

SPOUSAL MIGRATION TO THE U.S. AND LATER-LIFE HEALTH FOR OLDER MEXICAN WOMEN

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ABSTRACT

There is a growing interest in family member migration as a social determinant of health for those who stay. This is particularly true in Mexico, given large flows of out-migration to the U.S. At the same time, there is growing interest in the determinants of health and well-being for Mexico's rapid aging population. This analysis is at the intersection of these two concerns. In particular, I aim to test the relationship between spousal migration to the U.S. earlier in life and later-life health for a nationally representative sample of middle-aged and older Mexican women. I use the baseline (2001) wave of Mexican Health and Aging Study to examine the association between spousal migration to the U.S. and diabetes, hypertension, and depression, with attention to differences by respondents' current marital status. I find that spousal migration to the U.S. is associated with significantly greater odds of diabetes and hypertension in late life, but only for women who were not in a union at the time of the survey (i.e. divorced, separated, or widowed). There is no significant association between spousal migration to the U.S. and past-week depression in late-life. These results are confirmed with a propensity score approach that attempts to account for the potential selectivity of women into marriages in which spouses might be more likely to migrate to the U.S. based on factors that might also influence later-life health. However, there were no clearly significant mediators of the relationship between spousal migration to the U.S. and late-life chronic disease for older Mexican women not in a union; the burden of raising children alone, labor outside the home, and respondents' body mass index did not significantly mediate this relationship.

INTRODUCTION

Mexico is currently undergoing a rapid demographic and epidemiologic transition with consequences for health and well-being. Longer life expectancy in combination with declining fertility rates have led to a quickly aging Mexican population (Ham-Chande 2011). Meanwhile, the epidemiological transition has led to the rise of non-communicable diseases as leading causes of morbidity and mortality in Mexico. The leading causes of mortality in Mexico are now heart disease, diabetes, and cerebrovascular disease, and major depressive disorder is the largest contributor to disability (Stevens et al. 2008). Within this shifting demographic and health

context, there is an increasing interest in the life-course social determinants of health for older adults in Mexico.

At the same time, there is growing evidence of the effects of family member migration to the U.S. migration on the health of those who remain in Mexico (Bojorquez, Salgado de Snyder and Casique 2009; Creighton et al. 2011; Ullmann 2012). For example, the stress associated with family separation, feared or actual family dissolution, and increased responsibility for the well-being of young children has been linked to more depressive symptoms for Mexican women whose spouses have migrated to the U.S. (Bojorquez, Salgado de Snyder and Casique 2009; Salgado de Snyder 1993). Family members of U.S. migrants may also benefit from socio-economic mobility, better access to quality health care, as well as potentially adverse consequences of increased access to purchased foods or tobacco products (Handley et al. 2013; Riosmena et al. 2012; Salinas 2008).

The objectives of this paper are at the nexus of these two lines of inquiry – the social determinants of health and well-being for older Mexican adults and the effects of family member migration to the U.S. on family members in Mexico. Specifically, I estimate the effect of spousal migration to the U.S. on the later-life health outcomes, including diabetes, hypertension, and depression for older Mexican women. Diabetes is the leading cause of mortality for Mexican women, and hypertension, or high blood pressure, is one of the leading risk factors for diabetes, heart disease and cerebrovascular disease (Stevens et al. 2008). Major depressive disorder is now considered to be the leading cause of disability worldwide (Murray et al. 2012), and in Mexico (Stevens et al. 2008).

In addition to estimating the relationship between spousal migration to the U.S. and later-life health outcomes, I aim to identify mediators of the relationship between spousal migration to

the U.S. and later-life health outcomes. It is possible that women whose spouses migrated to the U.S. at some point in their lives experienced stressors associated with raising children alone and working outside the home that in turn elevate risk for later-life chronic disease and depression. It is also possible that the link between spousal migration to the U.S. and later-life chronic disease might be explained by differences in overweight and obesity for older women based on their connection to U.S. migrant networks.

LITERATURE LINKING SPOUSAL U.S. MIGRATION AND HEALTH

Mexican migration to the U.S. has potentially far reaching effects on the families and community members of migrants. Research on the effects of migration on family members who remain in Mexico has found evidence of change in a range of nutritional, infectious disease, and mental health outcomes (Frank 2005; Hamilton, Villarreal and Hummer 2009). More recently, this work has started to consider the potentially adverse health impacts of having migrant family members for children. For example, Creighton and authors (2011) found that children with some U.S. migrant networks in their household had significantly greater odds of becoming overweight or obese over a three-year period compared to those with no migrant networks. Riosmena and co-authors (2012) also find an association between receiving remittances from the U.S. and increased odds of overweight and obesity. They suggest that their findings were largely explained by the increased purchasing power of those with U.S. migrant family members, but also by potential changes in preferences around food, preparation, portions, and body sizes as the result of ‘cultural remittances’ from migrants who have spent time in U.S. food environments.

Another body of literature on the effects of migration on family members who stay has focused on the health outcomes for women with spouses who migrate to the U.S., which is the focus of my analysis. This literature has origins in qualitative research on Mexican women and

their families from the 1960s onward (Dinerman 1978; Dinerman 1982; Kanaiaupuni 1995; Mummert 1988; Wiest 1983) and has documented that there are multiple, countervailing effects of spousal migration to the U.S. on women's lives in Mexico. There are many potential stressors related to the U.S. migration of spouses, including worry and anxiety about spouses' safety, but also the potential of infidelity or marital dissolution. In addition, women are often charged with increased burden of household responsibilities, and often assume informal or domestic work outside the home in order to support their family's basic needs as husbands work to establish themselves in the U.S., or during periods of fewer remittances.

On the other hand, some of this research suggests that women may benefit from the international migration of their spouses. For one, they may benefit from improved social and economic standing, particularly in the cases in which men were able to maintain consistent remittance sending to families back home in Mexico (Wiest 1983). Given the absence of husbands and increased responsibility for their household finances, some informants in these earlier qualitative studies reported experiencing a sense of freedom and increased control within their families. As Hondagneu-Sotelo writes of Mexican immigrant women informants reflecting on their time in Mexico, before their spouses' migration to the U.S. women "had always obeyed their parents or husbands, but their husbands' migration enabled them, indeed required them, to act decisively and autonomously", assuming the position of de facto head of the household and often taking on leadership roles in the broader community (Hondagneu-Sotelo 1994).

Only recently have studies of the impact of spousal migration to the US focused more specifically on health effects. This research has primarily focused on mental health outcomes using qualitative data (McGuire and Martin 2007) or quantitative data with community or regional samples (Bojorquez, Salgado de Snyder and Casique 2009; Salgado de Snyder 1993).

These studies suggest that the stress associated with familial separation and the additional roles and responsibilities assumed by women who remain in countries of origin can lead to depression, anxiety, or *ataques de nervios* (Bojorquez, Salgado de Snyder and Casique 2009; Salgado de Snyder 1993). For example, in ethnographic work with women in Oaxaca, Mexico, McGuire and Martin (2007) report that many women with spouses in the U.S. expressed a sense of grief or loss during the time their spouse was away, often as part of real or perceived concerns of family disintegration. This sense of loss was compounded by feelings of uncertainty or fear around the safety of their family members while crossing the border and living in the U.S., particularly if they were undocumented. In addition, women who remain in communities of origin face additional roles as the result of their spouses' migration, including the potentially dual responsibilities of raising children and providing economically for the family, at least during periods in which spouses are not sending remittances back home (Salgado de Snyder 1993).¹

There may also be positive mental and physical health consequences of spousal migration on mental health, related to actual or expected improvements in the household economic situation or children's educational prospects due to migration (McGuire and Martin 2007), or the potential for women's increased autonomy around personal and family economic and health-

¹ Another study Caballero, M., R. Levya-Flores, S.C. Ochoa-Marín, A. Zarco, and C. Guerrero. 2008. "Las mujeres que se quedan: migración e implicación en los procesos de búsqueda de atención de servicios de salud." *Salud Pública de México* 50(3):241-50. based on in-depth interviews with women in two Central Mexican communities report that in the absence of sufficient remittances, women who remain often take on domestic or informal work in addition to their roles as heads of household and work inside the home. When women worked outside the home it was often indicative of insufficient remittances or general economic strain in the family. On the other hand, in their analysis of Mexican Migration Project data, Aysa and Massey Aysa, M., and D.S. Massey. 2004. "Wives left behind: The labor market behavior of women in migrant communities " in *Crossing the border: Research from the Mexican Migration Project*, edited by J. Durand and D.S. Massey. New York, NY: Russell Sage Foundation. found that only urban-dwelling women with migrant spouses in the U.S. were compelled to join the labor force; spousal migration did not appear to influence the labor participation of women who remained in rural areas of Mexico.

related decisions. For example, Caballero and authors (2008) found in ethnographic work that some women with spouses abroad gained greater freedom to seek out health care services, particularly related to sexual and reproductive health. However, this increased autonomy around healthcare services was only enjoyed by women who did not move in with other family members during their spouses' time in the U.S.; while these women who remained on their own may have had less social support, they had greater autonomy. On the other hand, Bojorquez and authors (2009) found no support for the idea of increased autonomy, including autonomy in family decision-making and economic autonomy among community samples of Mexican women in the states of Guerrero, Oaxaca, and Puebla, and no significant interaction between spousal migration and autonomy measures on past-week depressive symptoms.

Ullmann (2012) has extended this literature on the relationship between spousal migration to the U.S. and chronic disease outcomes in her analysis of health differences for young and middle-aged adult women in Western Mexico based on their spouses' history of U.S. migration. Ullmann found mixed evidence for differential chronic health outcomes among women with migrant and non-migrant husbands. Those who had spouses with U.S. migration history were more likely to report heart disease, but there were no significant differences in hypertension, diabetes, or the odds of ever smoking when comparing women with migrant spouses and those with never-migrant spouses. In line with the literature on mental health outcomes, Ullmann also found evidence that women with spouses abroad were more likely to report "emotional or psychological" problems more generally, although with no clarification on the specific kind of problems these might be. There was no 'dose-response' effect of male

migration whereby women whose husband's spent a greater proportion of the total time of their union abroad had worse health.²

Although the extant literature on depressive symptoms and chronic disease outcomes represent an important extension in the literature on the potential health impacts of spousal migration on the health of women primarily in middle adulthood, there is an additional need to understand how these findings extend into later-life, and to examine some of the factors that might explain these findings of worse or similar health.

CONCEPTUAL FRAMEWORK

This paper draws on theories of transnationalism, and in particular the gendered effects of cross-border relationships. Transnationalism refers to the “political, economic, social and cultural processes that extend beyond the borders of a particular state, include actors that are not states, but are shaped by the policies and institutional practices of states” (Glick-Schiller, 1999). Of specific relevance to this analysis is the idea that families may extend temporarily or permanently across nation-state borders. Family members across borders may be engaged in economic exchanges, cultural practices, and social relationships that include caregiving, social support, and compliance with familial obligations (McKenzie and Menjivar 2011; Viruell-Fuentes and Schulz 2009). Shifts in lifestyle or dietary preferences, changes in family level

² Ullmann also considered the possibility that women with migrant spouses were somehow differently selected into such unions based on their earlier life health conditions, as measured by a retrospective indicator of self-rated health status by 14 years old and adult height – a commonly used proxy of early childhood nutrition and health context. Although she found no differences on these two proxies of childhood conditions for women based on spousal migration histories, tests of other measures of childhood context (e.g. material deprivation, parental education, place of birth) and the role of women's broader family migration histories (e.g. among siblings, parents, or children) might be included in further examination of how spousal migration contributes to health and aging amidst other life-course contributors.

purchasing power, and resources around chronic disease prevention and management as the result of migration to the U.S. might extend to family members, including those who never migrate, through economic or social remittances (Creighton et al. 2011; Riosmena et al. 2012). In addition, family separation across borders can very often involve experiences related to actual or potential family dissolution and feelings of worry and grief (Frank and Wildsmith 2005; McGuire and Martin 2007). These family strains over time may contribute to chronic stress burden, which may potentially elevate the risk of depressive symptoms, hypertension, and diabetes.

Attention to cross-border family ties and later-life health also needs to take into consideration the role of gender and the family in structuring transnational processes and the health outcomes of these processes. Levitt and Jaworsky (2007) suggest that “family networks that cross borders are characterized by gendered differences in power and status” (p. 137). Mahler and Pessar (2001) propose the idea of gendered geographies of power to explain the way in which gender structures migration, and how migration may both change and reinforce traditional gender relationships and inequalities. Migration may lead to changes in gender hierarchies, but may also reinforce traditional, gendered divisions of labor and power as migrants encounter new social locations in the reception context while continue to operate within the gendered context of their country of origin. Even amidst changes in the gendered division of labor, women who gain employment outside the home as the result of migration likely have a double burden of formal employment and childcare (Caballero et al. 2008; Dinerman 1982).

Based on both the extant literature on spousal migration to the U.S. and the health outcomes of Mexican women and my conceptual framework linking transnationalism to theories of gender and power, I propose the following hypotheses:

H1: Spousal migration to the U.S. will be associated with higher probabilities of diabetes, hypertension, and depression for middle-aged and older Mexican women, compared to those whose spouses never migrated.

H2: The adverse effect of spouses' U.S. migration history on chronic disease and depression outcomes for middle-aged and older Mexican women will be explained in part by the following factors: 1) having a history of raising children on their own, 2) an increased burden of labor outside the home, 3) by higher rates of overweight or obesity among those with U.S. migration networks.

METHODS

DATA

Data for this analysis comes from the baseline (2001) Mexican Health and Aging Study (MHAS), a nationally representative panel survey of adults living in Mexico who were born before 1951. The objective of the MHAS was in part to understand the role of migration, including family member migration, on the health and aging indicators of middle-aged and older Mexican adults. The MHAS selected households with adults 50 years and older that were previously included in the nationally representative 2000 Mexican Employment Survey (ENE-2000) (Wong and Espinoza 2004). Based on the pool of potential respondents, the MHAS used a multistage area probability sample, stratifying by two Mexican regions consisting of: 1) six states with high rates of out-migration to the United States and 2) the remaining 26 states and the Federal District of Mexico. Households in heavy out-migration states (Durango, Guanajuato, Jalisco, Michoacán, Nayarit and Zacatecas) were oversampled relative to households in the remaining states³.

³ Based on out-migration data from 1995. Guanajuato, Jalisco, and Michoacán were the most prominent sending regions throughout 20th Century U.S.-Mexico migration history, although the

At the household level, each adult 50 years or older had an equal probability of being selected, proportionate to the number of age-eligible adults in the household. Spouses or cohabitating partners were also interviewed regardless of age. Proxy interviews were completed for respondents who could not answer directly due to severe health problems, cognitive impairment, and language difficulties (e.g. non-Spanish speakers), or prolonged (but temporary) absences. Next-of-kin interview were conducted on subjects who had died by the follow-up visit.

The MHAS had a baseline response rate of 89.7% and collected data from a total of 15,156 respondents, spouses and proxy respondents in 2001. I excluded 1032 proxy respondents from my analytic sample given their limited responses on key measures in my models (i.e. childhood conditions, depressive symptoms).⁴ I also excluded 1669 spouses that were younger than 50 years old at baseline. After excluding proxy respondent interviews, non age-eligible spouses, I was left with a baseline sample of 12,455 age-eligible direct respondents and spouses.

remaining three states are also considered part of the 'historic sending region' of Western Mexico Durand, J., D.S. Massey, and R.M. Zenteno. 2001. "Mexican immigration to the United States: Continuities and changes." *Latin American Research Review* 36(1):107-27..

⁴ The exclusion of proxy interviews may bias the sample towards healthier individuals with more education, given that health and language difficulties were primary reasons for interviewing a proxy. In addition, while long-term care facilities are rare in Mexico relative to the US, a growing number of older adults make use of these facilities and would not be represented in this study Wong, R, M Pelaez, A Palloni, and K Markides. 2006. "Survey data for the study of aging in Latin America and the Caribbean - Selected studies." *Journal of Aging and Health* 18(2):157-79.. This may skew the MHAS sample towards younger adults with better physical, mental and cognitive health indicators. On the other hand, Wong and Espinoza Wong, R., and M. Espinoza. 2004. "Mexican Health and Aging Study (ENASEM), 2001: Methodological Document and Project Report, Version 2." compared baseline sample characteristics for the MHAS to responses to other household surveys (National Health Survey, the National Income and Expenditures Survey, and the National Employment Survey, all fielded in 2000) and the 2000 Mexican Census to test the validity of the sample. They found that MHAS respondents were comparable to respondents to the Census and other national surveys on distributions of age, gender, educational, marital status, literacy and number of children. Distributions of responses on average height, body mass index, self-rated health, doctor-diagnosed diabetes, hypertension, and current smoking and alcohol use were comparable between MHAS respondents and respondents 50 years and older to the National Health Survey.

I further restricted my sample to female respondents with some marital history that were not missing information on spousal U.S. migration history (n=498), yielding a final analytic sample of 6253 respondents.

MEASURES

Outcome measures

The outcome measures include self-report measures of doctor-diagnosed diabetes and hypertension, respectively. Respondents were asked, “has a doctor or medical personnel ever told you that you have diabetes or a high blood sugar level?” and “has a doctor or medical personnel ever told you that have hypertension or high blood pressure?”; a total of 121 respondents reported never visiting a doctor or medical personnel as of 2001 and were excluded from the analysis.⁵

The third dependent variable is a measure of past-week depressive symptoms using an adapted, 9-item version of the Centers for Epidemiological Studies – Depression (CES-D) scale. This scale has been validated for use among older adult populations in Mexico (Aguilar-Navarro et al. 2007). For the scale, respondents were asked to indicate if for the majority of the past week they felt the following: depressed, lonely, sad, tired, that everything they did was an effort, or that their sleep was restless. An additional three positively worded items were included: whether respondents felt happy, enjoyed life, or felt they had a lot of energy. Each item originally had a response code of 1 for a “yes” and 0 for a “no” answer. The three positively worded items were reverse coded and all of the items were summed such that higher scores indicated more depression-related feelings. The scale has a reliability coefficient of $\alpha = 0.80$ for this sample. In

⁵ See further on in the paper where I describe sensitivity tests re-testing the relationship between spousal migration to the U.S. and later-life diabetes and hypertension based on whether or not respondents had recent tests for either of these conditions and other indicators of access to health care.

my analyses I utilize a binary measure of five or more past-week depressive symptoms as a proxy for clinical depression. This cut-off point was suggested based on the validation study by Aguilar-Navarro and co-authors, (2007), based on their validation study with a sample of geriatric clinical patients in Mexico City.⁶

Spousal migration to the U.S.

The MHAS collected data from female respondents on whether or not their spouses ever went to live and work in the U.S., only if those respondents were not currently married (i.e. widowed, divorced, or separated). This means that for those women currently married, spousal migration history must be captured from their spouse's own interviews. This creates two categories of female respondents whose spouses migrated to the U.S. – those who are divorced, widowed, or separated, and those currently married and living with their spouses. Given my findings of significant descriptive differences across demographic, socio-economic, and health outcomes, I create a four-category measure of spousal U.S. migration history (i.e. yes or no) by current marital status (i.e. currently in a union versus currently not in a union). As an alternative to this four-category measure, I test a binary measure of spousal U.S. migration, but stratify analyses by current marital status.

ADDITIONAL COVARIATES

Controls in multivariable analyses include age, residence characteristics (i.e. more urban versus less urban; state with high US out-migration versus other state), and a number of family-

⁶ After comparing scores on the 9-item CES-D scale to clinician diagnoses of major depressive disorder using the criteria from the Diagnostic and Statistical Manual, Fourth Edition (DSM-IV), the authors found that a cut-off of five points maximizes both the sensitivity –the ability of the CES-D to suggest clinical depression given a positive clinical diagnosis using the DSM-IV, and specificity—or the ability of the CES-D cut-off to detect negative cases given a true negative clinical diagnosis of depressive disorder using the DSM-IV. In particular, the sensitivity estimated for the 5-point cut-off was 85.3% and the specificity was 56.7%.

related measures. Specific to respondents' family history, I control for total number of years respondents were married and number of live births. I use a measure of whether or not respondents ever raised their children alone as a control variable, but also as a potential mediator of the relationship between spousal migration to the U.S. and later-life health. I control for respondents own migration history. Because very few female respondents migrated to the U.S., I collapsed those with both U.S. and internal migration histories and compared them to those with no migration history. I additionally control for measures of adult socio-economic status, including occupational history, number of durable household items (range: 0-6, including telephone, refrigerator, etc), and an indicator of self-rated economic status. The latter measure was created from a question asking respondents to describe their financial situation as "excellent, very good, good, fair, or poor"; I created a variable contrasting those reporting "excellent, very good, or good" financial situations with those who reported "fair or poor".⁷

I also employ measures referring to early-life socio-economic and health status as part of a propensity score matching approach described below. These indicators include measures of childhood socio-economic status, including whether or not respondents had any formal education, and their mother's educational attainment (no formal education, any education, or don't know), and whether or not respondents had sanitation facilities in their household before age 10. I also include a measure of whether or not respondents experienced a serious illness or injury before age 10, a potential indicator of childhood health status. Finally, I include a measure

⁷ I tested occupational history alternatively as a history of whether or not respondents worked for pay; and an indicator of whether or not they reported their lifetime occupation in the domestic sector (versus other occupations or no work history), since domestic work seemed to be associated with more depressive symptoms compared to other work. I also alternatively test indicators of whether or not respondents report being in the bottom two quartiles of monthly income and household wealth for the entire MHAS sample, although these appear to be less predictive of health outcomes than the indicators of household items and subjective financial situation.

of the number of years that respondents were exposed to the Bracero era of expanded labor migration to the U.S. This mirrors approach of Wong, Palloni and Soldo (2007) who use introduce a similar measure in a propensity score approach to asses the role of male migration to the U.S and later-life wealth among MHAS respondents. I experiment with ages to start considering “exposure” to the Bracero period, and the possibility of selecting into marriages that include migration, and select 16 years of age, which is just below the younger ages reported for entering into marriage.⁸

ANALYTIC PLAN

I estimate a series of multivariable logistic regression models of diabetes, hypertension, and depression, respectively, on whether or not respondents reported spousal migration to the U.S. at any point in their lifetime. I test these models alternatively by including all respondents with some marital history, using a four-category indicator of spousal migration to the U.S. and current marital status (i.e. currently in a union versus not currently in a union), and stratifying by current marital status using a binary measure of spousal migration to the U.S.

Mediation Analyses

The test for mediation effects in the case of logistic regression calls for an alternative approach to the comparison of reduced and full models with and without the key mediating variables to assess the impact on the coefficient and significance of the measure of spousal migration to the U.S. (Mood 2010) The `-knb-`function in STATA allows for the decomposition of mediation effects that account for the rescaling of variance in a latent outcome variable that

⁸ The average age of last marriage for women in the sample is 20 years old, with only a few reporting marriage before 17 years old. Those that reported more than one marriage (n=663) reported slighter earlier ages for this first marriage, with an average of 17 years old and about 20 total cases reporting marriages at ages 12-15 years old.

occurs each time another predictor variable is added to a logistic regression model (Kohler, Karlson and Holm 2011).

Propensity Score Approach

I address in part the possibility that there is some selectivity bias present in my analysis. That is, there may be factors that influence women's selection into marriages that may include spousal migration to the U.S. that may also influence later-life health. These may be factors related to family or the broader community (e.g. norms around male migration), or to personal selection into marriages that might promise greater stability in terms of spouse's presence in the home (non-migration), or greater economic returns (labor migration).

I therefore carry out a propensity score matching approach in which I leverage variables that refer to early-life characteristics such as respondents' educational attainment (no versus any), mother's educational attainment, an indicator of childhood illness, and another of respondents' material conditions during childhood (measured by the indicator of whether or not they have sanitation facilities in their household). I additionally include the continuous measure of 'exposure' to the Bracero era. I use this set of covariates (X) to estimate a logit model predicting $D = 1$, or spousal U.S. migration. The probability of spousal U.S. migration, $D=1$, given X , is the propensity score, expressed as $P(D = 1|X)$ in the following equation predicting outcomes Y^1, Y^0 (e.g. doctor-diagnosed diabetes or not).

$$(Y^1, Y^0) \parallel D \mid P(D = 1|X) \quad \textbf{Equation 1}$$

I use these propensity scores to obtain average "treatment" effects or the average effects of spousal migration to the U.S. based on "matching" individuals with spousal migration propensity scores that are similar to one another (Nichols, 2007; Morgan and Winship, 2007). I

use the `–teffects–` function in STATA 13, which takes a nearest neighbor matching approach with replacement.⁹

Missing Data

Income and wealth measures were imputed by the MHAS study team given the somewhat number of missing values for those measures. In other cases, as with the large number of ‘don’t know’ indicators for the measures of body mass index and maternal education, I create a category to indicate missing values. To otherwise address missing data I completed the analyses using the GSEM framework in STATA 13, which does not allow for full-information maximum likelihood as with SEM models, but something called ‘equation-wise’ deletion, which means that information from cases missing on some values are used to help estimate the equation, which is an improvement on list-wise deletion (StataCorp LP 2013).¹⁰

RESULTS

Descriptive Statistics

Table 1 presents demographic differences by the categories of spousal migration to the U.S. and current marital status. In terms of current residence, it seems that who are not in a current union are also more likely to be living in urban areas compared to their married counterparts, regardless of spousal migration history. On the other hand, both married and

⁹ This approach should produce similar results compared to some of the alternative methods (e.g. kernel, interval) offered in earlier versions STATA, but with more accurate estimation. That is, the `–teffects–` command accounts for greater uncertainty in its estimates of standard errors, which results in more accurate estimates of significance. I also run a post-estimation test of overlap the propensity for spousal migration to the US with the idea that respondents who might not plausibly match to any other respondent based on the group of “selection” covariates (e.g. early childhood circumstances, exposure to Bracero era) be ‘trimmed’ from the analysis. However, I find that respondents with and without spousal migration to the U.S. overlap sufficiently so that I do not have to trim respondents from my analysis.

¹⁰ In additional models that I do not have the space to show here, I estimate depressive symptoms as a continuous outcome. In this case I employed the full information maximum likelihood approach to address missing (i.e. the MLMV model specification within the SEM framework).

unmarried women who report a history of spousal migration to the U.S. are more likely to living in one of the six historically high out-migration states oversampled as part of the baseline study. Women with a history of spousal migration are also more likely to have their own history of migration to the U.S.: 10% of women with a history of spousal migration to the U.S. also went to the U.S. to work or live across categories of marital status, compared with 2% of those with no spousal migration history. Rates of internal migration, on the other hand, were highest for women both currently married and with a history of spousal migration to the U.S. (68%), and lowest for those not currently in a union and with spousal migration history (57%).¹¹

There were substantial differences in the burden of labor in and outside the home by spousal migration to the U.S. and current marital status. Between 22% and 25% of women not in a union at the baseline survey reported working in the domestic sector, while only 12% to 15% of those currently married reported the same. About 75% of women not currently in a union report ever working in their lifetime, regardless of spousal migration history, while only 56% of those currently married whose spouses also migrated to the U.S. ever worked (not shown). Women who were widowed, divorced, or separated at baseline were more likely to report raising children alone regardless of spousal migration to the U.S., nearly 66% of those both not in a union and reporting spousal migration history reported a period of raising children alone

¹¹ I report on respondents U.S. migration for context only, since I end up collapsing this measure with internal migration history. For additional context, the descriptive tables show that spouses who migrated to the U.S. – themselves more likely to have gone abroad and more likely to reside in historically high out-migration states—were more likely to have family members that have immigrated to the U.S. to live or work, including parents, siblings, and children. Over 40% of respondents whose spouses migrated to the US reported that their parents and/or siblings had also migrated to the U.S. compared to around 20% of those with no spousal migration to the U.S. The figures were similar for the percentage of respondents who had at least one adult child living or working in the U.S. at the time of the survey: up to 48% of respondents who reported that their spouses migrated to live or work in the U.S. also reported having an adult child currently living in the U.S. compared to around 20% of those with no spousal U.S. migration history.

compared to the 41% not in a union but with no spousal migration history. In other words, those who are not currently in a union faced greater burdens of work in and outside the home over their life-course, but these burdens appear to be even greater if their spouse also migrated to the U.S.

[Table 1 about here]

All groups categorized by spousal migration history and marital status were similar on indicators of education and having a serious health problem before age 10 – all indicators of childhood socio-economic and health conditions that may influence the selection of individual women into marriages with and without histories of migration to the U.S. However, about 64% of those with no spousal migration history to the US, and 74% of those with a history of spousal migration to the U.S. reported having no sanitation facilities in their household before age 10, suggesting a context of more disadvantaged material conditions for those in marriages that did not involve migration to the U.S. It may be important to control for this particular indicator of early childhood material conditions and health context, given that these early-life (and pre-marriage) conditions may also influence later-life health outcomes.

The final set of descriptive statistics in this table report on current economic and material conditions. Across categories of marital status and history of spousal migration to the U.S., respondents report a similar number of household items (slightly more than four, on average). They also give similar ratings of their subjective economic situation, with around 80% reporting insufficient funds to meet basic needs. There is a greater variability when it comes to reporting monthly incomes and net assets that fall in the bottom two quartiles, based on the overall baseline sample. Around 57% of respondents who are married report being in the bottom two quartiles of monthly income, whereas the figure is *lower* for those who are currently widowed, divorced, or separated (52% of those with no spousal migration history and 50% of those with

spousal migration history). It may be that women in particular who are not in a union receive more monthly contributions from their children and other family members than those who are married and combine resources with their spouse. On the other hand, women who are not in a union have fewer total assets to their name compared to their counterparts in a union, regardless of spousal migration history. Well over half of respondents not in a union report being in the bottom quartiles of wealth as constructed from the overall sample, whereas 40% of those in a union report being relatively disadvantaged in terms of their total assets.

[Table 2 about here]

Table 2 shows descriptive statistics for the outcome variables for my analysis and additional health measures. On the descriptive level, there appear to be important differences in health outcomes by both history of spousal migration to the U.S. and current marital status – with the most adverse health outcomes reported by those whose spouses migrated to the U.S. *and* who are not currently married. Around 45% of women with no spousal migration history (regardless of marital status) and 48% of those whose spouses migrated to the U.S. but are currently married reported ever being diagnosed with hypertension. This compares to the 57% of women who reported not being in a current union and spousal migration to the U.S. that reported doctor-diagnosed hypertension. Similarly, 17% with no spousal migration history reported ever being diagnosed with diabetes while a full quarter of those with both spousal migration *and* no current union reported a doctor diagnosis of diabetes. It should be noted, however, that women with some history of spousal migration—and those who are not currently in a union, in particular—are significantly more likely to report having had recent tests for hypertension and diabetes.

Results are a bit more varied for the measure of past-week depressive symptoms. At first glance, the trends in past-week depressive symptoms appear to be more closely related to current

marital status: around 40% of those currently married report five or more past-week depressive symptoms, regardless of spousal migration to the U.S. Among those not currently in a union, 49% of those with no spousal migration history report symptoms consistent with past-week depression and 55% of those with spousal migration to the U.S. report the same.

There are some differences in BMI across categories of spousal U.S. migration and current marital status. Those whose spouses migrated to the U.S. and are currently married were the least likely to report being underweight or of normal weight (16% compared to 20% to 22% for other categories). However, it is not clear that this group is necessarily more overweight or obese, since they are also more likely to have missing BMI numbers (nearly 40% compared to about a third for other groups). About two thirds of respondents reported having some kind of health insurance coverage by 2001, although this was closer to 60% for those who reported spousal migration to the U.S. and were in a union at the time of the survey. Nevertheless, rates of reporting no usual source of healthcare were similar across all groups – less than a third report having no usual source of care for a minor health problem.

Simple Statistics

Table 3 reports results from simple logistic regression analysis for all three-outcome variables using only the four-category measure of both spousal migration history and current marital status. The results for depression suggest that respondents not in a current union – both those who report spousal migration history and those who do not – have significantly greater odds of reporting five or more past-week depressive symptoms compared with those who are both currently married and reported no spousal migration history, which is the reference group. There was no significant difference in the odds of depression for those who reported spousal migration to the U.S. and are currently married compared to their counterparts who are also married but have no history of spousal migration to the U.S. Again, it appears that the odds of

depression, based on a cut-off of five or more past-week depressive symptoms, is more closely linked to current marital status than respondents' experience with spouses migration to the U.S.. For the analyses of doctor-diagnosed hypertension and diabetes, respectively, the only group that has significantly greater odds of reporting these conditions compared to the currently married/no spousal migration history reference category is the group that is both currently not in a union *and* reports a history of spousal migration to the U.S.

Multivariable logistic regression models

In Tables 4-6, I present multivariable logistic regression models for each of the three health outcomes using, variably, a four-category measure of spousal U.S. migration and current marital status, and models stratified by current marital status. Here I summarize results across tables by each health outcome.

[Table 4 About here]

Depression

Across all multivariable results presented in Tables 4-6, it is clear that current marital status is a more important predictor of depression than spousal migration history in the multivariable model, as was evident in the simple models. The binary measure of spousal migration is not significantly associated with depressive symptoms in models stratified by current marital status. What is interesting to note is that there are other variables related to migration that are significantly associated with the odds of depression (Table 4). Living in a state with high rates of out-migration to the US is significantly associated with greater odds of past-week depression, all else equal (OR: 1.38, 95% CI: 1.22, 1.56, Table 6). Personal migration, which in the case of women is primarily internal migration within Mexico, is associated with 12% greater odds of depression controlling for spousal migration and residence in a high out-migration state ($p < 0.05$). Finally, raising children alone is significantly associated with greater

odds of depression, all else equal (OR: 1.47, 95% CI: 1.29, 1.67, Table 6). It should be noted that living in a high out migration state, internal migration, and raising children alone are all more prevalent among those who report both spousal migration to the U.S. and not currently in a union.

[Tables 5 and 6 about here]

Hypertension

Spousal migration is not significantly associated with later-life hypertension after including the full set of controls, including family demographics, early childhood and adult socio-economic status when using the four-category measure of spousal migration and current marital status (Table 4). However, in the stratified models, spousal migration to the U.S. is associated with increased odds of hypertension when limited to the sample of respondents not currently in a union (Table 6, OR: 1.41, $p < 0.01$). In addition to separating models by four-category and binary models, I present results in Tables 7 and 8 that further stratify the results by specific categories of divorce/separated versus widowed. There is a significant association between spousal migration and the odds of hypertension for those who are currently widowed only (OR: 1.42, $p < 0.01$). However, it should be noted that these stratified models are comparing results for models with quite different sample sizes, which could explain some of the differences in significance level.

Among the other set of controls in the model, older age, greater numbers of reported live births, and reporting a serious health condition during childhood are each associated with greater odds of hypertension (Table 4). Raising children alone is associated with 22% greater odds of doctor-diagnosed hypertension ($p < 0.01$); raising children alone is more prevalent among those currently not in a union, but in particular for those who both report spousal migration to the US and not currently being in a union. Poorer self-rated economic situation, a subjective measure, is

associated with significantly greater odds of reporting hypertension, but having more household items, a slightly more objective measure of material conditions, is also significantly associated with greater odds of hypertension. This is a somewhat contradictory finding that might reflect the strain of relative or perceived economic deprivation, even while there may be a reverse socio-gradient for some health outcomes for this group of older adults in Mexico, where better economic conditions facilitate diets or sedentary lifestyles that are risk factors for chronic disease outcomes.

[Tables 7 and 8 about here]

Diabetes

The results for the doctor-diagnosed diabetes outcome suggest that spousal migration among those who report not currently being in a union continues to be associated with greater odds of diabetes as was found in the simple models. Table 4 shows that reporting both spousal migration and being currently widowed, divorced, or separated is associated with 46% greater odds of reporting doctor-diagnosed diabetes, all else equal ($p < 0.05$), compared with the reference group of women currently married and with no spousal migration history. There was a significant odds of diabetes for those who reported spousal migration to the U.S. in stratified models as well, including those who were separated or divorced, and those widowed at the time of the survey (Tables 6-8).

Unlike with the models for depression, living in a state with high rates of out-migration to the U.S. and respondents' personal migration each appeared to be significantly associated with *lower* odds of diabetes diagnoses, all else equal. Also unlike both the models for depression and hypertension, raising children alone is not significantly associated with diabetes (and is not associated with diabetes even in an analysis without controls, not shown). This may suggest that the pathways linking spousal migration and being currently widowed or divorced/separated from

one's spouse to later-life diabetes do not operate through the stress of raising children alone, which again is most prevalent among those with both spousal migration and currently not married or in a union.

MEDIATION ANALYSES

My theoretical model emphasizes the possibility that the relationship between spousal migration to the U.S. and later-life health outcomes is mediated by the effect of raising children alone, and potentially by variables of labor outside the home, or by overweight/obesity. One limitation of the *-khh-* function is that it does not yet allow for key independent variables to be factor variables, which means that I cannot use my four-category measure of spousal migration by marital status. The alternative is to use the binary measure indicating whether or not respondents' spouses ever went to live or work in the U.S. or not. This complicates the test of raising children alone as a potential mediator, since my demographic variables suggest that a *combination* of spousal migration history and the end of one's marriage or union are correlated with raising children alone. Women whose spouses migrated but are currently still in a union and living with them are just as likely to report raising children alone as those currently married women whose spouses never migrated. In addition, there is no significant zero-order association between spousal migration and any of the three outcomes for those currently in a union. I therefore run the mediation models using the binary measure of spousal migration, restricted to those not currently in a union.

[Table 9 about here]

The results suggest that there is a very small and non-significant mediating effect of raising children alone on the relationship between spousal migration and each of the three later-life health outcomes. As shown in Table 9, the estimated odds ratios and significance levels decrease only very slightly when adding the measure of raising children alone (the full model) to

the reduced model that includes only the measure of spousal migration to the US with the remaining demographic and socio-economic controls, as described in the multivariable models above.

Given the null results for the mediating effect of raising children alone, I moved on to test measures of occupation as potential mediators of the relationship between spousal migration and greater odds of depression, hypertension, and diabetes, at least among those not currently in a union. I do not show the results here, given that I find no significant mediating effects when using any of the occupation variables I tested. These include type of work (domestic versus other) and other indicators of work history (ever worked, ever worked for pay, ever worked for free). I test indicators of adult socio-economic status as alternative potential mediators. The results are null for all of these measures as significant mediators on their own. While many of these measures are significantly associated with health outcomes on their own, there is little variability in the distribution of occupational and other SES measures among women who are not currently in a union.

The final measure that might explain some of the relationship between spousal migration and hypertension and diabetes, at least for those not currently married, is body mass index – an important risk factor for both hypertension and diabetes. It is possible that those with improved socio-economic status due to U.S. migration (or spousal migration) to the U.S. have higher body mass index on average, given their greater ability to purchase prepared and processed food products or to afford more sedentary lifestyles. Nevertheless, I formally test BMI as a mediator of the relationship between spousal migration and both hypertension and diabetes, also using the

–khh- decomposition analysis, and find no significant mediating effect of BMI on my zero-order relationship (not shown).¹²

PROPENSITY SCORE APPROACH

Table 10 shows the full set of measures I use to implement the propensity score matching approach, although here I show the model as a multivariable logistic regression of spousal migration on the set of predictors. Notably, age is inversely associated with the odds of reporting a spouse who has migrated to the US, but exposure to the Bracero period is positively associated the odds of spousal migration to the US. Specifically, each year of additional exposure to the Bracero era is associated with 7% greater odds of having a spouse that migrated to the US, controlling for the effect of age and childhood socio-economic status indicators ($p < 0.001$). The other two indicators reflect early childhood socio-economic and material conditions, although with some contradictory findings. Those who report having no sanitation facilities in their household before age 10 are significantly more likely to report having a US migrant spouse, suggesting a link between socio-economic and material disadvantage and the odds of spousal migration.

[Table 10 about here]

On the other hand, having low levels of education (i.e. no education compared to any education) is associated with reduced odds of reporting a US migrant spouse. The relationship

¹² As might be expected, being in higher categories of BMI was in most cases significantly associated with greater odds of diabetes and hypertension in the model with full demographic and socio-economic controls. The exception was for models predicting diabetes that were either limited to those currently married or models that included this group of currently married respondents. It is also notable that those with missing BMI had significantly greater odds of hypertension and in diabetes models restricted to those not currently married compared to the reference group of underweight/normal respondents. This suggests that those with missing data may in fact have higher BMI on average, but may be reporting that they do not know their weight or height out of social desirability bias (or lack of access to knowledge about weight or height), which may present a challenge in really assessing how BMI does not explain part of the relationship between spousal migration and chronic disease outcomes (not shown).

between childhood socio-economic status and the US migration of spouses during one's union may reflect different childhood contexts if those raised in high out-migration states, for example, are also more likely to report lack of sanitation facilities (but higher levels of education) *and* spousal migration to the US. This is difficult to confirm because I do not know respondent's place of birth or where they were raised. Mother's education and childhood health are not significantly associated with spousal migration to the U.S. but still important to include as baseline indicators in the propensity model (Austin 2011).

[Tables 11 and 12 about here]

Tables 11 and 12 present results from a propensity score matching method using the variables I presented in 10 to assess the propensity of having a US migrant spouse. The figures for the average treatment effects can be interpreted as the difference in the proportion of respondents who did not report spousal migration that would have doctor-diagnosed hypertension if their spouses did indeed migrate to the U.S. after being matched on what I am assuming are "pre-marriage" covariates related to childhood SES, health, and migration context (Austin 2011). The results largely reflect the findings from the regression analyses. There is no significant effect of spousal migration to the U.S. on the proportion of respondents who report depression or diabetes across the whole sample of women with some marital history, when matched on indicators that might influence the propensity to have a U.S. migrant spouse (Table 11). It does appear that there is a significant treatment effect of spousal migration to the US on hypertension for this group of all women with some marital status. The results for the average treatment effects suggest that the proportion of hypertension for women who reported no spousal migration to the US would increase by 5% if their spouse had migrated to the U.S., once matched on early-life characteristics ($p < 0.05$). However, this significant result was not robust to all

specifications of the propensity score matching approach. For example, while results were significant when using a nearest neighbor matching approach with a single neighbor allowed, but not with three neighbors, which gives me less confidence in this significant result.

The results in Table 12 repeat the propensity score matching method but only for women who were no longer in a union by the time of the survey. The results confirm the findings from the regression analyses, that spousal migration to the U.S. is associated with significantly higher proportions of diabetes and hypertension, but not depression. Specifically, the average treatment effects suggest that the proportion of hypertension would be 8% higher for non-married respondents who reported no spousal migration if they did experience spousal migration to the U.S., accounting for early-life indicators ($p < 0.05$). Similarly, the proportion of diabetes would be 8% higher for those non-married respondents who did not experience spousal migration to the U.S. if their spouses had migrated to the U.S. ($p < 0.05$). The figures are similar for the average treatment effects on the treated. This means that the effect of spousal migration to the U.S. on hypertension and diabetes is roughly the same for female respondents no longer in a union whether or not they actually experienced spousal migration to the U.S. The significant treatment effects of spousal migration to the U.S. for women no longer in a union hold up to alternative specifications of the propensity score matching method, including additional neighbors for the nearest neighbor matching method.

SENSITIVITY ANALYSES FOR DOCTOR-DIAGNOSED CONDITIONS

I re-tested all results for the multivariable models regressing diabetes and hypertension, respectively, on spousal migration history, and the full set of demographic and socio-economic controls to those respondents that report having received a test for diabetes or hypertension in the last two years (not shown). This analysis appears to be particularly important given that those who report spousal migration to the U.S. also report higher frequencies of recent tests for

hypertension and diabetes, respectively. The results suggest that there no difference in the significance of the associations between the measure of spousal migration and current marital status and each of the health outcomes when comparing the results using the full sample to the results restricted to those who have had recent tests for these conditions. The only notable difference is that the size of the effect of reporting spousal migration and not currently in a union on doctor-diagnosed diabetes (relative to those with no spousal migration and currently married) is slightly larger.

I additionally attempt sensitivity tests that restrict analyses to whether or not respondents report having a usual source of medical care and whether or not they report some form of health insurance coverage in 2001, respectively. There continue to be no real changes in the effect size for the indicator of spousal migration history across models predicting hypertension across unrestricted and all versions of the restricted models, for those analyses limited to those not currently married or in a union. However, there continues to be differences in effect size, although not significance, across models predicting diabetes with different specifications of access to care, which may underscore the importance of access to health care and the quality of that care (e.g. that includes tests for diabetes) in shaping respondents knowledge of their diabetic status.

DISCUSSION

Overall, the results of this chapter suggest that the effect of spousal migration to the U.S. on the later-life health of middle-aged and older Mexican women is heavily dependent on respondents' current marital status. For women who are currently married or in a consensual union, there are largely non-significant effects of spousal migration to the U.S. on later-life health. On the other hand, for women who are not currently in a union – divorced, separated, or widowed – a history of spousal migration to the U.S. is associated with significantly greater odds

of doctor-diagnosed diabetes and hypertension, respectively. This result appears to be robust to a multivariable model that includes a number of controls for current and past demographic and socio-economic characteristics.

The finding of adverse effects of spousal migration on later-life diabetes and hypertension for those not currently in a union are also reflected in the results of the propensity score matching methods, where I attempt to address potential selection bias on characteristics of female respondents before marriage, including indicators of exposure to the Bracero Era period of increased labor migration to the U.S., and respondents own characteristics of early childhood education and material conditions. Even when ‘matching’ respondents who are similar on these criteria, the probability of diabetes and hypertension, respectively, is much higher for those whose spouses migrated to the U.S. to live or work. In addition, the results remain nearly identical when limiting the models to respondents who have had tests for hypertension and/or diabetes in the past two years. This iteration of the analysis, limited to those who have actually had recent tests for the chronic diseases in question is an important step, given the descriptive findings that women whose spouses migrated and are not currently in a union are the most likely to have had these clinical tests, which may inflate the likelihood of their reports of positive diagnoses.

The findings of adverse effects of spousal migration to the US on diabetes and hypertension outcomes later on in the life course, at least for those currently not in a union, reflects to some degree the qualitative research on the effect of spousal migration on women ‘left behind’ in Mexico. As Dinerman (1982) observed based on her ethnographic work on the effect of migration on Mexican families in the 1970s:

“The increasingly prolonged absence of male heads of household has had a negative effect on family roles and relationships. It has caused notable strain between

husbands and wives. Women comment freely on their suspicions of their absent husbands' sexual activities and express fear that a husband will 'take another wife' in the United States." (70)

In addition to concerns about the dissolution of unions, which appears to have a significant effect in its own right on later-life health, Dinerman also observed the burden that women faced in raising children on their own, stating that many women in the village she studied "commented on the difficulty of rearing adolescent sons without their husbands present to enforce discipline" (72). Although there is some ambiguity in my analysis as to the timing of raising children alone, and the gender, age, and numbers of children raised alone at any one time, my findings suggest that there are long-term effects of the experience of raising children alone, most notably on the odds of depression and hypertension.

There are some complicating factors even to this overall finding of adverse effects of spousal migration on later-life health. For one, my results suggest that spousal migration is not significantly associated with depression. In fact, current marital status appears to be a much stronger predictor of depression than spousal migration; those not currently in a union have significantly greater odds of depression, regardless of their spousal migration history. This finding runs counter to much of the qualitative research, as well as quantitative research carried out on small, community-level samples, which points to the adverse mental health impacts of being 'left behind' (Bojorquez, Salgado de Snyder and Casique 2009; McGuire and Martin 2007). For example, in a community-based survey of women in a rural Mexican town, Bojorquez and authors found that having a partner in the U.S. was associated with significantly greater odds of scoring above a cut-point for depression on the CES-D scale (OR: 3.8, 95% CI: 1.92, 7.43). Ullmann and authors also found a significant association between spousal migration to the U.S. and "emotional or psychological", vaguely defined, for female respondents to the Mexican Migration Project. In a 2005 survey across multiple communities in Mexico, Familiar and co-

authors (2011) found significantly increased odds of depression and anxiety for family members of U.S. migrants relative to respondents with neither personal or familiar U.S. migration experience, although they did not differentiate which family members were migrants (e.g. spouse versus child).

On the other hand, although Salgado de Snyder (1993) documents a great deal of stress due to taking on additional responsibilities, common feelings of loneliness and isolation, and “high” scores of psychological distress in her small, community-based sample of rural Mexican women with U.S. migrant spouses, she finds that the majority (60%) of women reported being happy with their husband’s decision to migrate given the possibility of increased income. It may be that depression in this case reflects more immediate conditions of family life and change, as well as current socio-economic conditions. The measure of depression used in this analysis reflects only past-week symptoms, rather than chronic experiences with depression over the life-course. In this case, more recent life events like widowhood or marital dissolution, and the potential for reduced social and economic support in middle-age and older adulthood may be more important in shaping one’s current emotional and mental health than past events like spousal migration to the U.S.

The findings here might have been different if the outcome was *lifetime* depression. Given that spousal migration likely occurred in the distant past, it may not resonate with past-week depressive symptoms in mid-life and older adulthood. On the other hand, the significant results for hypertension and diabetes may be picking up on effects of chronic stress due to spousal migration and marital dissolution, as well as increased burden for work in and outside the home, that accumulated earlier in the life-course to produce adverse effects on chronic disease. There is no detailed information about the onset of hypertension or diabetes, and it may

be that women were diagnosed with these conditions far before the baseline survey, such that these conditions were more sensitive to stressors in early and mid-adulthood.

In addition to null findings for the effect of spousal migration on depression, there were varying results for the diabetes and hypertension outcomes when further stratifying by respondent marital status. While spousal migration to the U.S. is associated with significantly greater odds of doctor diagnosed diabetes for both those who are currently widowed and those reporting they are divorced or separated, respectively, the effect of spousal migration to the U.S. on hypertension is only significant for women reporting they are currently widowed. This suggests that the effects depend on current marital status even within the category of those respondents not currently in a union – not surprising, given the distinct experiences of marital dissolution versus widowhood. It is surprising that the effects of spousal migration are more consistently significant for women who are widowed, although the difference in effects may be due to different sample sizes across the stratified models.

Another limitation of this analysis is that the variables of migration and marriage are measured at the individual level. I do not have information on community-level experiences of migration and sex ratios during respondents' earlier lives. While I know some information about their current residence (high out-migration state or not, urban residence or not), I have no way of assessing whether this is the same context in which they lived out their marital and migration histories earlier in life. Choi and Mare (2012) emphasize the importance of considering community-level migration in models combining marriage and migration, given the fact that migration can contribute to vast changes in community marriage markets by removing marriageable single men for stretches of time. They suggest that women in these depleted marriage markets may be more likely to 'marry down' to men with lower education levels. It's

possible that partnering with men with lower education might lead to poorer economic outcomes for the family unit across the life-course, especially compared to women with a wider selection of marriage prospects in lower out-migration communities. On the other hand, women who have higher levels of education may also enjoy higher levels of power over decisions within their families and about their personal lives, which may diminish the adverse effects of spousal migration on health outcomes (Parrado, Flippen and McQuiston 2005). Raphael (2013) also finds that the intensity of out-migration in a given community is positively associated with women's educational attainment and entry into the labor market before marriage, which might also afford them more decision-making power once married. I am not able to take this community-level variation into account in my models.

Despite the limitations in my analysis, the overall findings support my hypothesis that spousal migration has an adverse effect on the later-life health of Mexican women, with the qualifications that these results only apply to those not currently in a union, and to models of doctor-diagnosed diabetes and hypertension. Even with these restrictions, the results speak to the importance of family migration history in shaping later-life chronic disease outcomes for older women in Mexico, in combination with their marital histories. Although the timing of spousal migration is not entirely clear, these findings point to the potentially 'long-arm' of spousal migration to the U.S. on the health of a subset of Mexican women who are currently divorced, separated, or widowed, suggesting that spousal migration history may be an important aspect of life-course influences on later-life health.

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Table 1. Baseline descriptive statistics for older women in Mexico, based on spousal migration history to the US and current marital status (n=6764)

	Spouse never migrated to US, currently married (n=3211)	Spouse never migrated to US, currently widowed/divorced/separated (n=2079)	Spouse migrated to the US, currently married (n=627)	Spouse migrated to US, currently widowed/divorced/separated (n=336)
Age, mean	59.3 (7.85)	65.5 (10.3)	61.1 (7.9)	66.0 (9.7)
Urban residence	2123 (65.9)	1521 (73.1)	342 (54.6)	241 (71.7)
High out-migration state	824 (25.6)	489 (23.5)	305 (48.6)	130 (38.7)
Marital History				
<i>Current marital status</i>				
Married	3211 (100.0)	--	627 (100)	1 (0.3)
Widowed	0 (0.00)	--	0	97 (28.9)
Divorced/Separated	0 (0.00)	--	0	238 (70.8)
Never married	0 (0.00)	--	0	0
Married more than once	313 (9.8)	241 (11.6)	52 (8.3)	52 (15.5)
Total years married	37.8 (9.77)	29.5 (14.6)	39.7 (10.2)	29.8 (14.3)
Occupational History				
<i>Primary occupation</i>				
Domestic	490 (15.3)	445 (21.5)	81 (12.9)	84 (25.0)
Factory	202 (6.3)	119 (5.8)	24 (3.8)	26 (7.7)
Service	626 (19.5)	528 (25.5)	116 (18.5)	84 (25.0)
Agricultural	200 (6.24)	143 (6.9)	71 (11.3)	25 (7.4)
Professional	481 (15.0)	328 (15.8)	58 (9.3)	35 (10.4)
Never worked	1205 (37.6)	507 (24.5)	275 (43.9)	80 (23.8)
Children				
Number of live births, mean (SD)	6.14 (3.46)	6.13 (3.60)	7.11 (3.73)	6.92 (3.53)
Ever raised children alone	424 (13.2)	852 (40.9)	213 (34.1)	221 (65.8)
Personal Migration History				
Ever migrated internally	1962 (61.2)	1302 (62.8)	427 (68.1)	190 (56.6)
Ever migrated to U.S.	42 (1.3)	64 (3.1)	57 (9.1)	43 (12.8)
Never migrated	1242 (38.8)	773 (37.3)	196 (31.3)	103 (30.7)
Family Migration to U.S.				
Siblings or parents migrated to U.S.	790 (24.6)	412 (19.8)	287 (45.8)	145 (43.2)
Adult child currently lives or works in U.S.	655 (20.4)	378 (18.2)	301 (48.0)	147 (43.8)
Early-life SES and health				
<i>Before age 10:</i>				
No household sanitation	2062 (64.2)	1352 (65.1)	466 (74.4)	244 (72.6)
Serious health problem	344 (10.7)	230 (11.1)	75 (11.9)	39 (11.6)
No education	835 (25.9)	670 (32.2)	148 (23.6)	91 (27.1)
Mother had no formal education	1660 (51.8)	1130 (54.5)	301 (48.0)	172 (51.3)
Don't know mother's education	250 (7.8)	202 (9.7)	69 (11.0)	45 (13.4)
Adult SES				
Number of items in household, mean (SD)	4.37 (1.74)	4.08 (1.79)	4.66 (1.42)	4.38 (1.65)
Poor self-rated economic conditions	2516 (78.4)	1692 (81.4)	511 (81.5)	273 (81.3)
Bottom half of monthly income	1369 (57.4)	1092 (52.5)	363 (57.9)	167 (49.7)
Bottom half of net assets	1309 (40.8)	1194 (57.4)	247 (39.4)	195 (58.0)

Source: Mexican Health and Aging Study, 2001 and 2003.

Table 2. Descriptive health statistics for older women in Mexico, based on spousal migration history to the US and current marital status (n=6764)

	Spouse never migrated to US, currently married (n=3211)	Spouse never migrated to US, currently widowed/divorced/separated (n=2079)	Spouse migrated to the US, currently married (n=627)	Spouse migrated to US, currently widowed/divorced/separated (n=336)
Diagnosed with hypertension	1424 (44.4)	945 (45.5)	300 (47.9)	190 (56.6)
Had test for hypertension in past two years	2505 (78.0)	1653 (79.5)	511 (81.5)	280 (83.3)
Diagnosed with diabetes	565 (17.6)	347 (16.7)	113 (18.0)	84 (25.0)
Had test for diabetes in past two years	2276 (70.9)	1474 (70.9)	457 (72.9)	252 (75.0)
Past-week depressive symptoms, 2001				
Depressed (≥ 5 symptoms)	1242 (39.8)	984 (48.6)	253 (41.4)	179 (54.9)
Mean (SD)	3.82 (2.70)	4.37 (2.74)	3.99 (2.72)	4.61 (2.80)
Other health measures				
Body Mass Index				
Underweight/Normal (24.9 or below)	643 (20.0)	474 (22.8)	102 (16.3)	73 (21.7)
Overweight (25-29.9)	909 (28.3)	554 (26.7)	156 (24.9)	81 (24.1)
Obese (29.9 or above)	685 (21.3)	348 (16.7)	123 (19.6)	67 (19.9)
Missing	974 (30.3)	703 (33.8)	246 (39.2)	115 (34.2)
Insurance coverage, 2001	2066 (64.3)	1343 (64.6)	357 (56.9)	225 (66.9)
No usual source of medical care, 2001	1001 (31.2)	617 (29.7)	201 (32.1)	97 (28.9)

Source: Mexican Health and Aging Study, 2001 and 2003.

Table 3. Simple logistic regression models of depression, hypertension and diabetes for older Mexican women by spousal migration history, n=6266

Spousal Migration History/Marital Status (Ref = No Spousal Migration/Currently Married)	Five or more depressive symptoms (n=6253)			Doctor-diagnosed hypertension (n=6126)		Doctor Diagnosed Diabetes (n=6135)	
	OR		95% CI	OR	95% CI	OR	95% CI
No spousal migration to U.S., Currently Widowed, Divorced, or Separated	1.42	***	(1.27, 1.59)	1.05	(0.94, 1.18)	0.94	(0.81, 1.09)
Spouse migrated to US, Currently Married	1.07		(0.90, 1.27)	1.15	(0.97, 1.37)	1.02	(0.82, 1.28)
Spouse migrated to US, Currently Widowed, Divorced, or Separated	1.76	***	(1.41, 2.21)	1.60	*** (1.28, 2.01)	1.53	** (1.18, 1.99)

Source: Mexican Health and Aging Study, 2001, *p<0.05, **p<0.01, ***p<0.001

Table 4. Multivariable model of past-week depression, hypertension and diabetes for older Mexican women by spousal migration history, four-category measure

	Depression (n=5989)			Hypertension (n=5877)			Diabetes (n=5885)		
	OR		95% CI	OR		95% CI	OR		95% CI
Spouse Migration to the US									
No spousal migration, not currently in union	1.25	**	(1.08, 1.45)	0.95		(0.82, 1.10)	0.89		(0.73, 1.07)
Spousal migration, currently in union	0.87		(0.72, 1.05)	0.99		(0.83, 1.20)	1.03		(0.81, 1.30)
Spousal migration, not currently in union	1.43	**	(1.09, 1.86)	1.24		(0.96, 1.61)	1.46	*	(1.08, 1.98)
Age	1.01	*	(1.00, 1.02)	1.01	***	(1.01, 1.03)	1.01		(0.99, 1.02)
Urban residence	0.94		(0.83, 1.07)	0.99		(0.88, 1.13)	1.24	*	(1.05, 1.46)
High out-migration state	1.38	***	(1.22, 1.56)	1.02		(0.91, 1.16)	0.70	***	(0.60, 0.83)
Respondent was a migrant (primarily internal)	1.12	*	(1.00, 1.26)	1.04		(0.93, 1.16)	0.91		(0.79, 1.05)
Family Demographics									
Number of live births	1.01		(0.99, 1.03)	1.02	*	(1.00, 1.04)	1.05	***	(1.03, 1.08)
Raised children alone	1.47	***	(1.29, 1.67)	1.22	**	(1.07, 1.39)	1.01		(0.86, 1.19)
Number of years married	1.01	*	(1.00, 1.01)	1.00		(0.99, 1.01)	0.99		(0.99, 1.01)
Early Childhood (possible selection criteria)									
No education	1.13		(0.99, 1.29)	0.92		(0.80, 1.05)	1.13		(0.95, 1.33)
No sanitation in household before age 10	1.20	**	(1.06, 1.37)	1.08		(0.95, 1.22)	1.01		(0.86, 1.18)
Serious health condition before age 10	1.61	***	(1.36, 1.91)	1.24	*	(1.05, 1.46)	1.35	**	(1.11, 1.65)
Adult Socio-economic Status									
Domestic work	1.24	**	(1.07, 1.42)	1.09		(0.95, 1.26)	1.04		(0.87, 1.24)
Number of household items	0.92	***	(0.89, 0.96)	1.04	*	(1.00, 1.08)	1.06	*	(1.01, 1.11)
Poor self-rated economic situation	2.34	***	(2.02, 2.72)	1.25	**	(1.09, 1.43)	1.47	***	(1.22, 1.77)
Body Mass Index (ref = normal/underweight)									
Overweight				1.24	**	(1.07, 1.45)	1.02		(0.84, 1.25)
Obese				2.15	***	(1.82, 2.54)	1.17		(0.92, 1.45)
Don't Know/Refused				1.34	***	(1.15, 1.56)	1.12		(0.92, 1.36)
LR Chi-squared	501.1	***		196.1	***		101.9	***	

Source: Mexican Health and Aging Study, 2001 *p<0.05, **p<0.01, ***p<0.001

Table 5. Multivariable model of past-week depression, hypertension and diabetes for older Mexican women by spousal migration history, for women currently in union

	Depression (n=3743)		Hypertension (n=3670)		Diabetes (n=3676)	
	OR	95% CI	OR	95% CI	OR	95% CI
Spouse Migration to the US	0.87	(0.71, 1.05)	0.95	(0.79, 1.15)	1.00	(0.78, 1.28)

Source: Mexican Health and Aging Study, 2001 and 2003, *p<0.05, **p<0.01, ***p<0.001. Notes: Controlling for age, residence characteristics, personal migration history, family demographics (marital status, total number of years married, number of live births, whether or not raised children alone), childhood and adult SES characteristics, and BMI category at the time of the survey.

Table 6. Multivariable model of past-week depression, hypertension and diabetes for older Mexican women by spousal migration history, for women currently widowed, divorced, or separated.

	Depression (n=2246)		Hypertension (n=2207)		Diabetes (n=2209)	
	OR	95% CI	OR	95% CI	OR	95% CI
Spouse Migration to the US	1.16	(0.90, 1.50)	1.41	** (1.10, 1.81)	1.73	*** (1.29, 2.32)

Source: Mexican Health and Aging Study, 2001 *p<0.05, **p<0.01, ***p<0.00. Notes: Controlling for age, residence characteristics, personal migration history, family demographics (marital status, total number of years married, number of live births, whether or not raised children alone), childhood and adult SES characteristics, and BMI category at the time of the survey.

Table 7. Multivariate model of past-week depression, hypertension and diabetes for older Mexican women by spousal migration history, binary measure, women currently widowed only

	Depression (n=1578)		Hypertension (n=1553)		Diabetes (n=1556)	
	OR	95% CI	OR	95% CI	OR	95% CI
Spouse Migration to the US	1.20	(0.88, 1.62)	1.42	* (1.05, 1.91)	1.56	* (1.10, 2.22)
LR Chi-squared	498.0	***	95.8	***	18.6	

Source: Mexican Health and Aging Study, 2001 *p<0.05, **p<0.01, ***p<0.00. Notes: Controlling for age, residence characteristics, personal migration history, family demographics (marital status, total number of years married, number of live births, whether or not raised children alone), childhood and adult SES characteristics, and BMI at the time of the survey.

Table 8. Multivariate model of past-week depression, hypertension and diabetes for older Mexican women by spousal migration history, binary measure, women currently divorced or separated only

	Depression (n=668)		Hypertension (n=654)		Diabetes (n=653)	
	OR	95% CI	OR	95% CI	OR	95% CI
Spouse Migration to the US	1.12	(0.69, 1.82)	1.49	(0.93, 2.39)	2.14	* (1.20, 3.82)
LR Chi-squared	80.7	***	23.1	***	41.4	***

Source: Mexican Health and Aging Study, 2001 *p<0.05, **p<0.01, ***p<0.00. Notes: Controlling for age, residence characteristics, personal migration history, family demographics (marital status, total number of years married, number of live births, whether or not raised children alone), childhood and adult SES characteristics, and BMI at the time of the survey.

Table 9. KHB models of past-week depression, hypertension and diabetes for older Mexican women by spousal migration history for women currently not in a union (widowed, divorced, separated)

	Depression (n=2246)		OR	Hypertension (n=2207)		OR	Diabetes (n=2209)	
	OR	95% CI		95% CI	95% CI			
Spouse Migration to the US								
Reduced model (without raising children alone)	1.28	(0.99, 1.64)	1.38	**	(1.08, 1.77)	1.58	**	(1.19, 2.10)
Full model	1.16	(0.90, 1.50)	1.39	*	(1.08, 1.78)	1.58	**	(1.19, 2.11)
Difference	1.10	(1.04, 1.16)	0.99		(0.95, 1.04)	0.99		(0.94, 1.06)

Source: Mexican Health and Aging Study, 2001 *p<0.05, **p<0.01, ***p<0.00. Notes: Controlling for age, residence characteristics, personal migration history, family demographics (marital status, total number of years married, number of live births, whether or not raised children alone), and childhood and adult SES characteristics.

Table 10. Multivariable model predicting whether or not one's spouse ever migrated to the US to live or work, for a nationally representative sample of Mexican women born before 1951 with some marital history (n=6240)

	OR		95% CI
Age	0.96	**	(0.93, 0.99)
Years exposed to Bracero Era ^a	1.07	***	(1.03, 1.12)
Early Childhood SES			
No sanitation in household before age 10	1.70	***	(1.45, 2.01)
Serious health problem before age 10	1.12		(0.90, 1.39)
Respondent had no education	0.71	***	(0.60, 0.85)
R's mother had no education	0.86		(0.73, 1.01)
Don't know mother's education	1.27	*	(1.00, 1.62)
LR Chi-squared	86.63	***	

Source: Mexican Health and Aging Study, 2001 *p<0.05, **p<0.01, ***p<0.00.

Table 11. Average treatment effects of spousal migration on past-week depression, hypertension and diabetes for older Mexican women for women with and without histories of spousal migration to the US

	Depression (n=6211)	Hypertension (n=6087)		Diabetes (n=6228)
Average treatment effects (ATE)	0.01	0.05	*	0.02
Average treatment effects on the treated (ATET)	0.02	0.04	*	0.04

Source: Mexican Health and Aging Study, 2001 *p<0.05, **p<0.01, ***p<0.00. Notes: Variables used to construct propensity scores include age, years of exposure to the Bracero Era, and childhood socio-economic status and health.

Table 12. Average treatment effects of spousal migration on past-week depression, hypertension and diabetes for older Mexican women for women with and without histories of spousal migration to the US, for those currently not in a union

	Depression (n=2399)	Hypertension (n=2351)		Diabetes (n=2354)	
Average treatment effects (ATE)	0.02	0.08	*	0.08	*
Average treatment effects on the treated (ATET)	0.05	0.07	*	0.09	**

Source: Mexican Health and Aging Study, 2001 *p<0.05, **p<0.01, ***p<0.00. Notes: Variables used to construct propensity scores include age, years of exposure to the Bracero Era, and childhood socio-economic status and health.

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