	0.037 **	0.013
Ln of Municipal Population	-0.008	0.055	0.008	0.127
Constant	-3.990 **	1.491	0.379	3.245
Number of Observations	1,718			

† p<0.10

* p<0.05

** p<0.01

*** P<0.001

Table 5.

Multinomial logistic regression predicting reported health after return from the last US trip.

Independent Variables	Excellent Health		Poor Health	
	B	SE	B	SE
Potential Sources of Error				
Currently in U.S.	-0.387 ⁺	0.227	-0.243	0.201
Informant	0.155	0.141	0.032	0.153
Years since Return from U.S.	0.004	0.007	-0.059 ^{***}	0.009
Legal Status				
Undocumented	-0.404 [*]	0.179	0.218	0.225
Risk Factors				
Height	0.022 [*]	0.009	-0.023 [*]	0.010
Weight	-0.010	0.006	0.003	0.006
Ever Smoked	0.024	0.138	0.210	0.148
Controls				
Age	0.000	0.007	0.041 ^{***}	0.007
Female	0.014	0.333	-0.058	0.329
Years of Education	0.006	0.020	-0.010	0.021
Relative Ever Migrant	0.098	0.149	0.622 ^{***}	0.153
Owns Home	-0.412 ^{**}	0.151	-0.334 [*]	0.163
Migration Prevalence Ratio	0.015 [*]	0.007	0.020 ^{**}	0.008
Ln of Municipal Population	0.107 ⁺	0.062	0.072	0.069
Constant	-5.237 ^{**}	1.674	-0.611	1.810
Number of Observations	1,730			

⁺ p<0.10^{*} p<0.05^{**} p<0.01^{***} P<0.001

Table 6.

Multinomial logistic regression predicting reported health at the survey date.

Independent Variables	Excellent Health		Poor Health	
	B	SE	B	SE
Potential Sources of Error				
Currently in U.S.	-0.156	0.207	-0.360*	0.158
Informant	-0.184*	0.087	0.153**	0.054
Migrant Status				
Non-Migrant	---	---	---	---
Documented	0.707***	0.193	-0.219	0.146
Undocumented	0.370**	0.110	-0.174*	0.077
Risk Factors				
Height	0.041***	0.006	-0.025***	0.004
Weight	-0.010**	0.004	0.005 ⁺	0.002
Ever Smoked	-0.005	0.088	0.110 ⁺	0.056
Controls				
Age	-0.013***	0.003	0.037***	0.002
Female	0.655***	0.143	0.190*	0.082
Years of Education	0.023*	0.010	-0.038***	0.007
Relative Ever Migrant	-0.109	0.110	0.261***	0.069
Owens Home	-0.292**	0.089	-0.034	0.061
Migration Prevalence Ratio	0.005	0.005	0.016***	0.003
Ln of Municipal Population	0.046	0.031	0.033	0.020
Constant	-7.965	0.948	0.884	0.588
Number of Observations	8,042			

⁺ p<0.10

* p<0.05

** p<0.01

*** P<0.001

Table 7.

Logistic regression models predicting decline in health pre- to post-migration and health just after last U.S. trip.[†]

Independent Variables	Logit Model of Whether Health Worsened Pre- to Post-Migration		Ordered Logit Model of Poor Post-Migration Health	
	B	SE	B	SE
Legal Status				
Undocumented	0.757**	0.271	0.590**	0.215
Migration History				
Number of Trips	0.120**	0.041	0.117**	0.039
Years of U.S. Experience	0.053**	0.018	0.049**	0.017
Pre-Migration Health				
Good	---	---	---	---
Poor	---	---	3.448***	0.413
Excellent	---	---	-4.682***	0.227
Risk Factors				
Height	-0.017	0.011	-0.022*	0.010
Weight	0.013 ⁺	0.007	0.012 ⁺	0.006
Ever Smoked	0.375*	0.161	0.361*	0.143
Controls				
Age at Return from Last U.S. Trip	0.030**	0.010	0.031***	0.009
Years since 1st Departure to U.S.	-0.028 ⁺	0.017	-0.032*	0.016
Years since Return from U.S.	0.018	0.019	0.024	0.017
Female	0.061	0.406	0.036	0.357
Years of Education	-0.011	0.024	-0.012	0.021
Ln of Municipal Population	-0.076	0.065	-0.088	0.056
Informant	0.313 ⁺	0.163	0.219 ⁺	0.144
Constant 1	-1.367	1.947	-5.347**	1.715
Constant 2	---	---	0.233	1.670
Number of Observations	1,430		1,430	

⁺ p<0.10

* p<0.05

** p<0.01

*** p<0.001

[†]What are the immediate consequences for migration and legal status for the health of Mexican migrants? The dependent variable in the left-hand model is a dummy variable for whether the household head is reported to have experienced worsened as opposed to the same or improved level of health from immediately prior to the first U.S. trip to immediately upon return from the last U.S. trip. The dependent variable in the right-hand model is a three-level ordinal variable for health immediately upon return from the last U.S. trip, with levels “excellent,” “good,” and “poor.”

Table 8.

Logistic regression models predicting decline in health from just after last trip to survey date and health at time of survey.[†]

Independent Variables	Logistic Model of Whether Health Worsened Post-Migration to Survey Date		Ordered Logit Model of Poor Health at Survey Date	
	B	SE	B	SE
Legal Status				
Undocumented	0.136	0.186	0.239	0.161
Migration History				
Number of Trips	0.060 ⁺	0.035	0.079 [*]	0.032
Years of U.S. Experience	-0.007	0.011	-0.018 ⁺	0.010
Post-Migration Health				
Good	---	---	---	---
Poor	---	---	2.056 ^{***}	0.195
Excellent	---	---	-2.035 ^{***}	0.168
Risk Factors				
Height	0.003	0.009	-0.005	0.008
Weight	-0.000	0.006	0.006	0.005
Smoked	0.084	0.133	0.171	0.116
Controls				
Age at Time of Survey	0.030 ^{***}	0.008	0.039 ^{***}	0.007
Years since Return from U.S.	0.033 ^{***}	0.008	0.019 ^{**}	0.007
Female	0.186	0.330	0.038	0.296
Years of Education	-0.001	0.021	-0.007	0.018
Ln of Municipal Population	0.091 ⁺	0.052	0.020	0.046
Owens Home	0.072	0.161	0.145	0.133
Amenities	-0.097 ^{**}	0.031	-0.116 ^{***}	0.027
Household Density	-0.014	0.076	-0.034	0.067
Informant	0.322 [*]	0.134	0.278 [*]	0.116
Constant 1	-4.182 [*]	1.638	-1.337	1.362
Constant 2	---	---	2.467 ⁺	1.364
Number of Observations	1,428		1,527	

⁺ p<0.10

^{*} p<0.05

^{**} p<0.01

^{***} P<0.001

[†] What are the continuing consequences of legal status for the health of Mexican migrants after they return home? The dependent variable in the left-hand model is a dummy variable for whether the household head is reported to have experienced worsened as opposed to the same or improved level of health from immediately upon return from the last U.S. trip to the survey date. The dependent variable in the right-hand model is a three-level ordinal variable for health at the survey date with levels "excellent," "good," and "poor."

Table 9.Ordered logistic regression predicting health at time of survey.[†]

Independent Variables	Ordered Logistic Regression Model of Poor Health at Survey Date	
	B	SE
Migration Status		
Non-Migrant	---	---
Documented Migrant	-0.461 **	0.153
Undocumented Migrant	-0.125	0.093
Migration History		
Number of Trips	0.092 **	0.029
Years of U.S. Experience	-0.015 ⁺	0.008
Health at Age 14		
Good	---	---
Poor	1.762 ***	0.160
Excellent	-0.973 ***	0.054
Risk Factors		
Height	-0.025 ***	0.003
Weight	0.007 **	0.002
Smoked	0.169 **	0.052
Controls		
Age at Time of Survey	0.045 ***	0.002
Female	0.231 **	0.079
Years of Education	-0.024 ***	0.007
Ln of Municipal Population	-0.037 *	0.016
Owens Home	0.001	0.055
Amenities	-0.049 ***	0.011
Household Density	0.005	0.028
Informant	0.184 ***	0.050
Constant 1	-5.212 ***	0.547
Constant 2	-1.675 **	0.542
Number of Observations	7,742	

⁺ p<0.10

* p<0.05

** p<0.01

*** P<0.001

[†]What are the overall consequences of migration and legal status for Mexican adults? The dependent variable in this model is a three-level ordinal variable for health at the survey date with levels “excellent,” “good,” and “poor.”