Migration, marriage and fertility in migrant sending states in Mexico

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Abstract

Using the 2000 Mexican Census, we examined the effect of increasing levels of household migration on women's marriage and fertility in municipalities from seven traditional sending states. We calculated age-specific fertility rates and the proportion of women living in conjugal unions by level of migration in the municipalities. At higher migration levels, reproductive aged women had lower fertility rates. This was accounted for by a lower proportion of women living in unions as there were no differences in marital fertility. To assess how variation in the availability of men was associated with women's union status, we used a municipal-level fixed-effects model. The absence of men was associated with a lower proportion of women living in union. Finally, we found that the residual fixed-effects were correlated with the level of migration, suggesting migration has an effect on women's marriage beyond its demographic impact on the marriage market.

Introduction

Much of the literature investigating the relationship between migration and fertility has focused on the ways in which women's migration affects their fertility in destination areas. The impact of the level of migration in a community on local fertility rates in the sending regions has been less studied. Additionally, most studies of migration and fertility have centered on migration from areas of low economic development, which are presumed to have "traditional" patterns of childbearing, to areas with greater levels of economic development where migrants are exposed to more "modern" fertility norms. However, in the last several decades many migrant sending areas have undergone demographic transitions, and fertility rates which were once high have declined substantially. These changing conditions present a new opportunity to examine the effect of migration on demographic behavior in sending communities.

Mexico is a useful case for exploring the relationship between migration and fertility. The migration stream between Mexico and the United States (US) is one of the largest migratory systems in the world (Zlotnik, 1998). Although a large portion of migrants from Mexico are seasonal and temporary male laborers, the number of women migrants has increased in the last several decades (Massey, Durand & Malone, 2002). The geographic scope of migration has resulted in a substantial number of communities in Mexico that have been affected by circular or permanent migration to the US. Furthermore, despite the persistence of significant income disparities between the two countries, the differences in total fertility rates have virtually disappeared due to increasing access to family planning services in Mexico (Frank & Heuveline, 2005; Mundigo, 1996; Potter & Mundigo, 2006).

In this article, we use data from the 2000 Mexican census for traditionally high migrant sending states to examine how fertility varies across municipalities in relation to the level of migration. After reviewing the main mechanisms by which migration has been suggested to influence fertility and situating our study in the literature that has particular relevance to the Mexican case, we look at how fertility and other socioeconomic characteristics vary across

sending communities. We then analyze how migration is related to marriage, the key proximate determinant of the fertility differentials we observe.

Theoretical Background and Previous Findings

Migration has been posited to impact fertility through four primary processes: assimilation, disruption/separation, adaptation and selection. According to assimilation, migrants eventually have fertility outcomes that are similar to the majority population in the destination community due to increased knowledge and use of contraception, as well as changing ideas about reproduction (Ford, 1990; Jensen & Ahlburg, 2004; Kulu, 2005). Assimilation is usually seen as a gradual process; changes in fertility may not occur among first generation migrants, but second and later generations will have childbearing patterns that are similar to those of native-born women.

Disruption or separation suggests that migration will have a negative impact on fertility by interrupting normal childbearing due to periods of spousal separation (Chattopadhyay, White & Debpuur, 2006; Ford, 1990; Kulu, 2005; Singley & Landale, 1998). Authors discussing disruption and separation often conclude that interrupted childbearing is only a temporary phenomenon; once reunited with their spouse and more settled in the destination area, women will eventually "catch-up" to their desired family size either through more closely spaced births or by extending childbearing into their later reproductive years.

Unlike the processes of assimilation and disruption, adaptation results from a deliberate attempt by migrants to change their fertility behavior in order to adjust to a new environment. For example, a migrant couple may decide to postpone childbearing given the change in actual and opportunity costs of maintaining a particular family size, although these changes may not have long-term impacts on fertility as overall family size preferences remain unaltered (Jensen & Ahlburg, 2004).

Selection may lead to either higher or lower fertility. This is not due the migration process itself affecting fertility, but rather to selectivity and can be attributed to the particular characteristics of migrants. The most commonly cited characteristics used to explain observed fertility patterns are migrants' fertility preferences and socioeconomic characteristics, such as greater economic resources to leave one's community or a desire for social mobility (Chattopadhyay, White & Debpuur, 2006; Kulu, 2005; Singley & Landale, 1998).

The explanations for how these processes operate are primarily grounded in research on women's migration and their fertility in destination areas. The effect of community migration levels on local fertility rates in the sending communities could also be affected by these same mechanisms. Given the scale of migration from Mexico, the predominance of men in migratory flows, and increased access to family planning through government-sponsored programs, we expect that the association between migration in sending communities and fertility will largely be due to the processes of disruption and adaptation, rather than assimilation or selection.

At the community level, migratory flows that are dominated by men may disrupt fertility by altering the sex composition in the community (i.e. the marriage market) as men of marriageable age with whom women can form stable partnerships are regularly absent. A lower proportion of men in the community may delay women's age at first marriage and reduce the time that women spend in a conjugal union, which may limit the number of children they have over the course of their reproductive years. Additionally, temporary male absences could also affect exposure to the risk of childbearing within marriage, but this relationship should decline in importance as contraceptive use increases and birth planning becomes prevalent.

The research to date on Mexican sending communities has not found evidence that migration affects the marriage market. In their analysis of marriage in Mexico, Parrado and Zenteno (2002) found that the sex ratio in the municipality was not associated with an increased age at marriage. The authors concluded that this was because migration did not necessarily remove men from the marriage market, and was a means by which men could become more

attractive partners. Furthermore, there is no indication that migration limits fertility within marriage. Lindstrom and Giorguli Saucedo (2002) reported that the prevalence of male migration was associated with an increased probability of birth in the last year and a higher total number of children among women married to migrants.

In addition to disruption, migration may also impact fertility by changing how individuals and households adapt to a new socioeconomic environment and thereby change social and economic goals. For example ideas surrounding social mobility and use of economic resources for consumption versus subsistence may be altered (Moreno, 1992). Changes in household goals also would include ideas about family formation such as marriage and childbearing (Moreno, 1992). Women and families may decide to delay marriage or childbearing in order to migrate or take advantage of opportunities that would facilitate migration of other family members (Moreno, 1992; Singley & Landale, 1998). Additionally, couples may delay childbearing with the expectation that the family unit will eventually migrate and therefore try to limit the costs of relocation by having fewer children.

Marriage and fertility may also be influenced by educational attainment as individuals adapt to changing conditions of migration. The probability of migration may change incentives to invest in education among potential migrants living in the community as individuals perceive few economic advantages for higher levels of education in Mexico and in the US immigrant labor markets (Massey et al, 1987). Changing incentives would produce an environment in which the majority of individuals in high migration areas possess relatively low levels of education but increased potential for migration and earnings, and subsequently greater opportunities for marriage (Hanson & Woodruff, 2003; Parrado & Zenteno, 2002; Parrado, 2004). In areas where individuals leave school earlier and have lower levels of education, one would expect to see earlier marriage and higher fertility (Caldwell, 1980).

Although some authors have suggested that assimilation operates in sending communities as non-migrants adopt the values and norms about family size and contraception

disseminated by return migrants (Lindstrom & Giorguli Saucedo, 2002), these processes may not be adequate explanations for the fertility patterns observed in Mexican sending communities. As noted above, assimilation is presumed to take several generations to affect the fertility of migrants. Therefore, it seems unlikely that temporary migration, even several return trips, has a substantial effect on fertility and childbearing preferences. Additionally, given the availability of contraception in Mexico through government-sponsored programs, it is no longer reasonable to presume that more information about contraception is available in the US than in Mexico.

The selectivity of migrants may affect the observed fertility rates in sending communities. In a recent analysis, Lindstrom and Giorguli Saucedo (2007) demonstrated that married women were less likely to migrate with their husbands following a recent pregnancy and delivery. The odds of migration also decreased with each subsequent birth. Therefore, it seems likely that women who remain in sending communities would likely have higher fertility than those women who eventually migrate. However, this selection effect would presumably affect both internal and international migration, and might not vary according to the importance of international migratory moves.

In the following analysis, we will assess the direction and strength of the association between the level of migration and fertility across municipalities, as well as investigate the pathways through which migration may influence fertility - disruption, adaptation, assimilation, and selectivity.

Data and Methods

Data

This analysis used data from the 2000 Mexican Census long form for the traditional migrant sending states of Colima, Guanjuato, Jalisco, Michoacán, Nayarit, San Luis Potosí and Zacatecas. The census long form, applied to a 10 percent sample of households in February

2000, recorded data on both household and individual characteristics and included a module on international migration. Household characteristics gathered by the census included the number of household members, materials of household construction, and access to public services. Information on individual household members included age, educational attainment, marital status, current employment and income. Fertility information was collected for women of reproductive age and included the total number of births and date of last live birth. The international migration module recorded information about whether any member of the household had migrated abroad since 1995, the total number of household migrants, and the gender, age and years of departure and return for migrating household members.

Households in the census were identified by state, municipality and locality (localidad). We used the municipality as the level of aggregation in this analysis. The locality units are small and, even with a 10 percent sample, aggregation at this level does not produce reliable estimates of fertility and migration. Aggregation at the municipality level also presents challenges as some municipalities include relatively large cities where the majority of the population lives. These municipalities are not comparable to smaller municipalities that lack a sizeable city; preliminary analyses demonstrated that larger municipalities had lower levels of international migration. To control for this difference, we restricted our analyses to the 314 municipalities that did not have localities with more than 15,000 inhabitants. These municipalities accounted for 73% of the municipalities across the seven states, 47% of the population and 61% of households with international migration experience in the 5 years prior to the census. While there is clearly a cost to generalizability by leaving out the highly urbanized municipalities, by doing so we have a sample in which there is a wide and nearly normal distribution of the level of migration (see Figure 1).

For the first part of the analysis, we constructed characteristics of municipalities by grouping household and individual-level variables by municipality of residence and computing weighted means. We assessed the level migration in a municipality using the variable indicating

whether or not a household had at least one member who migrated internationally in the five years prior to the census. Approximately 75% of households reported only one individual migrating since 1995, and less than five percent of households reported more than two migrants. Thus, the measure we use to assess the relative intensity of migration in the municipality is the proportion of households which had an international migrant.[1] Other municipal-level characteristics that we examined were the proportion of households with electricity, access to piped water and sewerage, household income, educational attainment for adults 25 to 64 years of age, employment status for adults 15 to 64 years of age, and the proportion of adult (15 to 64 years of age) household members who were men.

Characteristics of reproductive aged women used in this analysis included age, educational attainment, current employment, marital status, birth in the last year and total number of children. Highest level of education was grouped into the following categories: incomplete primary (0 to 5 years), complete primary (6 years of education), incomplete secondary (7 to 8 years), complete secondary (9 years of education) and post-secondary education for individuals with 10 or more years of schooling. Marital status was categorized as single, currently married or in union, and previously married. Women currently in a union were defined as those women who reported being married by civil and/or religious ceremony as well as those who were living in consensual unions, which are not markedly different in nature than marriage (Parrado & Zenteno, 2002; Pebley & Goldman, 1986). Previously married women were those who reported being divorced, separated or widowed. Incidence of birth in the last year was determined using the month and year of last live birth.

Methods

After examining the distribution of municipalities by the proportion of households experiencing international migration, we divided the municipalities into migration quartiles: first

[1] As we were interested in the effect on marriage and fertility resulting from migrants' absence, we used this measure of migration rather than the CONAPO Intensity of Migration Index, which is a composite measure including remittances, return and circular migration.

(less than 10.8% of households with migrating family members), second (10.8 – 16.1%), third (16.2 – 21.6%), and fourth (21.7% or greater). For each quartile of migration, we calculated means and percentages for community and individual-level continuous and categorical variables, respectively. We determined the statistical significance of linear trends in continuous and categorical characteristics across quartiles of migration using linear and logistic regression. As the difference in migration varied between quartiles, we modeled the linear trend in the respective variable as a function of the median level of migration for each quartile.

We then calculated age-specific fertility rates for each quartile of migration. Age-specific fertility rates were calculated first for all reproductive aged women and then separately for women who were married or in union. Women age 15 to 19 were omitted from the marital fertility rates, as marital fertility rates below age 20 are not considered to be reliable due to the high level of premarital pregnancies (Bongaarts & Potter 1983). In each age group, the statistical significance of trends in fertility rates across quartile of migration, modeled as the median level, was determined using logistic regression.

In the second part of the analysis, we focused on marriage as the main proximate determinant explaining fertility differences across migration quartiles. One way that migration might affect marriage is by influencing the proportion of men in the relevant marriageable age range for women; higher levels of predominantly male migration would be associated with lower proportions of men in the municipality. As noted above, migration may also influence enrollment in school and educational attainment, and more education is usually associated with later age at marriage. However, migration could also influence marriage in other ways, such as the changing of norms, opportunities and expectations, for which there are no indicators available from the census data. We used several methods, described below, to assess both the "observable" and "unobservable" effects of migration on marriage.

In order to determine the more direct effect of migration on women's marriage patterns, we followed previous work by Parrado and Zenteno (2002) and stratified the proportion of adult

men into categories to reflect the marriage market for specific age groups. This categorization was based on Parrado and Zenteno's (2002) construction of age-specific marriage markets from analyses using the 2000 Mexican Retrospective Demographic Survey (Encuesta Demográfica Retrospectiva) where the authors reported that the majority of individuals married partners within 10 years of their own age. In the current analysis, the availability of males for each female age group extending from age *a* to *a+4* in a municipality (*i*) was calculated using the following formula:

$$P_{ai} = \frac{\sum_{x=a-2}^{a+7} M_{xi}}{\sum_{x=a}^{a+4} F_{xi} + \sum_{x=a-2}^{a+7} M_{xi}}$$

where *a* is the lower bound of the age group for women, and *M* and *F* are the number of men and women that fall into the specified age ranges. For example, the proportion of adult men in a marriage market for women age 20 to 24 would be the number of men age 18 to 27 in the numerator divided by the sum of the number of women 20 to 24 and the number of men 18 to 27 in the denominator. For women in the youngest age group (15 to 19), Parrado and Zenteno (2002) found a more limited age range for available partners, and thus the age categorization for adult men in this group was truncated to ages 15 to 22 for our analysis.

In addition to the municipal-level marriage market, we included the mean level of educational attainment for each age group of women in a municipality to predict the proportion of women married or in union. To get at any remaining association between migration and marriage, we examined the residual variation in the proportion of women married or in union that was not explained by these two variables.

We decided to consolidate the analysis of these "observed" and "unobserved" effects into one "pooled" model that incorporated each of the seven age groups, the proportion men for the age group, and the mean level of education of women in the age group – along with a fixed-

effect for the municipality – rather than have separate regressions for each age group. Combining the different age groups in a model with a single fixed-effect for each municipality, however, required that the dependent variable have similar variance in each group. The variance in the proportion married across municipalities in this sample was not constant in the different five year age groups. The standard deviation was relatively low in the first age-group, much higher in the next two age-groups, and then somewhat lower in the remaining age-groups. We found that taking the logit of the proportion married yielded a much more uniform variance pattern across the age groups, and chose this transformation for the dependent variable (see Appendix A).

We estimated the following model:

$$\text{logit}(U_{ij}) = \alpha_i + \sum_{j=2}^{7} \beta_j A_j + \sum \gamma_j A_j P_j + \sum \delta_j A_j E_j + \varepsilon_{ij}$$

where U is the proportion of women in union in each age group (*j*) and municipality (*i*), A is an indicator variable for each age group, P is the proportion of men in the marriage market for each age group (*j*) in a municipality (*i*), E is the mean level of education of women in the age group, α is a fixed effect for the municipality, and ε is an error term. After estimating the fixed-effects model, we used OLS regression to analyze the fixed-effects and determine whether the residual municipal variation was independently associated with the level of migration.

Results

The distribution of the 314 municipalities by the proportion of households with a family member who migrated abroad since 1995 is presented in Figure 1. This proportion ranged from less than one percent to 42.6%. The distribution followed a normal pattern, with a mode between 15 and 19 percent of households having at least one migrant.

[Insert Figure 1 about here]

Municipal characteristics for each migration quartile are presented in Panel A of Table 1. Municipalities with higher migration demonstrated significantly greater levels of economic development on indicators such as household electrification, piped water, access to sewerage systems, and a larger proportion of households in the upper income quartile. This is the pattern that would be expected on the basis of both the earnings and remittances of migrants. However, two other markers of socioeconomic development, the mean level of adult education and the adult labor force participation rate, declined as migration increased. The proportion of men among adults 15 to 64 years of age was also significantly lower in areas with higher levels of migration ranging from 48.8% to 43.9% across the quartiles. This difference is likely a direct demographic consequence of the gender difference in migration.

[Insert Table 1 about here]

Characteristics of reproductive aged women in the municipalities are presented by quartile of migration in Panel B of Table 1. Women in higher migration quartiles had significantly lower levels of education and current employment, which follows the pattern observed for adults 15-64 in Panel A of the table. There was also a significant trend in marital status between municipalities, with higher proportions of single women and lower proportions of women who were living in a union or who were previously married in high migration areas. Finally, both the incidence of birth in the last year and mean parity were significantly higher in municipalities with lower levels of migration. These figures suggest that fertility is inversely related to migration, and this phenomenon is influenced, at least in part, by differences in the proportion of women living in a union.

The age-specific fertility rates for all reproductive aged women and married women only more directly reflect this relationship (Table 2). Among reproductive aged women, increasing levels of municipal migration were associated with lower age-specific fertility rates in the primary childbearing years (i.e., 15 to 34 years of age; Panel A of Table 2). The Total Fertility Rate (TFR) ranged from 3.90 to 3.32 across the quartiles. However, a similar pattern is not observed

in the age-specific fertility rates for married women, and there were no significant trends across quartile of migration (Panel B of Table 2). The stability of the Total Marital Fertility Rate across quartiles implies that marriage accounts for the differences observed in the TFRs for reproductive aged women, since births to women married or in union at the time of the census account for 93% of all reported births in the year preceding the census.

[Insert Table 2 about here]

[Insert Figure 2 about here]

The impact of migration on marriage is evident by looking at the proportion of women in union by single year of age in each of the four quartiles (Figure 2). As the level of migration increases, there is a decrease in the proportion of married women. The differences, however, are most apparent for women 15 to 34 years of age – the same years as lower age-specific fertility rates and the prime years of male labor migration. After 35 years of age, there were only small differences in marriage across migration quartiles.

As noted above, the difference in the proportion of women living in union by migration quartile could be attributed, in part, to the proportion of men in the municipality (i.e. the local marriage market). The variation in the marriage market for the seven five-year age groups shows clear differences by migration quartile (Panel A Figure 3). These differences are more pronounced among younger women (15 – 29 years of age) compared to those in the older age groups, as would be expected from the diminishing differences in fertility rates and proportions married at these same ages.

Additionally in each age group there is a clear trend between the level of migration and the other determinant of marriage - education (Panel B Figure 3). As in Table 1, the differences in education by migration quartile are not in the direction one would expect if education was the main determinant of the differences in marriage across the quartiles; there is more education in the quartiles where proportions married are highest. There are also notable differences in the

level of education among younger and older women, likely reflecting the growth of primary schooling.

[Insert Figure 3 about here]

The pooled municipal-level fixed-effects model assessed the relationship between the marriage market, the mean level of women's education and the logit of the proportion of women in the municipality living in union in each age group. The estimated coefficients for this model are shown in Table 3. The coefficients for the age-group indicator variables followed the pattern that would be expected given the results in Figure 2. In each older age group there was an increase in the logit proportion married. The age group specific proportions of adult men in a municipality were also associated with the logit of the proportion of women living in a union. An increase in the proportion of men in the marriage market was associated with a higher proportion of women who were observed to be in union. Although the association was in the same direction across the different age groups, the composition of the marriage market was no longer a significant predictor of the proportion of women who were living in a union in the municipality for women 40 years of age and older. This finding corresponds to the results presented above where there was less variation in both marriage and the proportion of men across municipalities among women at older ages. Additionally, higher mean levels of education for each age group were associated with a lower proportion of women in union in the municipality, but the size and significance of the association declined as age increased.

[Insert Table 3 about here]

Finally we examined the fixed-effects estimated from the pooled model to determine whether they were associated with the level of migration in the municipality. These estimates represent an average residual for each municipality equaling the sum of the differences between the estimated and observed logits of the proportion married in the seven age groups.

A plot of these 314 estimated fixed-effects and the proportion of households in the municipality experiencing migration is shown in Figure 4. In this figure, a negative value for the fixed-effect indicates that a lower proportion of women were living in a union than would be expected given the estimated coefficients and levels of the covariates. Likewise, a positive value for the fixed-effect shows a higher proportion of women are married than would be predicted by the variables. Using an OLS regression of the migration variable on the fixed-effect, we observed a significant negative relationship, indicating that that as the proportion of households experiencing migration increased, there was less marriage among women ages 15 to 49 than would be expected after controlling for the effect of the marriage market and education. This suggests that migration has an additional independent effect on women's marriage in sending communities, apart from that captured by the marriage market and level of education in the pooled model.

[Insert Figure 4 about here]

Discussion

In a subsample of municipalities in Mexico's traditional migrant sending states, we found that increasing levels of household migration were associated with lower fertility. Among reproductive aged women living in municipalities with higher levels of migration, age-specific fertility rates were lower, particularly for women 30 years old or younger. However, there was no significant variation in age-specific fertility among married women. By calculating and comparing fertility rates for these two groups, we were able to isolate migration's effect on one of the main proximate determinants of fertility – marriage, which indicates exposure to the risk of pregnancy (Bongaarts & Potter, 1983). Moreover, the absence of any migration related differential in marital fertility indicates that the net effect of migration on fertility is exclusively the result of migration's impact on union formation.

The results from our municipal-level fixed-effects model of the proportions married in different age groups indicate that marriage was, in fact, influenced by the availability of men in the respective marriage market. Additionally, in a municipality, the mean level of educational attainment of the women in an age group was inversely related to the proportion in union. This effect would seem to offset some of the impact of the availability of men on the marriage market. In both cases, the strongest effects were observed in the three youngest age groups, which correspond to the main years of male labor migration as well as union formation and childbearing.

Our analysis of the residual variation in marriage across municipalities in the pooled model indicated that the level of migration has an independent effect on union formation above and beyond the availability of male partners and women's mean years of education. After adjusting for these covariates, increases in the proportion of municipal households with international migration experience were associated with a lower expected proportion of women living in union across the seven age groups.

These findings have implications regarding the different pathways through which migration may be related to fertility in the contemporary Mexican context. We find little support for assimilation and the effect of migrant selection on community-level fertility and marriage. As there were no differences in marital fertility across levels of migration, it is not likely that widespread or circular migration changes fertility norms or contraceptive practice within the marital union through the dissemination of new ideas or information by returning migrants. Additionally, these similarities in marital fertility do not seem to indicate that married couples who migrate have different fertility than those who stay behind. The estimate of the TFR for municipalities with the greatest participation in migration streams (3.3) is comparable with Hispanic fertility in the US (Frank & Heuveline, 2005) and is fairly low considering our sample of municipalities is selective of rural areas.

We do, however, find strong evidence for migration's disruptive effect on union formation, and thus, on fertility. Across migration quartiles, there were substantial differences in the total fertility rate for all reproductive aged women, most of which was accounted for by lower age-specific fertility rates among women under 30 years of age. This, in turn, can be explained by the lower proportion of women in high migration areas who enter unions in their early childbearing years. Predominantly male migration stream may contribute to delays in union formation by creating an imbalance in the sex composition in the community which disrupts the local marriage market. Our model of the proportions of women in union in seven different age groups provides strong evidence that such disruption has taken place, particularly among younger women.

Our results also provide indirect evidence of community adaptation to increasing levels of migration that may have impacted union formation and childbearing. One form of adaptation could be changing educational goals. Mean educational attainment for women varied across municipalities according to the level of household migration; women in municipalities with higher levels of migration had lower levels of education. While this result most likely reflects both the limited value of schooling in Mexico for the US labor markets (Massey et al, 1987), as well as the competition between migration opportunities and staying in school, lower levels of education would like accelerate marriage. Yet, we observe postponement of marriage in municipalities with higher levels of migration.

As noted above, the expected proportion of women living in union was not completely accounted for by the marriage market or education, and residual variation between municipalities was significantly associated with migration. This may be the result of two, possibly complementary, types of adaptation. The municipality characteristics presented in Table 1 indicated higher levels of infrastructure and income in areas with more migration, and later marriage could be a response to greater economic development (Thornton, 2001). Additionally, delayed marriage could be due to individuals' adaptations to the social realities

produced by increasing migration or opportunities to migrate. Massey and colleagues (1987) have argued that as rates of migration increase, community members see migration as a right of passage. As a result, norms about individual and household goals begin to change, including norms regarding family formation and reproductive behavior. In high migration sending communities, women may postpone marriage in order to find a partner with a stable migratory pattern and more certain economic future (Parrado, 2004). Additionally, women may not enter into marital or consensual unions as they themselves intend to migrate out of Mexico. Furthermore, with a substantial portion of marriageable aged men living abroad, women may look to international migration as a means by which form unions outside of their community of origin (Edmeades, 2006; Singley & Landale, 1998).

The findings of this study should be interpreted within the context of its limitations. Fertility indicators and martial status were only collected for women currently living in the household at the time of the census. Therefore, the fertility and union formation patterns of women who had migrated from the household and not returned are excluded and may be different than those of women currently residing in the municipality. Furthermore, restricting our analyses to municipalities with localities that had no more than 15,000 residents excluded approximately 40% of households with international migration experience in the five years prior to the census. Although this restriction allowed us to better control for differences between municipalities, it limits the generalizability of our results, and associations between migration, fertility and marriage might be different in more urban areas.

Finally, it is difficult to interpret our results given the cross-sectional nature of the data. Our analysis examined the marriage experience of older as well as younger cohorts. Although there was a negligible difference in proportions married among the older women relative to the level of migration, there was a substantial difference among younger women. This could suggest that the eventual proportion of married women in a cohort is independent of the level of migration. However, as migration is assessed only with respect to the five years preceding the

census, the level of migration may have been quite different—probably much lower—at the time the women in the older cohorts were in the marriage market. Under these circumstances, the differences in the fertility rates may be underestimates of the eventual impact of current levels of migration on fertility, at least in proportional terms.

Of course, "reading history sideways" it is also possible to interpret the decline in the size or significance of coefficients across age groups as an age effect (Thornton, 2001). The differences by age groups across migration quartiles could be due to the fact that migration has a greater effect on life course decisions early in the reproductive years and then attenuates as women age. Future research that incorporates retrospective cohort experiences or cross-sections for additional periods could help to clarify association between migration, union formation and fertility.

Conclusion

Increasing levels of household migration within municipalities has a significant impact on lowering women's fertility in sending communities. The effect of migration on fertility is attributable to changes in the proportion of women who marry early in their reproductive years. The variation in the proportion of married women in municipalities with high levels of migration is, in turn, related to the disruptive effects of migration on the marriage market. However, migration seems to be resulting – directly or indirectly – in other adaptive responses and may be changing community norms regarding family formation. As migration networks become well-established, a greater proportion of individuals have the opportunity to migrate. This may result in changes in how women evaluate potential marriage partners as well as their own migratory behavior in order to achieve life goals.

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Figure 1. Distribution of Municipalities by the Proportion of Households Experiencing Migration since 1995 (n=314)

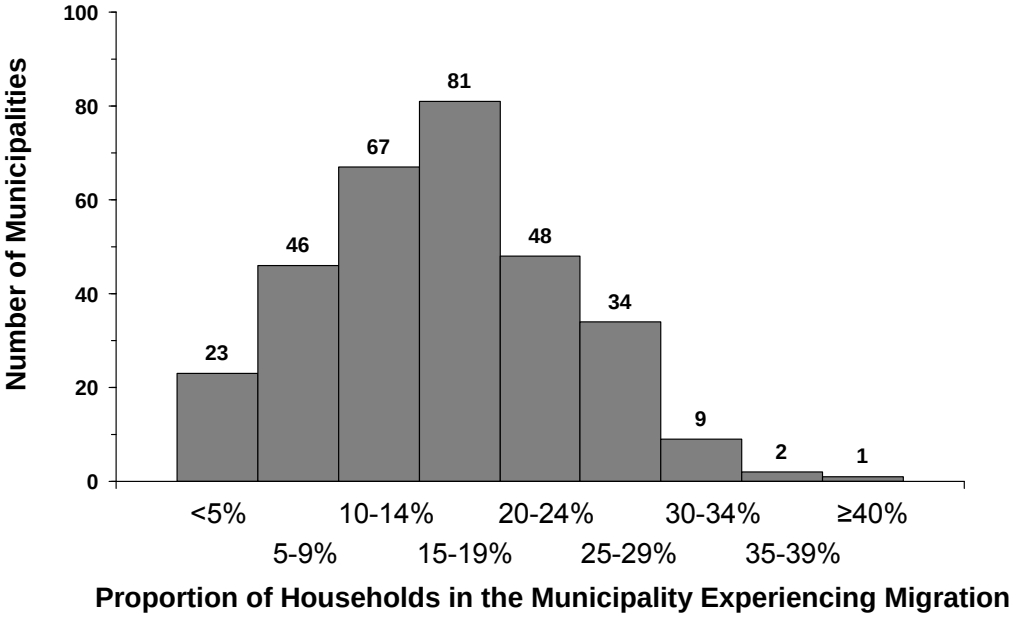


Table 1. Characteristics of Municipalities and Reproductive Aged Women by Quartile of Migration

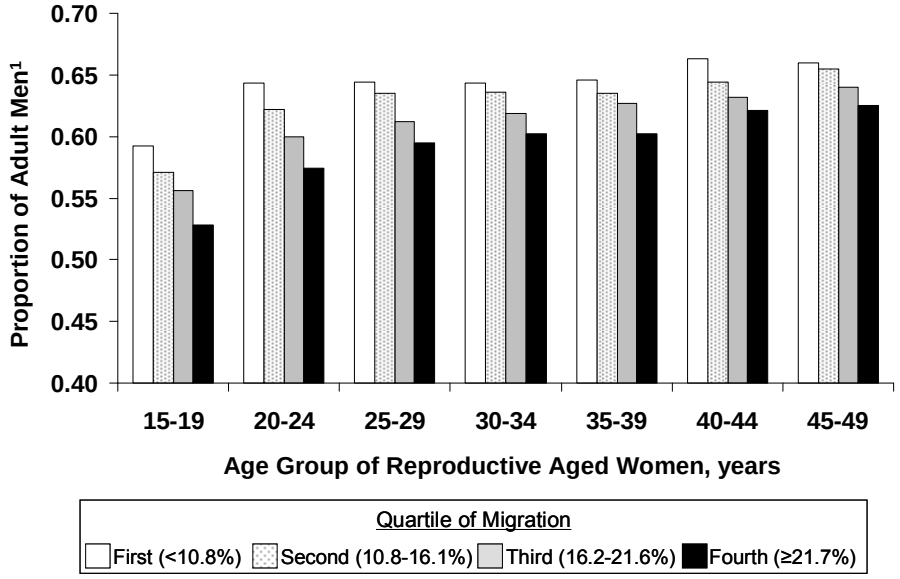
	Quartile of Municipal Migration (<1.0% - 42.6%)				
	Lowest Quartile (<10.8%)	**Second Quartile (10.8-16.1%)**	**Third Quartile (16.2-21.6%)**	**Highest Quartile (≥21.7%)**	**P-trend**
Panel A: Municipalities	(n=78)	(n=79)	(n=78)	(n=79)	
Community Population Size, %					
Less than 2500	65.7	57.1	67.3	64.9	0.627
Economic Development, %					
Electrified households	82.3	90.1	92.9	93.7	<0.001
Piped water	37.8	53.5	58.1	55.5	<0.001
Sewerage connection	41.8	54.8	55.3	53.9	0.005
Mean Household Income in pesos, %					
Less than 21,199	41.2	23.5	15.7	16.8	0.001
21,200 – 34,099	17.1	31.7	24.7	27.7	0.284
34,100 – 47,599	26.9	20.6	26.1	26.1	0.870
Greater than 47,600	14.2	24.3	33.6	29.4	0.021
Adult Educational Level in years, mean	5.1	5.0	4.9	4.6	0.001
Adult Employment, %	43.6	43.7	41.2	37.1	<0.001
Female Employment, %	6.5	7.0	6.6	6.1	0.163
Proportion Adult Men, %	48.8	47.3	45.8	43.9	<0.001
Panel B: Reproductive Age Women	(n=62,390)	(n=58,945)	(n=56,541)	(n=61,850)	
Age in years, mean	28.8	28.5	28.5	28.6	0.217
Educational Level, %					
Incomplete Primary	33.9	32.3	33.8	35.1	0.270
Primary	26.4	29.6	31.6	31.5	<0.001
Incomplete Secondary	6.2	5.9	5.5	5.3	0.001
Secondary	18.8	18.5	17.2	17.0	0.048
Post-Secondary Education	14.7	13.7	11.9	11.1	0.002
Currently Employed, %	24.1	26.7	22.8	21.4	0.005
Marital Status, %					
Single	32.3	35.8	37.9	39.3	<0.001
Married	63.3	60.0	58.6	57.2	<0.001
Previously Married	4.4	4.2	3.5	3.5	<0.001
Birth in last year, %	12.1	10.8	10.8	10.0	<0.001
Parity, mean	2.6	2.4	2.3	2.4	<0.001

Table 2. Age-specific and Total Fertility Rates for Reproductive Aged and Married Women by Quartile of Migration

	Level of Municipal Migration				
	First Quartile (<10.8%)	**Second Quartile (10.8-16.1%)**	**Third Quartile (16.2-21.6%)**	**Fourth Quartile (≥21.7%)**	**P-trend**
Panel A: Reproductive Aged Women					
Age 15-19	77	61	57	48	<0.001
Age 20-24	189	174	167	150	<0.001
Age 25-29	192	181	171	172	0.051
Age 30-34	162	147	143	146	0.081
Age 35-39	107	87	109	99	0.894
Age 40-44	44	41	44	40	0.724
Age 45-49	8	10	6	9	0.965
Total Fertility Rate	**3.90**	**3.51**	**3.49**	**3.32**	
Panel B: Married Women					
Age 20-24	306	305	308	303	0.920
Age 25-29	234	232	230	240	0.709
Age 30-34	184	170	171	177	0.562
Age 35-39	121	98	127	117	0.630
Age 40-44	49	46	50	46	0.846
Age 45-49	9	11	7	10	0.871
Total Fertility Rate	**4.52**	**4.31**	**4.47**	**4.47**	

Figure 2. Proportion of Women 15 to 49 Years of Age Living in Union by Quartile of Migration

Figure 3.
Panel A. Proportion of Adult Men by Age Group of Reproductive Aged Women and Quartile of Migration



1. Proportions exceed 50% as the age range for men used to compute the proportion is twice that used for women

Panel B. Mean Years of Education by Age Group of Reproductive Aged Women and Quartile of Migration

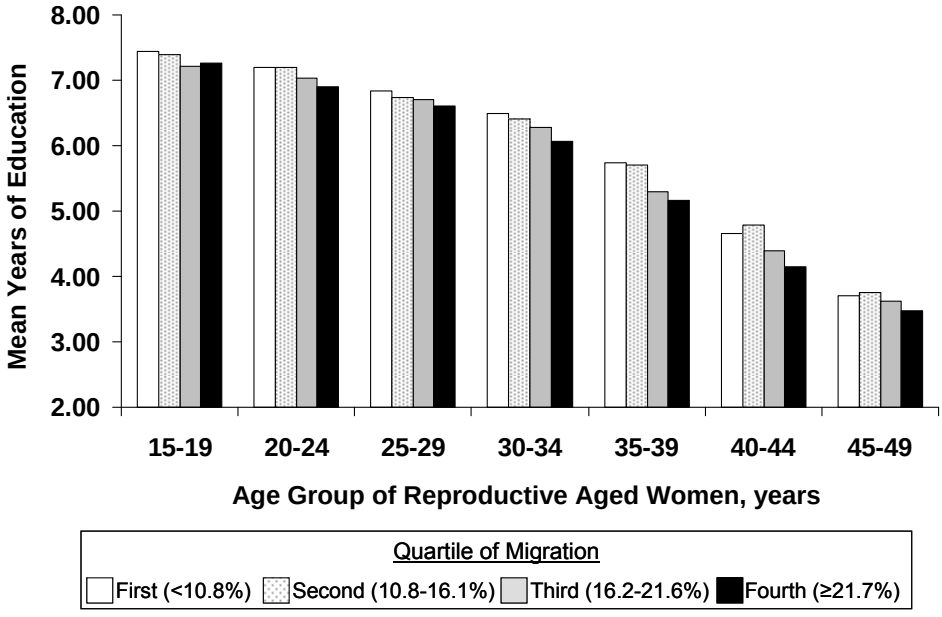
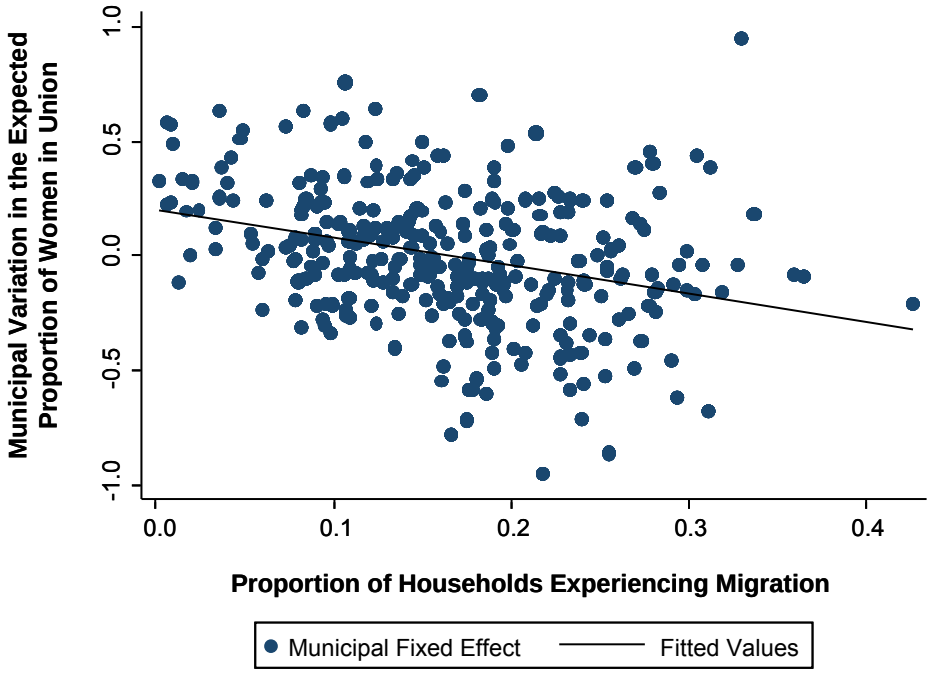


Table 3. Adjusted Fixed-Effects Regression Model on the Logit transformation of Proportion of Women in Union

	Coefficient	P value
Age 15-19	--	--
Age 20-24	1.286	0.008
Age 25-29	1.547	0.004
Age 30-34	2.160	<0.001
Age 35-39	2.131	<0.001
Age 40-44	2.295	<0.001
Age 45-49	2.645	<0.001
Proportion Male 15-19	1.555	0.005
Proportion Male 20-24	1.312	0.015
Proportion Male 25-29	2.129	0.001
Proportion Male 30-34	1.389	0.028
Proportion Male 35-39	1.859	0.004
Proportion Male 40-44	1.101	0.062
Proportion Male 45-49	0.507	0.351
Mean Education 15-19	-0.203	<0.001
Mean Education 20-24	-0.128	<0.001
Mean Education 25-29	-0.111	<0.001
Mean Education 30-34	-0.051	0.043
Mean Education 35-39	-0.081	0.001
Mean Education 40-44	-0.041	0.098
Mean Education 45-49	-0.053	0.049

Figure 4. Residual Municipal Variation for the Proportion of Women in Union by Level of Municipal Migration



Appendix A. Means and Standard Deviations of Transformations for Proportion Women in Union by Age Group

	Proportion Married		Logit-transformed Proportion Married	
	Mean	Standard Deviation	Mean	Standard Deviation
Age 15-19	0.150	0.059	-1.816	0.514
Age 20-24	0.498	0.103	-0.011	0.438
Age 25-29	0.712	0.090	0.945	0.450
Age 30-34	0.812	0.072	1.532	0.489
Age 35-39	0.832	0.064	1.681	0.497
Age 40-44	0.826	0.070	1.641	0.517
Age 45-49	0.819	0.072	1.603	0.554