Fertility-Migration Interactions: Exploring the Association between Migration of Children and Parental Fertility in Mexican Rural Communities

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ABSTRACT

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Migration is a central component of the demographic transition set in motion by the buildup of "excess" rural populations as mortality declines before fertility, yet relatively few studies have integrated migration into the analysis of the fertility transition. What work has been done has focused on the link between parental migration and marital fertility; almost none on intergenerational links between parental fertility and migration of their children. This thesis explores how parental fertility influences the migration of children and vice versa. Specifically it examines whether the potential economic contributions of migrant children can increase the value of and demand for children, and hence parental fertility as expected by Caldwell's (1976) Wealth flow theory, or whether parents encourage adult child out-migration as a more desirable and rational alternative to having fewer children as expected by Davis' (1963) Multiphasic Response theory. Using data from Mexico's Encuesta Nacional de la Dinámica Demográfica (ENADID) 1997, we explore the mechanisms by which parental fertility and the migration of children influence each other in rural Mexican communities. Special attention is paid to socio-demographic variables that are known to influence both fertility and migration. The research shows that households with migrant children have higher fertility than non-migrant households and households with migrant husbands only. This finding is interpreted within the context of the two different hypotheses and theories.

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CHAPTER 1: INTRODUCTION

Globally major changes in women's reproductive patterns have been taking place: women are marrying later, using contraceptives to prevent unwanted births, postponing the birth of their first child, and choosing to remain single or childless. Known as the fertility transition, these changes have reduced fertility worldwide from an average of 6.2 births per woman in 1950 to 3.2 in 2000 and 2.6 today (PRB, 2010). Early studies on the subject have offered both socioeconomic and cultural explanations of the phenomenon (Alter, 1992). These explanations or theories have commanded great appeal from social scientist and policy-makers, perhaps because they provide a macro-scale universal 'explanation' of the social and economic processes governing changing fertility and reproductive behaviour.

Processes which underlie the fertility transition are also fundamentally linked to migration. Cultural diffusion and assimilation, economic development and income growth, and the transformation of family roles and relationships are important processes in reducing fertility (Lindstrom and Giorguli, 2007). These same processes have been recognized as outcomes of both rural-to-urban and overseas migration. Migrants for instance, are potentially influential agents for fertility change through the diffusion of contraceptive knowledge (Lindstrom and Muñoz-Franco, 2005), whereas the selective out-migration of men may increase the possibilities for women to become more independent and assume new economic and social roles (Goodson-Lawes, 1993). While migration seems to have important implications for fertility, relatively little work examines directly the effects of migration on fertility, and even less work has been done

on how fertility may affect migration.

Most studies of fertility transition have worked at the macro-scale. At the household level, research on fertility and migration has focused on how parental migration—more specifically the father's—reduces fertility through prolonged absence and how the timing and parity of births influence the occurrence of parental migration. Although the link between fertility and parental migration has been demonstrated, little is known about the intergenerational effect of parental fertility on the migration of children and vice versa.

This thesis explores fertility-migration interactions by focusing on households with migrant children in comparison with those without in rural Mexican communities. The mechanisms by which parental fertility influences the migration of children and the migration of children influences parental fertility will be discussed within the contexts of two fertility transition theories: Davis' (1963) Multiphasic Response Theory; and Caldwell's (1976) Wealth Flow Theory (1976). Special attention will be paid to socio-demographic variables that are known to influence both fertility and migration in an attempt to identify the pathways through which fertility and migration influence each other. According to the Multiphasic Response model husbands and ultimately adult children may feel that migration to the United States was a more desirable option than having fewer children or alternatively children may have no option but to migrate as their parents high fertility makes it difficult for them to make a living in rural Mexico. According to the Wealth Flows theory one might expect that the known potential economic contributions of migrant young adults may increase the value of and demand

for having many children, thereby making high fertility a rational choice.

This thesis consists of seven chapters. The next chapter provides a brief overview of the history of land-tenure, international migration and the fertility transition in Mexico as a context for understanding the relationship between them in Mexico. Chapter three reviews the literature on the fertility transition, the impact of migration on women's lives, and migration-fertility interactions. Chapter four introduces the conceptual framework, and research questions. Chapter five describes the data and the methodology. Chapter six describes and discusses the significance of the results. The concluding chapter synthesizes the findings, discusses the implications of this work, and makes recommendations for further research.

CHAPTER 2: LAND TENURE, MIGRATION AND FERTILITY IN MEXICO

2.1 Community-based (*ejido*) land tenure in Mexico

The term *ejido* refers to agricultural land expropriated from private holdings and redistributed to communal farms. Although the term was brought across from Spain and used extensively in colonial Mexico to designate areas around villages, its current meaning arose from the Mexican revolution in 1910. The revolution led to the reform of the constitution of 1917 which recognized communally based land tenure and forbade commercial manufacturing, mining or petroleum companies from acquiring or holding rural land (Barnes, 2009). The amount of *Ejido* land stepped up between 1931 and 1940 when the government expropriated nearly 18 million hectares of privately owned land for redistribution. The objective of land redistribution was to avoid mere subsistence production and promote productivity and supply for the national market (Assies, 2008). *Ejido* land rights were acquired through inheritance, cession or direct transfer, purchase from another *ejido* member, and leasing agreements. *Ejido* rights were lost in the case of: abandonment of land, fraudulent actions by *ejido* representatives, and the damaging of community natural resources (Barnes, 2009). Between 1940 and 1970 even though policies were geared to the promotion of large-scale agriculture, by the 1980s some 28,000 *ejidos* had been created and comprised over a half of the Mexican farmland. In 1992, while discussions on NAFTA were underway, the Mexican government introduced major reforms pertaining to *ejido* policies. These reforms were designed around neo-liberal policies, the main objective of which was to bring *ejidos* into a modern economy by promoting the transformation of *ejidos* into private property which could be sold (Assies, 2009; Barnes, 2009).

2.2 Mexican International-Migration to the United States: An Overview

Mexican migration to the United States has a long history involving millions of people, most of them undocumented, crossing the Mexico-United States border every year. This movement started in the late 19th century to supply cheap labour to work on the railways and agriculture in the Southwest. After World War II, this demand resulted in the *bracero*[1] program, which allowed Mexican agricultural workers to work legally in the United States on a temporary basis. However the demand rapidly surpassed the number allowed by the program and employers in the US started to recruit illegal Mexican workers (Zamudio, 2004).

The *bracero* program lasted twenty years. After it ended, illegal migration continued, reaching unprecedented heights during the Mexican economic collapse in the 1980s. In 1986 the United States implemented the Immigration Reform and Control Act (IRCA) to control the flow of undocumented immigrants. The act gave illegal immigrants living in the United States the opportunity to legalize their status, and imposed sanctions on employers who hired undocumented workers (Zamudio, 2004).

In 1994 Mexico joined the North American Free Trade Agreement (NAFTA), with the hope that access to the North American market would accelerate Mexico's recovery from the financial crisis by generating jobs, stabilizing inflation rates and hopefully stemming the exodus. At the time of joining NAFTA, *ejido* lands in Mexico encompassed 75% of all agricultural production (Davis et al. 2002), but after joining, the government cut off agricultural subsidies and small-holding rural agriculture in Mexico

[1] *Bracero* is a Mexican worker permitted to enter the U.S. and work in the agriculture for a limited period of time.

could not compete with the U.S. and employment in the sector declined sharply (McCarty, 2008). As a result Mexican emigration to the U.S. accelerated (Jones, 2005; Zamudio, 2004). Using *ejido* panel data from 1994 to 1997, Davis et al. (2002) found that during the first years of NAFTA, the proportions of households reporting any family member that had recently migrated to the U.S. rose from 3 to 8 percent (McCarty, 2008).

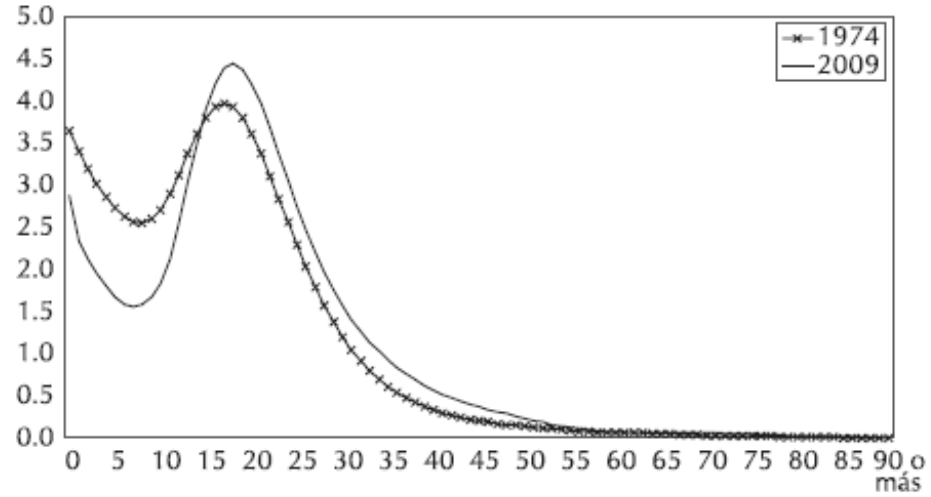
In this new century, Mexico has the dubious record of being the country with the highest proportion of its population living in a foreign country. It is estimated that nine percent of the total population born in Mexico is currently residing, either documented or undocumented, in the United States. Moreover, in recent years the Mexico-U.S. migration process has undergone a series of transformations in terms of its magnitude, intensity, modalities and characteristics. Mexican emigration has lost its circular character and become more permanent, while the migrant's profile has become more heterogeneous, involving women as well as men (Leite et al. 2009).

According to Mexican surveys and census data collected between 1990 and 2000, more than 96 percent of all Mexican international migrants go the United States (INEGI, 2001), and around 80 percent of all newly arrived Mexican immigrants to the U.S. are undocumented (CONAPO, 2001). In Mexico, international migration to the United States has become institutionalized[2]. In 2000 estimations indicated that, on average, 350,000 Mexicans migrate to the United States each year, close to the total number of deaths each

[2] In its initial stages, migration was disruptive to communities and families; with time, however, it became part of local institutions and community life and culture. In some Mexican sending communities for instance, annual ceremonies are held to recognize migrants and to acknowledge their importance to their families and communities (Espinosa, 1998; Kanaiaupuni and Donato, 1999).

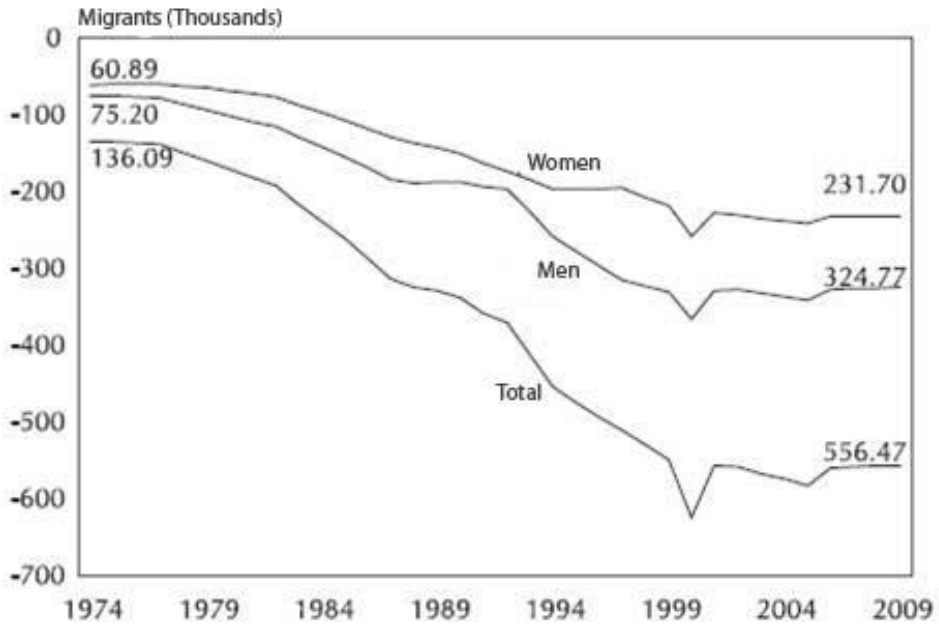
year in Mexico (435,000). Between 1990 and 2000, approximately 3.5 million Mexicans crossed the Mexico-U.S border (Lopez Villar, 2006). The most recent estimations (2009) show that on average, 500,000 Mexicans cross illegally to the U.S , of which 60 percent are men, most between 20 and 30 years old (Villagómez, 2009) (figs.2.1 and 2.2).

Figure 2.1 International Migrants Distribution (Percentage) by Age, 1974-2009



***Source*: Estimates from Mexico's National Population Council (CONAPO)**

Figure 2.2 Net International Migration, Total and by Sex, 1974-2009



***Source*: Estimates from Mexico's National Population Council (CONAPO)**

According to Massey and Espinosa (1997), there are three fundamental forces promoting Mexican migration to the U.S: (1) Social capital formation, which occurs because people who are related to U.S migrants are themselves more likely to migrate[3]; (2) Human capital formation includes migration experience (crossing the border, and living and working in the U.S). The more U.S experience migrants accumulate, the more likely they are to make a second trip; and (3) market consolidation. Mexico's wrenching economic transformations have brought about the displacement of workers, the concentration of land, and the mechanization of production. Growing economic insecurity, especially in rural settings, has led Mexican households to search for ways to self-insure against low family income and access to capital. Given ready access to human and social capital connecting them to the U.S., household heads and other immediate family members migrate intentionally as part of a strategy of risk diversification and capital accumulation (Massey and Espinosa, 1997).

Traditionally, the states with the highest rates of international migration are Aguascalientes, Colima, Durango, Guanajuato, Jalisco, Michoacán, Nayarit, Nuevo León, San Luis Potosí, and Zacatecas (Arias, 2009). These states continue to contribute more than 50 percent of all Mexican international migrants. More recently Central and South-southeastern states have experienced an increase in the rates of international migration (see figs. 2.3 and 2.4). Between 1995 and the 2000 for instance, 13 percent of the total population that left Mexico originated from the State of Mexico and Mexico City (Lopez Villar, 2006). Although international out-migration has increased in most states, the

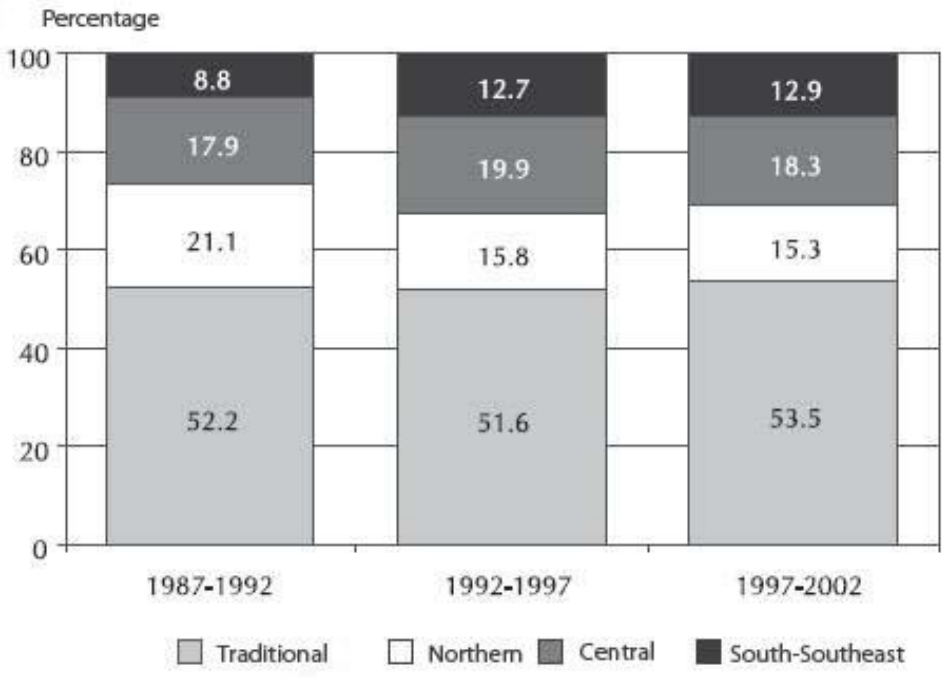
[3] About half of adult Mexicans are related to someone living in the United States. As a result social capital is widely diffused throughout the Mexican population (Massey and Espinosa, 1997).

traditional region remains the region with the greatest proportion of international migrants, whereas Central and South-Southeastern regions still are in the first stage of the migratory process (Leite et al. 2009). The central and traditional regions are the most densely populated regions in Mexico followed by the South-Southeastern region and the Northern region. Moreover, almost 60 percent of the total urban population is concentrated in the Central and Traditional regions, whereas the Northern and South-Southern regions contain only 26.6 and 14.4 percent respectively (CONAPO, 2001).

Figure 2.3 Map of Mexico Showing International Migration Regions

Source:

Figure 2.4 Mexico-U.S. Migration, by Region and Period, 1987-2002



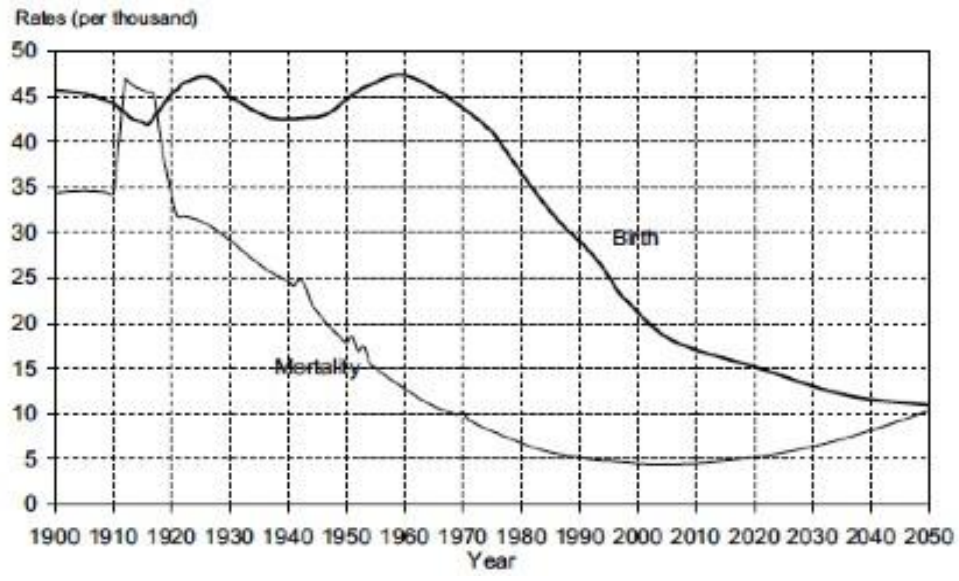
***Source*: Estimates from Mexico's National Population Council (CONAPO)**

2.3 Mexican Fertility Transition

The demographic transition refers to the change from a situation where population is kept stable by high fertility offset by high levels of mortality to one where growth is kept down by low and controlled birth and death rates. During the transition, mortality declines first fuelling rapid population growth. Mexico entered the demographic transition in the 1930s when mortality declined rapidly and life expectancy started to increase. Fertility did not begin to decline until the mid 1960s. At this point women were having on average 7.2 births and Mexico's population was growing at 3.3 per cent a year. As fertility declined so did population growth so that in 2000 the annual rate of growth had dropped to 1.7 per cent (see fig.2.5) (Tuiran et al., 2008).

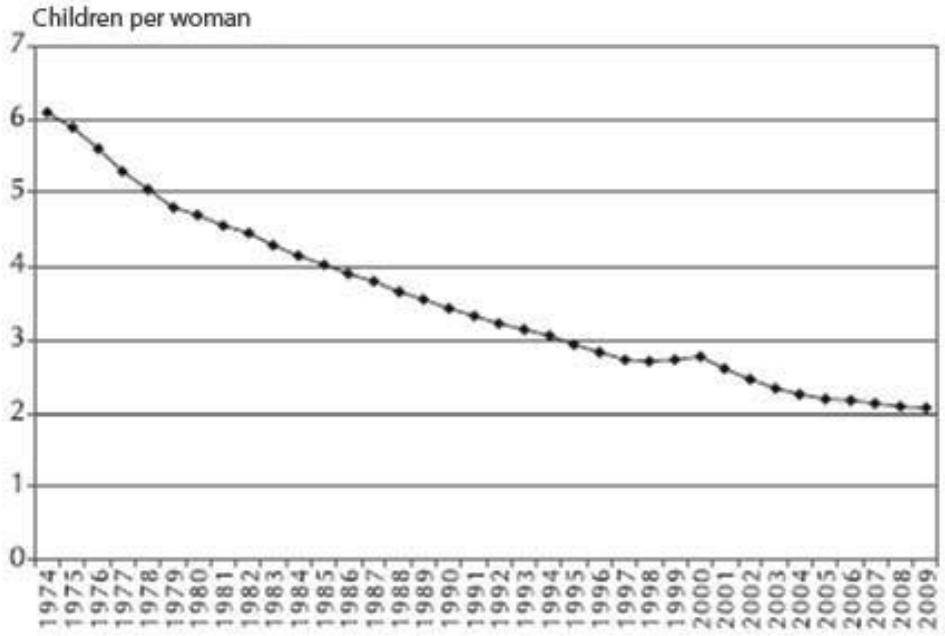
Three stages in the process of fertility decline in Mexico have been observed. In the first decade from 1964-1973 the total fertility rate (TFR) fell relatively slowly dropping by almost one child (an average decline of 0.09 children per year). This was followed by a decade of rapid decline from 1974-1984, when the TFR decreased by almost two children (an average of 0.20 children per year), corresponding closely with the establishment of a new national population policy. In the third stage, which spans from 1985 to 2001, TFR dropped more slowly (an average decrease of 0.10 children per year) half the speed of the reduction observed in the eleven previous years. Thus, fertility registered an average of five children per woman in 1978; fell to four children in 1985; decreasing to three children in 1993, reaching around 2.08 children at the present time (Tuiran et al., 2008; Villagómez, 2009) slightly under the 2.1 children needed to replace both parents (see fig.2.6).

Figure 2.5 Demographic Transition, Mexico, 1900-2050



***Source*: Estimates from Mexico's National Population Council (CONAPO)**

Figure 2.6 Mexico's Total Fertility Rate, 1974-2009



***Source*: Estimates from Mexico's National Population Council (CONAPO)**

In Mexico, the use of contraceptive methods has proven of great importance in bringing down fertility. In 1976, one out of three married women regulated their fertility using some kind of contraceptive method. In 1987 the prevalence of contraceptives was estimated at 52.7%, and in 1995, two thirds of the married women used contraception (Gómez de Leon and Hernández, 1997). While the use of contraceptive methods in Mexico has increased significantly, important differences can still be observed between urban and rural environments. In 1995, women in rural communities had a TFR of 3.8 children, whereas women living in urban areas had 2.6 children. In 2005, the TFR for women in rural areas decreased by one child (2.8) but remained higher than that of women in urban areas (2.1) (Romo and Sánchez, 2009).

Although in recent years Mexican-U.S migrants more often include women and urbanites than in the past, the majority of migrants are still rural and male, and studies

reveal remarkable continuity over time (Massey and Espinoza, 1997; Leite et al. 2009). For this reason this thesis focuses on rural communities and households where wives and mothers were not migrants. It is here that migration is endemic, persisted for long enough to become institutionalized and where most women whose husbands migrated and are old enough to have children who migrate reside, and where fertility remains sufficiently high to affect and be affected by migration.

CHAPTER 3: LITERATURE REVIEW

As we have seen, international migration is a way of life for a majority of families in Mexico. This may affect fertility in rural Mexico, from where migrants originate, through a combination of pathways. The link between migration and fertility may operate directly in a demographic context, or in more complex and indirect ways through the relationships between migration and social structures. In the short run, international migration, may reduce annual birth probabilities through absence of a husband and hence fertility among married women left behind. However, international migration may also result in long-term impacts on the lives of women—prolonged education, employment outside the home, greater autonomy—which may contribute to lower fertility directly by delaying marriage or indirectly by changing attitudes towards childbearing, family size or contraception. In order to understand some of the potential effects of international migration on fertility I have organized the stands of this literature into the following major issues: How do the fertility and mobility transition relate to each other? How do these transitions relate to women? How does gender affect the decision to migrate? What are the consequences of male-selective migration for women in sending communities? What are the pathways through which migration affects fertility?

3.1 The Fertility Transition

Fertility has been declining in most developing countries since the 1960s. Efforts to explain this reduction have resulted in four major fertility theories: (1) The classic demographic transition theory attributes fertility decline to social structural changes that accompany modernization (like urbanization, industrialization and secularization) that

reduce mortality and hence the need for of large families at the same time as increasing the costs; (2) Caldwell's (1976) theory of wealth flows attributes fertility decline to the emotional nucleation of the family, and the reversals in flows of wealth from children to parents in traditional societies to parents to children in modern societies; (3) the neoclassical microeconomic theory of fertility emphasizes the relative costs of fertility regulation and children versus other goods, the couple's income, and their preferences for children versus competing forms of consumption; and (4) the ideational theory which attributes the timing of the fertility transition to the diffusion of information and new social norms about birth control (Mason, 1997). More recently, interpretations of fertility decline have also been attributed to female empowerment (Folbre, 2002; Sanderson and Dubrow, 2000; Trovato, 2002).

The onset of the fertility transition, however, does not necessarily correspond to the level of development, as suggested in some of the above-mentioned fertility theories, and the path it will follow is not always determined by the level of socio-economic variables, such as education, and female employment (Bongaarts and Potter, 2002; Folbre, 2002; Sanderson and Dubrow, 2000; Trovato, 2002). Thus, in order to understand the causes of fertility change and variation it is crucial to analyze the mechanisms through which these socio-economic variables influence fertility. As a result, demographers have turned to the study of the proximate determinants of fertility, which are the biological and behavioral factors through which social, economic, and environmental variables affect fertility. There are seven proximate determinants of fertility: (1) age at marriage (and marital disruption); (2) onset of permanent sterility; (3) postpartum infecundability linked to breastfeeding practices and taboos on intercourse;

(4) natural fecundability or frequency of intercourse; (5) use and effectiveness of contraception; (6) spontaneous intrauterine mortality related to mother's nutrition and health; and (7) induced abortion. The first two determine the duration of the reproductive period while the remaining five, determine the rate of childbearing, the length of birth interval, often referred to as stopping and spacing behaviors respectively (Bongaarts and Potter, 2002).

These proximate determinants can be affected by the actions of governments and organizations—via public health campaigns or public work projects. In Mexico, for instance, the rapid fertility decline has been associated with a change in governmental policy from a pronatalist position to one favoring limiting growth which emphasized both the protection of the family and the promotion of women and their equal legal rights as well as the promotion of family planning infrastructure (Zavala de Cosío, 1992; UN, 1993). However, individual actions and behaviors can also have a strong impact on fertility (Mason, 1997). We know that in many developing countries major social, political and economic changes have lead to new motives and mechanisms that have diminished patriarchal authority over women and adult children reducing the social, psychological and economic benefits of large families and contributing to a decline in desired family size. Similarly, the empowerment of women through education, and greater participation in the paid economy have influenced women's childbearing patterns through delayed age at marriage and an increasing demand for control over their own reproduction (Rosero-Bixby and Casterline, 1994; Bongaarts and Potter, 2002; Folbre, 2002; Sanderson and Dubrow, 2000; Trovato, 2002). Education, for instance, may reduce fertility by increasing both men and women's aspirations for and investment in each child

and for themselves. However, the role of female education is particularly important to fertility decline. Female education increases women's economic independence and self-esteem, which in turn increases women's ability to negotiate fertility with their husbands (Sanderson and Dubrow, 2000). Given these conditions it is evident that each pathway to fertility decline reflects unique socio-cultural and economic conditions that suggest that fertility theories are not mutually exclusive and may interact with each other throughout the transition and may affect groups differently.

3.2 The Gendered Process of Migration: Who Migrates and Why?

Until recently, the process of migration in Mexico, more specifically from rural communities to the United States has been highly male selective. Far more women than men remain behind in Mexico, although increasingly many of them move to nearby towns and cities (Cohen et al. 2008; Parrado, 2004). The social construction of gender in different societies affects the migration of men and women in different and distinct ways. Massey et al. (2006) compared male and female migration in five Latin American countries (Mexico, Costa Rica, Nicaragua, Puerto Rico, and Dominican Republic). They found that female householders in the two most patriarchal societies (Mexico and Costa Rica) displayed relatively low rates of out-migration when compared to males, whereas in Nicaragua and Dominican Republic (matrifocal societies) the ratio of female to male migration was much higher suggesting that in societies where women are more autonomous and independent, women are more likely to migrate as independent agents. The benefits of migration may be perceived differently by men and women. In Oaxaca, Mexico, Cohen et al. (2008) found that men see migration as a benefit – a way of improving the household's economic situation, thereby increasing their social status in

the community, whereas for women migration divides and threatens the socioeconomic stability of the household.

The gender balance of migration is also affected by labour recruitment, regional economies, relative employment opportunities for men and women in places of origin and destination, and state institutions and policies, and they do this either directly or through their influence on the gender division of labour. For instance, female migration from rural areas in Peruvian Andean communities has been attributed, in part, to the gender-unequal effects of the agrarian reform, segregated labour markets, seasonality of labour demands, and specific sectors of growth with associated sexual divisions of labour (i.e. informal services in cities employing large numbers of women) (Radcliffe, 1992). In a similar study, Chant (1992) found that Costa Rican women move from rural communities to cities because of greater demand for women as domestic workers, while most male migration tended to be either rural-to-rural or international, with men working on farms.

The industrialization of the Mexico-U.S. border, more specifically the *maquiladora* industry has created a change in the demand for labour. Since its establishment in 1965, the *maquiladora* program has shown a strong preference for female labour force (Young and Fort, 1994) which contributed to shape migratory patterns within Mexico: the gendered recruitment of labour force along the Mexican-U.S. border increased female migration from the surrounding rural areas and the interior of Mexico to the border region (Fernández-Kelly, 1983). However, changes in the Mexican labour force, sometimes as a result of the NAFTA, has decreased the demand for female

workers in the *maquiladora* industry (Quintero-Ramírez, 2002) which may be a factor influencing female migration to the U.S.

Education, family considerations, socioeconomic status, and migrant networks may also determine migration patterns for men and women. Kanaiaupuni (2000) found that in Mexican rural communities, education affect migration differently among men and women: less-educated men are more likely to migrate to the United States whereas more-educated women do so. Migrant networks and their composition (i.e. family members, friends) at places of destination are also critical for migration decisions because they reduce the costs and maximize the benefits. For women they are especially critical. Mexican women often follow other family members, either the husband or a parent, whereas only a small fraction initiate migration independently (Kanaiaupuni, 2000; Cerutti and Massey, 2001).

Finally, marital status and stage of family formation affect men and women's likelihood of migration differently. Kanaiaupuni (2000) found that being married decreased migration among Mexican women; having children did not further reduce it. This suggests that it is not children, but the expectations of what it is to be a good wife in a patriarchal society that limits women's mobility. On the other hand, pressures to meet the responsibilities of fatherhood may push men into international migration to accumulate capital, reduce economic uncertainty, and achieve their marriage objectives upon returning to Mexico (Kanaiaupuni, 2000; Parrado, 2004).

3.3 The Impacts of Migration on the left-behind Women

Type of economic production, labour markets, household and family networks,

gender power relations and authority structures that are linked to fertility transition are also likely to affect, or be affected by, migration. These indirect linkages are complicated by the gender selectivity of migration and the relationships between the demographic characteristics and the social structure of places of origin and destination. For instance, selective migration of young men may change dramatically the population size and the age-sex structures of communities of origin. Such compositional changes may in turn affect the community's social structure by altering the household's socioeconomic situation, gender power relations, sex-related ideologies, material inequalities, and differences in social status (Massey and Mullan, 1984; Goldscheider, 1987; Watkins, 1993; Janssens, 2007).

Women who migrate may move away from situations where they are under constraints of patriarchal systems to situations in which they can exert greater autonomy over their own lives. Similarly, women who do not migrate, but remain behind when their husbands leave, take on new responsibilities that affect the social and economic wellbeing of the household, increase their personal freedom, autonomy, authority, and participation in productive income generating activities, and allow for economic and social empowerment (Chant, 1992; Chant and Radcliffe, 1992; Hondagneu-Sotelo, 1992; Conwey and Cohen, 1998). Although the pathways through which international migration influences a woman's life are not clearly known, remittances along with the diffusion of secular ideas are expected to enhance the standard of living of the left-behind women, provide greater access to resources, and consequently improve their position (Hadi, 2001; Elbadawy and Roushdy, 2010).

A number of studies have looked into the effects of migration on the lives of women left behind. Aysa and Massey (2004) found that Mexican women in urban settings acquired greater bargaining power, and tended to enter the labour market following their husband's migration. Nevertheless, their participation in the labour force was more likely to be determined by age, childrearing, and education. Goodson-Lawes (1993) noted that in Mexico, especially in regions of high male out-migration, there are greater possibilities for women to assume new roles previously filled by men, increasing their authority within the family and the community. Likewise, Hadi (2001) found that in Bangladeshi villages, women with migrant husbands were almost four times as likely to participate in household decision-making as women from non-migrant households.

Conversely, other studies have demonstrated migration can be disempowering to women or they may revert to previous patriarchal standards, temporarily removed, once men return to the communities (Hadi, 2001). Moreover, members of the immediate and extended family may contribute to preserve these patriarchal standards by controlling, in the case of married women whose husbands are migrants, access to remittances, the allocation of other economic resources, and even the social lives of these women (Arias, 2009; Rosas, 2008; Menjivar and Agadjanian). Salgado de Snyder (1993) noted that although male-selective migration increases women's autonomy, they are also more likely to experience higher stress levels as a result of new roles and responsibilities.

The role that women play by not migrating is critical to the migration behavior of other household members, particularly men. In Mexico, male-selective migration would not be possible without women to assume the household productive and reproductive

responsibilities at home when men leave (Kanaiaupuni, 2000).

3.4 The Reciprocal Nature of Migration-Fertility Interactions

In 1972, Wilbur Zelinsky's seminal paper on the mobility transition argued that migration is a central component of the demographic transition set in motion by the build-up of "excess" rural populations as mortality comes down but fertility remains high. The mobility transition model consists of four phases which parallel the original demographic or, in Zelinsky's own words, the vital transition model. In Phase 1 (The Premodern Traditional Society), there is almost no migration as communication is difficult and local and natural increase is close to zero. In Phase 2 (The Early Transitional Society) massive rural-to-urban migration, international migration, and movements to new colonization frontiers, is brought about by a rapid increase in the rate of natural increase in rural areas and increased communication and urbanization resulting from modernization. In Phase 3 (The Late Transitional Society), gradually urban-to-urban migration surpasses movements from countryside to cities as natural increase decelerates and most people live in urban places.[4]

Despite the links between migration and fertility very few people have followed up on Zelinsky's challenge to integrate migration into the analysis of the fertility transition. One exception is Skeldon (1990) who reexamined the relationship between fertility and mobility with reference to Zelinsky's theory, primarily based on the experience of developing countries. Skeldon argued that compared to European countries

[4] In phase 4 (The Advanced Society), rural-to-urban migration is reduced to a trickle while urban to urban movement persists as most people live in cities and natural increase approaches zero. Phase 5 (The Super-advanced society), where the population exhibits low mobility, mostly inter- and intra-urban, is a future perspective following the end of the demographic transition.

in the 19th century, far more people move to urban destinations today in the developing world. He also introduced two additions to the original mobility transition model[5]; changing urban destinations, and the changing sex composition of the migration flow. During the early transitional stage (phase 2), the largest cities are targets of migration; the intermediate transitional society (phase 3) sees the rapid growth of smaller urban centers as well as the large cities resulting from the accelerating rural-to-urban movements; the late transitional society (phase 4) sees and increasing proportion of long-distance movements from the rural sector, the smaller cities are short-circuited, and the megacity emerges as the principal destination. The predominance of each of these phases varies from country to country, and as mobility evolves across these phases, there is a trend from male-dominated flows towards greater female participation (Skeldon, 1990).

Empirical data supports the assertion that Mexico is in the third phase of the mobility and fertility transitions. Although Mexican fertility rates have substantially dropped, rural-to-urban and international migration remains high. Moreover, Mexican women are increasingly moving within the country, and more recently to the United States. Zelinsky's model, however, is macro-scale[6] and does not consider how migration may affect fertility, especially within households.

[5] According to Skeldon (1990), in the early transitional society (phase 2), the large cities are main targets of male-dominated migration, mainly from urban origins. Mobility, however, is still a support for rural communities. The intermediate transitional society (phase 3) sees the rapid growth of smaller urban centers as well as the large cities as they are the target of accelerating long-term rural-to-urban movements from their immediate hinterlands which in turn begin to show signs of demographic stagnation. During this stage migration to rural destination decreases and women's migration starts to increase. The late transitional society (phase 4) sees an increasing proportion of long-distance rural-to-urban migration with megacities cities as primary targets. Urban-to-urban migration increases and rural population starts declining. International migration emerges, and there is a trend from male-dominated flows towards greater female mobility, especially rural-to-urban and urban-to-urban mobility.

[6] Zelinsky´s model does not consider institutional differences among countries. It assumes that the process of modernization is similar in developed and less developed countries.

3.4.1 Migration and the Fertility Determinants

A number of hypotheses have been proposed suggesting migration may impact fertility behavior. These can be distinguished as the socialization hypothesis, the adaptation hypothesis, the selectivity hypothesis, and the disruption hypothesis (see Hervitz, 1985). However, only the disruption hypothesis focuses on places of origin. Specifically spousal separation resulting from migration disrupts opportunities for intercourse and combined with physiological consequences of the stress commonly associated with spousal separation affect the timing and spacing of births. Nevertheless, the drop in fertility attributable to disruption is expected to be temporary, and an accelerated pace of fertility is expected to resume as migrants return to their communities of origin (Hervitz, 1985).

Before the introduction of the disruption hypothesis, a few studies demonstrated, through mathematical modeling, that seasonal migration of men significantly reduces annual probabilities of women left behind becoming pregnant (Menken, 1979; Bongaarts and Potter, 1979). In 1984, Massey and Mullan demonstrated that short-term, seasonal separations between migrant husbands and their wives disrupt the distribution of conceptions in communities where seasonal male-selective migration is high. According to Massey and Mullan women with migrant husbands generally have fertility rates below those whose husbands do not migrate. In addition, among women with migrant husbands, fertility was especially depressed within the central childbearing ages, and the normal age pattern of fertility was as affected by the age of mother, and length of separation. More recently, Lindstrom and Giorguli (2002, 2007) found that Mexican women with migrant husbands were less likely to experience a birth in a given year when their husband was

away for more than three months during the prior year. Evidence provided by these studies strongly supports the disruption hypothesis and suggest that, at least initially, the demographic effects of migration are more or less mechanical, and do not require changes in motivation, norms, or attitudes towards family size.

On the other hand, research has looked into the notion that fertility can drive migration. Massey and Mullan (1984) noted that in rural Mexico the husband's migration was lowest at the start of marriage and prior to the arrival of children, and then rose as childbearing and childrearing occurred and the income needs of the household grew. White et al. (1995) also found that having fewer children was positively associated with the husband's migration, while Lindstrom and Giorguli (2007) established a direct relationship between the timing and parity of births and the occurrence of migration. Births constitute an important catalyst for men's migration and are turning points for women's migration. Married women are more likely to migrate before or in the same year as the first birth. However, once the first birth occurs, the likelihood of migration decreases. Highly gendered family-role specialization in Mexico pulls young mothers into the home for childcare and pushes men into U.S. labour markets where economic returns on men's labour are greatest (Lindstrom and Giorguli, 2007). Thus for married male household heads in Mexico, the odds that he migrates are closely tied to the age and number of dependents in the household, but as children age and became economically active a husband's migration declines (Massey and Mullan, 1984; Lindstrom and Giorguli, 2007).

Migration reduces some of the pressures resulting from rapid population growth

resulting from declines in mortality by transferring people out of places. This pattern is not the result of compositional effects or the selectivity of migration; it is not the result of social structural changes as migrants are exposed to new social situations in places of destination. Rather, migration is a behavioral response, a relief from population pressure that could be explained in terms of Davis' Multiphasic Response Theory (1963) (Goldscheider, 1987). Throughout the process of the demographic transition, people respond in almost every demographic manner to population pressure and relative socioeconomic deprivation. Demographic responses include contraception, sterilization, abortion, outward migration, delayed marriage, and celibacy (Davis, 1963). The two latter responses, however, could also be a by-product of migration. For instance, in 1975, Francine Van de Walle attributed low levels of fertility and marked seasonal variation in birth rates in Ticino, Switzerland in the nineteenth century to seasonal migration of men to work in the adjacent regions for more than a few months. Van de Walle concluded that emigration prevented population growth by lowering fertility, however, low fertility was only the result of migration which was a consequence of economic, social and geographical conditions that restricted the demand for male labour conferring on Ticino some unusual traits: a heavily female labour force, and an extraordinary extent of female celibacy. Importantly, however, Davis argues that once one response or adaptation to pressure is chosen it removes the necessity for choosing an alternative response.

The interrelationship between migration and fertility may act through different pathways. According to Carlson (1985), migration and exposure to new social contexts combined affect migrant population, especially the timing of marriage and of the first and subsequent births. However, his research showed that only short term disruptions in

family formation could be attributed to migration and that single migrants soon showed by their shorter birth intervals that the interruption had been overcome.

Stark (1988) argues that there is a reciprocal relationship between migration and the marriage market. Individuals who contemplate migration need to compare the cost of migration with the value of the potential outcome in both the labour and marriage markets. Labour migration for young adults is high as individuals make their initial job or career choices. At the same time these individuals may also be making decisions about first marriages. The nature of the demand for labour and the supply response which involves migration are sex-selective, thus migration may bring an array of reactions in the marriage market of the sending communities, which may result in fewer women ending up in marriage or more women spending a shorter spell of time in marriage.

Migration may be undertaken due to labour-market considerations, marriage market considerations or both. An individual may migrate to maximize employment opportunities and will postpone marriage if being married hinders such migration (Stark, 1988). Parrado (2004) noted that migration provides Mexican young men with the financial resources that accelerate union formation and reduce the prevalence of non-marriage among Mexican men. In a similar fashion, socioeconomic contexts may also influence migration-marriage interactions. For example, rural communities with low levels of education and low female formal economic activity display the lowest gradients between pre- and post-marital migration, a fact that may partly explain higher migration propensities at older ages and their overall high migration prevalence (Riosmena, 2009).

Disruptive and behavioral processes may reduce fertility only temporally, and the

longer-term impact of migration on fertility decline in places of origin may be partly associated with the diffusion of innovative ideas, such as attitudes and norms about low fertility, from places of destination to places of origin. The diffusion theory states that social change occurs, in part, as a result of exposure of one social entity to the values, behaviors, and technologies of another (Rosero-Bixby and Casterline, 1994). Massey and Mullan (1984) suggest that migration may expose Mexican migrants to US culture and upon returning to their places of origin, migrants may bring new values about childbearing and contraception. The diffusion of new ideas is best analyzed in terms of two defining features: social learning, and social influence. Social learning may enhance exchanges through local, national, and international channels about the advantages and disadvantages of fewer children or modern contraception influencing the pace of fertility decline, whereas social influence refers to the collective power of institutions, structures of authority, and social groups to establish the larger context within which individuals must evaluate their private decisions (Montgomery and Casterline, 1996).

Lindstrom and Muñoz-Franco (2005) examined the role of migration in the diffusion of modern contraceptive knowledge—via social learning—in rural Guatemala. They found that previous migration experience, having migrant family members, and living in communities with high rates of international migration, were all associated with greater contraceptive knowledge. They argue that contraceptive knowledge was the primary object of diffusion, rather than family-size ideals. In addition, Prabal (2007) noted that women belonging to migrant families have higher propensity to use modern contraceptive methods. Diffusion brings places of origin into contact with different social, economic, and cultural settings where different contraceptive methods are

accessible and widely used. Moreover, once innovative fertility has been adopted within a community, social learning can become a powerful force that may accelerate the pace of transition in the rest of the community as women pass the word about the advantages of using them (Bongaarts and Watkins, 1996; Janssens, 2007).

Although migration may bring greater exposure to different cultural milieus which favour low fertility norms and values, the effect of migration on succeeding fertility may differ amongst men and women due to the gendered nature of family roles and reproductive norms. Lindstrom and Giorguli (2002) found that Mexican men exposed to less traditional attitudes towards family size and low fertility norms and values in the United States had no significant effect on their preference for large families. On the other hand, women who migrated were affected by their experience in the United States. Upon returning to Mexico they had more widely spaced births, slightly lower completed fertility, and a preference for smaller families. The authors suggest that women's openness to low fertility norms and values may be linked to education, labour force participation, and the burden of childbearing and childrearing, whereas men's rejection of low fertility norms may be associated to ideals of manhood, status, and power.

Most of the existing theories on the fertility transition implicitly assume individuals weigh the benefits and costs of children, the objective and subjective costs of birth control, and are individually empowered to make reproductive decisions. However, sociological theory suggests ideas and behavior are more widely affected by the diffusion of ideas and norms throughout a population penetrated by outside agents and that this constitutes a powerful causal agent for fertility transitions or resistance to transitions

(Rosero-Bixby and Casterline, 1994). Communication technologies in developing countries have accelerated the diffusion of novel ideas about family planning in both urban and rural environments (Robey et al., 2002), and women have played a fundamental role either as innovators or as diffusers of these behavioral patterns and ideas (Janssens, 2007). Lindstrom and Muñoz-Franco (2005) found that Guatemalan migrants, particularly women, maintain ties with their communities of origin through return visits, correspondence, telephone calls, and regular contact with other migrant community members in the place of destination. Migrant women often report to non-migrant friends and relatives about life in destination areas, including new ideas and practices they have encountered about contraceptive techniques. In this way migration may affect the fertility attitudes and norms of most people in the community rather than just those who have themselves or whose husbands have migrated. Lindstrom and Giorguli (2007) found that women who migrate to the United States and adopt low-fertility practices dominant in the United Sates diffuse low-fertility values and behaviors back to their communities of origin through long-distance communication and return visits.

Migration may impact fertility in various ways and, likewise, fertility may impact migration. Migration is often a behavioral response to pressures of population growth in rural communities, especially where patriarchal systems favour the departure of men over women. The initial disruptive effects of male-selective migration may alter the timing and spacing of births through intercourse disruption and psychological stress. However, male-selective out-migration may have a more profound long term impact on the lives of women left behind. Increased labour force participation, delayed marriage, and increased

autonomy that may result, may have a long-term effect on depressing fertility. The complexity of the reciprocal migration-fertility interaction is summarized in the following model:

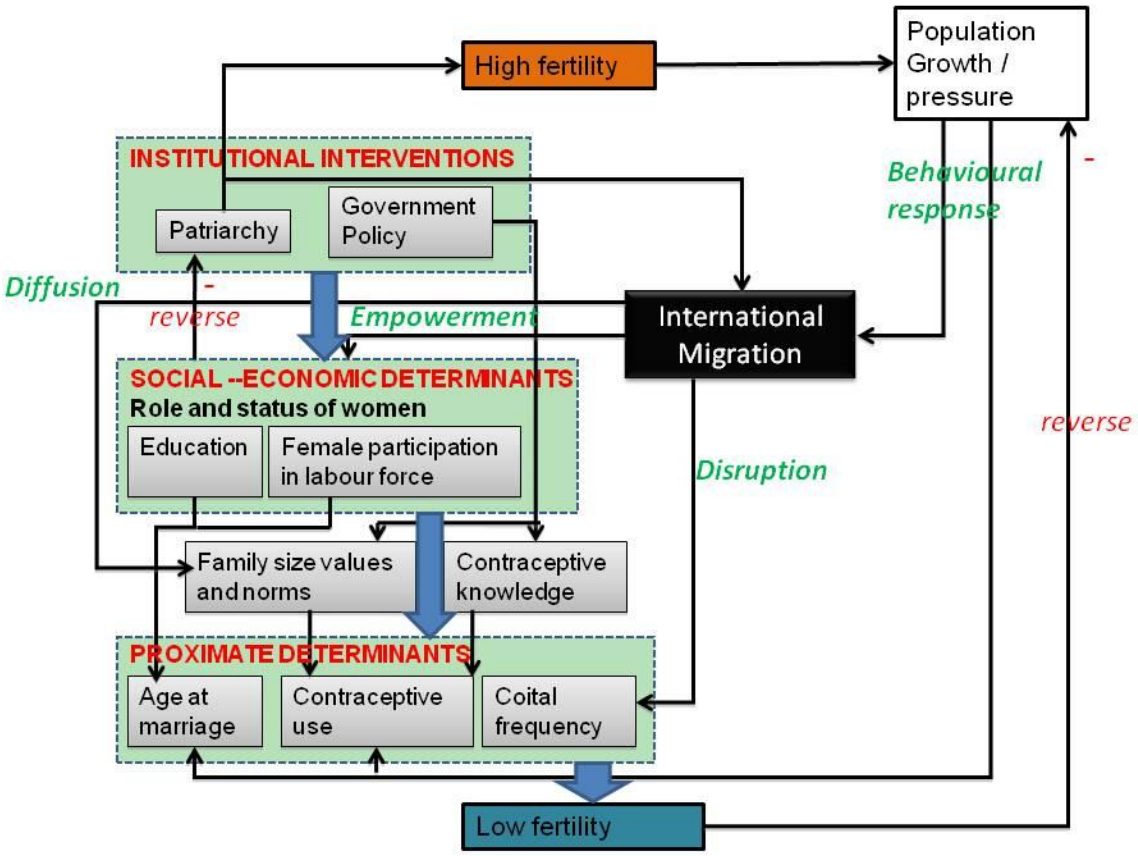


Figure 3.1 Reciprocal Migration-Fertility Interaction Model

3.5 Conclusions

Fertility-migration interactions are not new to population studies. Research on migration and fertility has demonstrated that parental migration has short-term effects on depressing marital fertility, whereas some others have shown that fertility influences parental migration. Alternatively, work has looked at the effects of migration on left-

behind women, marriage and contraceptives use. Very few of these works, however, have examined the effects of these interactions on fertility. So the question arises, why examine it further? Although most of the research on fertility-migration interactions has looked at the effects of male-selective migration—specifically the husband's—on fertility, the order and magnitude of migration for those in different stages of the family cycle, specifically children, could have different implications for parental fertility. Migrant children have been acknowledged as contributing significantly to the economic well-being of their parents' household, a factor that could potentially increase the value and demand for children consistent with Caldwell's Wealth Flows hypothesis. Similarly, parental fertility could also influence migration of children by providing increased pressure on household resources thereby necessitating outmigration of 'excess' children consistent with Multiphasic Response theory. Despite this, no attempt has been made to look at fertility-migration interactions in households where children are migrants, and to explain these interactions in terms of major fertility theories, like Davis's (1963) Multiphasic Response Theory and Caldwell's (1976)Wealth Flow Theory.

CHAPTER 4: CONCEPTUAL FRAMEWORK AND RESEARCH QUESTIONS

4.1 Conceptual Framework

Efforts to explain demographic changes, specifically reductions in fertility, have resulted in several macro-scale theories. The main purpose of this thesis is to explore fertility-migration interactions in households with migrant children. In light of the literature, the most appropriate fertility theories to explain these interactions are Davis' Multiphasic Response Theory (1963), and Caldwell's Wealth Flow Theory (1976).

Davis (1963) argued that population pressure on resources resulting from rising life expectancy results in families using every demographic response possible to reduce it. Demographic responses include delay of marriage, celibacy, contraception, abortion, out-migration to urban areas and overseas. These responses are behavioral in the sense that they involve human decisions in the pursuit of goals by different means. The strain of population pressure may be particularly acute in agricultural sectors. Such a strain may be assumed to reach its maximum when children are at the stage of leaving home to begin their own independent life. Children belonging to large families may find it difficult to establish economically independent households as a result they may migrate to places with better labour-market opportunities upon attaining marriageable age (Friedlander et al. 1999).

On the other hand, Caldwell (1976) proposes that when net flows transfer wealth from children to parents it is economically rational for parents to desire as many children as possible because their wealth will increase as a function of the number of children they produce. Conversely, when children consume more parental wealth than they provide

(negative wealth flow), parents are expected to desire fewer children. In traditional societies children start to contribute to the household economy at a very early age. Over the time, children's contributions increase and eventually they become responsible for their parents in old age. As a result, the flow of wealth from the younger to the older generation over the lifetime exceeds the reverse flow (Kaplan, 1994). Thus in Less Developed Countries parents have large numbers of children because in the long-term it pays them to do so. Caldwell stresses that wealth should be conceived not just in strict financial terms but include power over children and parental status in the community[7]. Extensive research on the intergenerational wealth flow conducted in Africa (see Caldwell and Caldwell, 1987; Clay and Vader Haar, 1993: Dow at al. 1994) has demonstrated that parents often maintain a high level of childbearing in order to improve their own social and economic well-being.

Mexican children in rural agricultural areas play an important role in the household economy. Older children often subsidize the consumption of younger children which allows parents to continue childbearing even in their later reproductive years when they might be unable to bear the cost of larger families (Lee and Kramer, 2002). Not only do younger children help to pay their own costs, but any economic contribution they make reduces the amount of subsidy that the parents have to make. When the number of dependents rises and parents are unable to support all their children, help from older children is a way for parents to redistribute their dependent children's consumption needs (Kramer and Boone, 2002).

[7] In addition, according to Caldwell, as the extended family and wider community controls become weaker so does the control parents have over their children, and at the same time children no longer depend on their parents and wider families to marry, establish themselves and earn a livelihood

In Mexico, where the constitution explicitly recognized community based land (*ejido*) tenure the economic contributions of children may have been enhanced. De Vany and Sanchez (1979) identified three motives Mexican rural families had for having many children in communally owned land: (1) the land retention motive for having children related to the fact that children helped parents to secure their rights to the land. (2) the consumption loans motive for high fertility related to the usufruct system of land tenure which provided the setting for the emergence of a system of intergenerational exchanges of land assets and consumption claims (since the land could not be sold, but could be inherited, it was natural for parents to pass their land use rights to their children in exchange for looking after them in their old age); and (3) the labour motive derived from the fact that rural farmers had an opportunity to use unpaid family labour (De Vany and Sanchez, 1979).

However, following economic development and modernization fertility is reduced when children cost more to raise and return less (Caldwell, 1976; Kaplan, 1994). Modernization of Mexican agriculture and the transition from communally owned land to private owned property meant that children were no longer needed to secure land retention. The mechanization of agriculture may also have reduced the need for agricultural labour force which left many rural farmers and their families landless or unable to compete with cheaper crop imports. Under these circumstances, large families were now surplus to the requirements of the household and local economy. In developing countries, more specifically in rural areas, modernization often results in inadequate credit markets and limited economic opportunity. In these regions, migrant children may assume the unique role of financial intermediaries. This role may be an element

conducive to an increase in the value of and the demand for children (Stark, 1981). Although NAFTA has had some positive impacts on Mexico´s economy, the impact on the rural sector has been negative: agricultural production has decreased rapidly as a result, and rural poverty has worsened which may have increased out-migration from Mexico to the U.S. (Barnes, 2009).

In exploring these alternative but not mutually exclusive theories special attention will be paid to socio-demographic variables that are known to influence both fertility and migration. Variables such as women's age at marriage, female labour force participation, female education, and contraceptive use are commonly associated with both parental fertility and migration. Although little is known about the effects of male education and male labour force on parental fertility, these variables are expected to be associated with migration of children.

4.2 Research Questions and Hypotheses

To understand the relationship between parental fertility and migration of children, in this thesis I explore the following questions:

1. Do women with migrant children have different parental fertility than women in non-migrant households and women with migrant husbands only?

2. In households with migrant children are married women more or less likely to practice contraception, have delayed the age at marriage, have more years of

education, and participate in the labour force than women in non-migrant households and women with migrant husbands only?

3. In households with migrant children are women more or less likely to have less educated husbands working in the agricultural sector than women in non-migrant households and women with migrant husbands only?

The purpose of this thesis is to explore the interrelation between fertility and migration. Disentangling cause and effect and causal pathways in such a complex problem, playing out over two generations, is beyond the scope of this thesis.

CHAPTER 5: DATA AND METHODOLOGY

The data used in this study is derived from Mexico's demographic dynamics survey or, in Spanish, la Encuesta Nacional de la Dinámica Demográfica (ENADID) which was conducted by Mexico's National Institute of Statistics, Geography and Informatics (INEGI) between September and December 1997. The survey's national probability sample consists of 325,558 people distributed in a total of 78,921 households across Mexico. Only women aged 15 to 54 answered the survey: they were asked to give information on other members of the household on a variety of socioeconomic and demographic characteristics, including migration, as well as retrospective information about their marital birth history and contraceptives use histories, where appropriate[8]. This is the only survey which provides data on both fertility and migration, which can therefore be used to explore the relationship between the two. Also because of its structure -- it can be used to examine households -- it included data on children's migration that could be linked to the fertility and characteristics of the parents, the focus of this thesis.

The information collected during the survey was organized into ten databases in SPSS format:

1. Contraception (ENADID97_anticon)

[8] For a detailed explanation of the survey refer to the Características Metodológicas de la Encuesta Nacional de la Dinámica Demográfica (ENADID) 1997.

2. General socio-demographic characteristics of women (ENADID97_carac-muj)
3. General socio-demographic characteristics of each household member (ENADID97_dat-gen)
4. Pregnancy histories (ENADID97_hist-emb)
5. Union formation histories (ENADID97_hist-uni)
6. International migration (ENADID97_mig-int)
7. Mortality (ENADID97_mort)
8. Maternal and child health (includes information on the second to last pregnancy only) (ENADID97_smi-pen)
9. Maternal and child health (includes information on the last pregnancy only) (ENADID97_smi-ult)
10. General socioeconomic characteristics of the household (ENADID97_viv-hog)

5.1 Data

From the ten original databases I used the following five: (1) ENADID97_anticon includes specific information on the contraceptive use histories for 62,920 women; (2) ENADID97_cara-muj comprises general socio-demographic information for 88,002 women aged 15 to 54 years old; (3) ENADID93_dat-gen includes general socio-demographic information for 325,558 household members; (4) ENADID97_mig-int includes information on the migratory experience for 8,277 migrants; and (5) ENADID97_viv-hog which includes general socioeconomic information for 73,412 households. Each database could be matched through either a unique household or

individual identifier. From these databases I used retrospective information on women's marital birth and contraceptive use, women's age at marriage, male and female parental education and labour force activity or participation. I used also information on the migratory status of household members to produce a unique file that includes information on fertility, international migration, and other socioeconomic characteristics relevant to the study by household and mother.

5.2 Sample and Methodological Issues and Limitations

This thesis focuses on rural communities[9] because: (1) men from rural communities in Mexico have long been involved in Mexico-U.S. migration; (2) reasons (i.e. socioeconomic, cultural) for emigrating may differ between rural and urban environments which would affect the interpretation of the results; (3) fertility has always been higher in rural communities although it has decreased in recent years; and (4) migration in rural communities has been highly sex-selective which could have important implications for fertility. In addition, the analysis does not include women who have themselves been migrants because the experience of migration is likely to affect their fertility differently (i.e. adoption of fertility practices after migration).

To measure fertility using complete history data we calculate the observed number of children ever born to married women aged 40 to 49. We focused on women aged 40-49 because they have more or less completed childbearing, they married sometime between 1966 and 1975 which is before rural fertility declined, contraception was available and population policies came into force in Mexico, and most importantly

[9] We define places with less than 2,500 inhabitants as rural.

only women of this age are likely to have children old enough to migrate in their own right.

The interpretation of the mean number of ever born children in a data set involving women of all ages (15-49) must avoid truncation bias resulting from the termination of the observations in an age cohort of women before they attain completed fertility (Pathak and Pandey, 1990). In order to minimize the truncation bias it was necessary to control for the woman's exact age at the time of the survey and to establish the most appropriate cut-off point in the age at which most women may have completed or nearly completed their fertility. For this reason we chose to measure how many children married women aged 40-49 had by the time they were exactly 40. According to the survey, women in rural communities had rarely completed childbearing before age 40.

Only married women were included because: (1) in rural Mexican communities, fertility is generally confined to marital (including consensual) unions[10]; (2) most of the time fertility studies are confined to married women to control for the population at risk of bearing children, and (3) this thesis is concerned with the relationship between children's migration and parental fertility.

For these conceptual and measurement reasons, from the national original sample of 88,002 women aged 15 to 54 mentioned above, this study is restricted to 2,745 ever-married women in rural communities between the ages of 40 to 49 years who have never

[10] Consensual unions, which are common in Mexican rural environments, were treated as marriages.

been migrants. For these women we measure the number of children ever born by exact age 40 as well as whether their husbands and any children have been migrants.

A second and very important limitation of the study concerns the information on migration. Although the survey collects basic information on migration (date of last emigration, date of last return, and legal status) for the entire set of households, the survey is not a migration survey. No information is provided on the migration history events for each migrant which would be necessary to measure the direct effects of fertility on migration or migration on fertility using event history analysis and hazard models. Also information on remittances, reasons for emigrating to the U.S., and home, land or business ownership before and after migration are not included in the original survey. Thus it is not possible to estimate the influence of these variables on the decision to migrate, and/or the effects of migration on the economic well-being of the household, that would be necessary to examine intergenerational wealth flows.

Information on education and employment included only characteristics for the current level of education and job and not on the previous education—and occupational history which would have been more accurate socioeconomic indicators for determining international migration and interpret its effects on fertility, more specifically in households with migrant husbands (fathers) only. Parents' education and employment could have been quite different from their current characteristics prior to the father's first trip to the U.S. and some of these characteristics could have changed when the father returned to the community. On the other hand, current education and employment characteristics may be more like those of parents at the time their children migrated

which is assumed to have taken place more recently when parents could have already obtained their present jobs and attained an education at a specific level.

Finally, the lack of precise information on the timing of migration for each migrant posed another methodological limitation. The survey includes information on the date of the last trip to the U.S. Only in cases where migrants have made no more than one trip to the U.S., can the date of the last trip be used to represent the date and characteristics of migrants on their first trip. Unfortunately it is not possible to know the date of the first trip for the majority of migrants that have made more than one trip, or—in the case of the husband (father)—to know whether he made the first trip before or after getting married.

5.3 Measurements of the variables

The purpose of this study is to examine the interrelationship between migration of children and parental fertility in Mexican rural communities. This section defines the variables used in the study to inform this interrelation.

The **dependent variable** in the analysis of fertility is the *total number of children ever born at exact age 40 to married women aged 40-49 years old*. The independent variables include women's age at marriage, contraceptives use, female education, male education, female labour force participation, male employment, and international migration status (Table 5.1).

Age at marriage is a continuous variable measured in single years. Rising mean ages at marriage is strongly associated with lower fertility when women are not deliberately limiting their family size; women who married at an older age in any population have the fewest children on average (Smith, 1993). On the other hand, out-migration may also affect marriage timing if young unmarried men decide to migrate to the U.S. The reverse is also possible and the likelihood of migration may decrease once individuals enter the first union (Massey and Mullan, 1984; Riosmena, 2009).

Contraceptive use includes both traditional (rhythm and withdrawal) and modern (pill, intrauterine device, condom, vasectomy, tubal ligation, etc.) methods. Contraceptive use is highly associated with fertility, with modern contraceptive methods normally most effective in reducing fertility. Since we are interested in the effect of contraceptive methods and use on cumulative fertility, the survey's initial question on the "ever use" of any method is more relevant to the study than the question pertaining to current use of contraceptive methods. Women who reported never having used a contraceptive method had their fertility control value fixed at zero; women who have ever used traditional methods only were coded as one, whereas having used both modern[11] and traditional methods had their value fixed at two.

Female education is commonly assumed to have a strong negative effect on fertility. However, education cannot affect fertility directly in the same way as age at marriage and contraceptive use, but must operate through such variables. In other words, education is assumed to reduce fertility by increasing contraceptive use, delaying the age

[11] The number of women who have used modern contraception only was very small compared to the number of women who have used both modern and traditional methods. Therefore, this group of women was included in the group that has used both.

at marriage, and by lowering the demand for children (Cochrane, 1983). *Male education* has also been related to smaller family size and preference for smaller families. Research in African countries (see Isiugu-Abahihe, 1994; DeRose and Ezeh, 2005) has shown that men with more school years completed are more likely to want fewer children than men with no—or almost no—formal education. In patriarchal societies like the Mexico men play an important role in reproductive decision-making, thus husband's education may influence the spouse's fertility intention even more than her own education.

This study examines whether both male and female education is related to smaller family size in Mexican rural settings. In Mexico, formal education comprises six years of primary (elementary) school, three years of middle school, and three years of high school. At a national level, the number of individuals that have completed any of these stages has increased (Kandel, 2004; Giorguli et al. 2007), however the odds of completing any of these educational stages for Mexican men and women in rural communities are low, therefore in this analysis the level of education is measured in terms of number of years of school completed. The average number of school years completed for women aged 40 to 49 years in 1997 and for their husbands is 3.5. The highest number of school years completed for women and men is 6 and 7 years, respectively. The women's number of years of school completed has been classified into two categories: 0 = zero to three years; and 1 = four to six years. Whereas the husbands' number of years of school completed has been classified into two categories: 0 = zero to three years; and 1 = four to seven years.

Female labour force participation is normally inversely related to fertility: that is women who actively participate in the paid labour force have lower fertility than those who do not either because they marry later or because work is incompatible with childbearing and childrearing (Standing, 1983). However, in some instances women in the labour force have higher fertility than women who do not work (Brewster and Rindfuss, 2000). In industrialized countries, where more women are employed, women have access to child support and other family services (Hilgeman and Butts, 2009), but in less developed countries, where governments have failed to provide child support and other family services, women's employment and additional income may enable the family to afford a large number of children making women's labour force participation compatible with childbearing (Standing, 1983). Alternatively while the separation of work and family roles among employed women in the industrial sector contributes to lower fertility of working women, in rural societies there may be little such conflict thus minimizing the effect of labour force participation on fertility (Goldstein, 1972). In contrast, men in patriarchal societies are regarded as sole breadwinners who decide how many children to have, while for married women the appropriate role is motherhood not employment outside the home.

In Mexico *employment sector* has been related to migration. Less skilled agricultural workers are more likely to emigrate, whereas skilled individuals working in more economically developed sectors, such as the modern sector, are less likely to do so (Kandel, 2004; Giorguli et al. 2007). Moreover, the odds of migration may decrease if both partners are skilled workers.

The survey confirms that married women in Mexico are much less likely to be part of the paid labour force than when single, particularly in rural communities. Of the 2,745 married women aged 40 to 49 years in the sample, only 35 percent of them participate in the labour force. Thus women's labour force participation in this analysis is a categorical variable which takes the value of two if the woman works in the modern sector; one if she works in agriculture; and zero if she has no paid work. On the other hand, husbands either work in the agricultural or modern sector, but all of them work. Therefore male employment sector is also coded as a dichotomous categorical variable which takes the value of one if the man works in the modern sector and zero if he works in the agriculture.

To test the association between migration and fertility in Mexican rural environments, I created two dichotomous categorical variables: (1) migrant husband/father; and (2) migrant children. These were combined to define households according to their migration status into four groups: non-migrant households (where nobody was a migrant); households where husbands only were migrants; households which migrant children but the husband had not migrated; and households with migrant children where the husband was also a migrant.

Table 5.1 Definition of Variables

Variable	Measurement
Women's age at marriage	Exact age at marriage
Contraceptive use	0 Never used any 1 Traditional methods only 2 Modern and traditional
Female education	0 Zero to three years of school completed 1 Four to six years of school completed
Male education	0 Zero to three years of school completed 1 Four to seven years of school completed
Labour force participation (female)	0 No paid work 1 Agriculture 2 Modern sector
Employment sector (male)	0 Agriculture 1 Modern sector
Migrant husband/father	0 No 1 Yes
Migrant children	0 No 1 Yes
Fertility	Exact number of children ever born at age 40 for women aged 40 to 49 years
<u>Case selection variables</u>	
Women's age	Exact age at the time of the survey (40 to 49 years)
Women's marital status	Ever-married women (includes consensual unions)
Women's migratory status	Women have never been migrants themselves
Type of community	Rural communities only

5.4 Analytical Strategy

This thesis is exploratory and attempts to provide a better understanding of the reciprocal relationship between parental fertility and migration of children. For this I divide the statistical analysis[12] into three parts. First, simple descriptive statistics are used to examine selected independent variables, such as women's age at marriage, contraceptive use, education, labour force participation, and fertility differentials according to household migration status (non-migrant household, household with migrant husband only, household with migrant children only, and household with migrant children and husband) and to see how each is correlated with fertility. The second part involves Linear Multiple Regression to explore variations in the number of children according to five predictor variables: (1) women's age at marriage; (2) contraceptives use; (3) female education; (4) male employment sector; (5) migration of the husband/father; and (6) migration of the children. Except for women's age at marriage which is a continuous variable, the rest of the predictors are categorical variables that needed to be recoded into a series of dummy variables to define mutually exclusive categories. Finally, Binary Logistic Regression is used to predict the likelihood of having migrant children. Since data meant that the household and not the migrant is the unit of analysis, the intent is to identify whether households with migrant children are more likely to have higher fertility than those without, and to test whether this remains after controlling for the statistical probability that the larger the number of children, the greater the probability of having at least one migrate. Predictor variables were chosen to reflect the circumstances where pressure on the household was greatest.

[12] The statistical software package SPSS version 11.5 for Windows was employed for all the statistical work done for this research.

CHAPTER 6: RESULTS

6.1 Descriptive Statistics of Selected Variables

Descriptive statistics of selected variables for married women aged 40 to 49 years are presented in table 6.1 The table summarizes the individual characteristics of 2,745 Mexican married women in rural communities between the ages of 40 to 49 years old according to the migrant status of the household. 1,954 (71%) of these women belong to non-migrant households and 791 (29%) to migrant households. Among the 791 women in migrant households, 349 (44%) have migrant husbands only, 154 (20%) have migrant children only, and 288 (36%) have both migrant children and husbands [13] The average age at the time of the survey for women in non-migrant households, and women with migrant husbands only is 44 years. Women with migrant children were one year older on average.

The average number of children ever born at age 40 for the entire sample is 6.17 children. The average number of live births for women in non-migrant households and women in households with migrant husbands only is 6.03 and 5.74, with no statistically significant difference between the two. Women in households with migrant children only and women in households with migrant children and husbands have higher fertility: an average of 7.12 and 7.18 children respectively, statistically significantly different from non-migrant households and households with migrant husbands alone.

[13] The categories *migrant children only* and *migrant children and husbands* were merged into one category: *migrant children* for further analyses, since the numbers in each were small and they share similar characteristics.

In terms of the immediate predictor variables, the average age at marriage for women in non-migrant households and women in households with migrant husbands only is 19 and 20 years, respectively. Whereas for women in households with migrant children (with or without migrant husbands) it is younger; the average age at first marriage is 18 years. Although not a predictor of fertility, the average age at marriage for men in each category is 24 in non-migrant households; 25 in households with migrant husband only; 24 in households with migrant children only; and 23 years in households with migrant children and husband. So households with migrant children are characterized by a statistically significant higher fertility and earlier women's age at marriage.

With regards to contraceptive use, more than 60% of the women in each of the four categories reported having ever used modern contraception combined with traditional methods. However, the proportion is much greater for women in households with migrant children and husbands (72%). In contrast, the proportion of women that have never used any method is greatest for women in non-migrant households (32%) followed by women in households with migrant children only (29%). The proportion of women that have ever used traditional contraception alone remains below 8 percent in all four categories. Still, women in households with migrant children and husbands have the smallest with only 2 percent. The crucial factor seems to be whether the husband was a migrant. In those households was the lowest percentage of women who had used no contraceptives and the highest percentage who had use modern contraceptives at some point. A Pearson's chi-square test shows that there is a significant association between contraceptives use (X^2=19.44, p =.003) and household migration status.

Turning now to the indirect predictor variables, except with respect to women's labour force participation the pattern is very similar, with non-migrant households lying in an intermediate position, households with migrant husbands alone at one extreme and those with children alone at the other end.

In terms of the number of years of schooling completed, overall 60 percent (1,338) of the women have zero to three years of school completed, whereas the remaining 40 percent (906) have completed four to six years. The greatest proportion of women with four to six years of school completed is for women in households with migrant husbands only (47%), whereas women in households with migrant children only have the smallest (34%) followed by women in non-migrant households (39%) and women in households with migrant children and husbands in between (43%).

The pattern for the husbands is similar to that of their wives. 61 percent of the husbands have zero to three years of school completed, whereas only 39 percent have more than three. Women in households with migrants husbands only have the greatest proportion of husbands with four to seven years of school completed (45%), whereas women in households with migrant children only have the smallest (31%). The proportions of men with four to seven years of school completed in non-migrant households and households with migrant children and husbands lie between at 37 and 34 percent, respectively. There is a significant association between education (female education, X^2=8.99, p =.029; and male education, X^2=11, p =.012) and household migration status.

Only 35 percent of women in the sample report participating in the paid labour force, either in the agricultural (15%) or the modern sector (20%) sector. Although the proportions are relatively close between categories, households with migrant husbands only have the greatest proportion of women working in the modern sector (22%). A Pearson's chi-square test shows that there is no association between female labour force participation (X^2=8.71, p = .190) and household migration status.

Males are predominantly employed in the agricultural sector (70%); only 30 percent are in the modern sector. However, women in households with migrant husbands only have the greatest proportion of husbands working in the modern sector (38%), whereas women in households with migrant children have the greatest proportion of husbands working in agriculture (77% for children only and 75% in households with migrant children and husbands) . There is a significant association between male labour force (X^2=16.83, p = .001) and household migration status.

To summarize table 6.1 women in households with migrant husbands only, have the lowest fertility (1.4 children less than the group with the highest fertility); they have the highest average for age at marriage (20 years); they constitute the highest proportion of women who have completed more than three years of school (47%); and the highest percent (66%) who have ever used modern contraceptive methods.

Women in non-migrant households (the control group) share some similarities with women in households with migrant husbands. The average number of children for women in non-migrant households is 6.03, only 0.3 more children than in women with migrant husbands only. The average age at marriage is 19 years; the second highest. On

the other hand, although 62 percent of the women have ever used modern contraceptive methods, they also constitute the group with the highest proportion of women who have never used birth control (32%).

At the opposite end of the scale are women in households with migrant children only and women in households with migrant children and husband. These groups have the highest fertility (about 7 children) and the lowest average age at marriage (18 years). Women with migrant children only are the least educated with only 34 percent having completed four to six years of school. In spite of the high fertility of women with migrant children and husbands, this group has the second highest proportion of women who have completed four to six years of schooling (43%) and the greatest proportion of women who have ever used modern contraception (74%).

Table 6.2 shows differences in housing quality between non-migrant and migrant households. Overall, migrant households have better housing quality than non-migrant households. A Pearson's chi-square test shows that there is a significant association between housing quality (type of floor, X^2=44.48: electricity, X^2=21.96; drinking water facilities, X^2=43.90; and W.C facilities, X^2=23.94) and household migration status (all *ps.* <.001).

Bivariate correlation between independent variables and fertility

Next we test the association between the total number of children ever born at age 40 and each independent variable separately. The Pearson correlation coefficient shows

that the total number of children ever born at age 40 is significantly inversely related to woman´s age at marriage, r =-.46, p <.001.

Female education, male education, male employment sector, migrant husband/father, and migrant children are dichotomous categorical variables therefore we use t-tests statistics to test the association between these variables and the total number of children ever born at age 40.

Years of schooling are significantly inversely associated with fertility for both women and men. Women who have completed fewer than four years of school have 6.36 children (SE=.08); women who have completed 4-6 years of school have 5.45 children (SE=.08). This difference is significant t =-7.75, p <.001. Likewise, women whose husbands have completed fewer than four years of school have 6.19 children SE=.07 compared to 5.72 (SE=.09) for women whose husbands have completed 4-7 years of school. In this case the difference between the means is also significant t =-3.93, p <.001.

Women whose husbands work in the modern sector have significantly fewer children ever born than women whose husbands work in agriculture (5.6 compared to 6.4 with a SE of .098 and .067 respectively). The difference between the means is significant t =-6.9, p <.001.

Women whose husbands are migrants have an average of 6.4 children (SE=.06), whereas women in non-migrant households have an average of 6.1 children (SE=.11). Even though there is only a small difference in the average number of children, the difference is statistically significant t = -2.2, p <.05, which supports the disruption

hypothesis that husband's absence reduces coital frequency and hence the number of children she has which is not fully compensated for by age 40. Women who have migrant children have 7.6 children (SE=.13) compared to 5.9 (SE .06) for women in non-migrant households. This difference is highly significant, t =-8.15, p <.001.

Finally, contraceptives use and female labour force participation are categorical variables with more than two categories thus we perform one way ANOVA test for each of these variables to establish whether or not these variables are associated with the total number of children ever born at age 40. The results show that there is a significant effect of modern and traditional contraceptive use on the total number of children ever born, F=13.82, p <.001. There is also a significant effect of female labour force participation on the total number of children ever born, F=19.02, p <.001.

Although all independent variables appear to be associated with the total number of children ever born at age 40, we exclude female labour force participation and male education from further analyses since in the case of female labour force participation we cannot be sure that they relate to circumstances that preceded childbearing and in the case of husband's education has not normally been considered as a determinant of fertility. Since this thesis focuses on women aged 40 to 49 years. It is likely that women's labour force participation may have changed throughout their lives in response to changing needs and circumstance. For instance, a woman whose husband migrated is likely to join the labour force after her husband left. She is also likely to resume her old role as a housewife (no paid work) when her husband returns to the community. As opposed to women, men are more likely to have worked in the same sector throughout their lives.

Although research in African countries (see Isiugu-Abahihe, 1994; DeRose and Ezeh, 2005) has shown that men with more school years completed are more likely to want fewer children than men with no—or almost no—formal education, the exact way in which male education affects fertility is not clear. In addition, male education appears to be highly correlated with female education. This could mean that more educated women prefer to marry more educated men.

Table 6.1 Descriptive Statistics of Selected Variables for Married Women Between the Ages of 40 to 49 years

Variables	Non-migrant N=1,954	Migrant husband N=349	Migrant children N=154	Migrant children and husband N=288
Women's average age	44	44	45	45
Average number of children ever born at age 40	6.03	5.74	7.12	7.18
(Standard deviation)	(2.77)	(2.72)	(2.82)	(2.74)
Women's average Age at marriage	19	20	18	18
(Standard deviation)	(4.38)	(4.76)	(3.50)	(3.02)
Contraceptives use				
Never used any	629 (32%)	90 (26%)	44 (29%)	74 (26%)
Traditional only	114 (6%)	24 (7%)	8 (5%)	6 (2%)
Modern and Traditional	1211 (62%)	235 (67%)	102 (66%)	208 (72%)
School years completed (women)				
zero to three years	940 (61%)	167 (53%)	85 (66%)	146 (57%)
four to six years	606 (39%)	147 (47%)	44 (34%)	109 (43%)
School years completed (men)				
Zero to three years	989 (63%)	166 (55%)	83 (69%)	150 (66%)
Four to seven years	591 (37%)	134 (45%)	37 (31%)	77 (34%)
Labour force (women)				
No paid work	1256 (64%)	234 (67%)	103 (67%)	190 (66%)
Agriculture	320 (17%)	37 (11%)	22 (14%)	45 (16%)
Modern sector	378 (19%)	78 (22%)	29 (19%)	53 (18%)
Labour force (men)				
Agriculture	1288 (71%)	192 (62%)	104 (77%)	178 (75%)
Modern sector	534 (29%)	120 (38%)	31 (23%)	60 (25%)

***Source*: ENADID, 97. Files: ENADID97_carac-muj, ENADID97_dat-gen, ENADID97_mig-int.**
Note: Bracketed percentages are column percents.

Table 6.2 Differences in Housing Quality, by Family Member Migration Status (Percentage)

	Non-migrant	Migrant husband	Migrant Children	Migrant children and husband
Type of floor				
Dirt	33	21	28	18
Cement, tile, wood	67	79	72	82
Electricity				
No	14	10	10	5
Yes	86	90	90	95
Drinking water facilities				
Outside the house	81	67	77	70
Inside the house	19	32	23	30
WC facilities				
Latrine	67	58	58	57
W.C.	33	42	42	43

Source: ENADID, 97. Files: ENADID97_carac-muj, ENADID97_dat-gen, ENADID97_mig-int, ENADID97_vig-hog.

6.2 Fertility Analysis

Multiple linear regression analysis is a method widely used in demographic and population studies for measuring the effects of several predictor variables concurrently, on a continuous dependent variable in this case the number of ever-born children at age 40. The method of regression we use is the backward method because of the exploratory nature of the study. The backward method is less likely to exclude predictors involved in suppressor effects and therefore runs a smaller risk of making a type II error. In linear multiple regression the model takes the form of equation in which the β-values indicate the individual contribution of each predictor variable to the model (Field, 2009). In this case, the β-values tell us the relationship between the total number of children ever born and each predictor variable. However, before drawing any general conclusion from the linear regression results, several assumptions, such as the normal distribution of the residuals with a mean of zero, homoscedasticity (the variance for the residual terms should be constant), and the absence of a perfect linear relationship between two or more of the predictor variables must be met. Linear multiple regression models also assume linearity (the residuals do not deviate from zero).

The linear regression model used to explain the variation in the total number of children ever born can be represented by the following equation:

$$E(Y) = \alpha_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \varepsilon$$

Where:

E (Y) = Expected number of children ever born at age 40 for women aged 40 to 49 years;

α = the constant;

β_n = the partial regression coefficients for each of the independent variables;

X_1 = Women's age at marriage;

X_2 = Contraceptives use;

X_3 = Female education;

X_4 = Male employment sector;

X_5 = Migrant husband

X_6 = Migrant children[14]

ε = the error term.

[14] Although the variable *migrant children* contravenes the normal assumption that a predictor variables should precede the dependent variable, that is children should have migrated before women had all or most their children, we decide to retain it as an independent variable to see if, after controlling for factors that normally determine fertility, fertility is still higher in households with migrant children.

6.2.1 Fertility Analysis Results

The Linear Multiple Regression Models test the effects of women's age at marriage, contraceptives use, female education, male employment sector, migration of the husband/father, and migration of the children on the number of children ever born at age 40 to women aged 40 to 49 years. The reference categories for each categorical variable are: *never used any* for contraceptives use; *zero to three years of school* for female education; *agriculture* for male employment type; *non-migrant* for migrant father; and *non-migrant* for migrant children.

Table 6.3 shows the regression coefficients (for each model) of the predictor variables on the number of children ever born. The adjusted *R*-value of .25 implies that 25 percent of the total variation in the number of children ever born at age 40 is explained by the variables included in the model. (Component contributions to the *R*-square are shown at the bottom of table 6.3).

The results show that for women aged 40 to 49 years, women's age at marriage, the use modern contraception (combined with traditional methods or not), women with four to six years of school completed, male employment in the modern sector, and having migrant children only contribute significantly to the variation in the number of children ever born at age 40. Conversely, having migrant husbands/fathers only is not a significant contributor to the models.

The coefficient on the age at marriage is negative (-0.28) suggesting that delaying the age at marriage reduces the total number of children ever born. In other words, by

every year a woman postpones getting married, there is a .28 decrease in the number of children, holding all other variables constant.

Modern and traditional contraceptives use has a coefficient of -0.37 which suggests that women who have ever used modern contraceptive methods (with or without traditional methods) have .37 fewer children ever born than women who have *never used any* method at all.

The negative coefficient on four to six years of school completed (-0.63) indicates that women with four to six years of education have .63 fewer children than women with *zero to three years* of school completed.

Women whose husbands work in the modern sector (-0.58) have around .60 fewer children than women with husbands working in the *agriculture*.

On the other hand, the coefficient on migrant children is positive suggesting that in these households after controlling for other factors women with migrant children have about one more child (.87) than women in *non-migrant households*.

The standardized coefficients (β) suggest a clear hierarchy in the determinants of the number of children ever born at age 40. In descending order of importance the variables are: age at marriage, which, not surprisingly, is by far the most important; female education; household migration status; male employment sector; and contraceptive use.

Finally, the assumptions for Linear Multiple Regression were checked using residuals. For the normality assumption a histogram of residuals was drawn and the dependent variable had a normal distribution. To test for homoscedasticity and linearity the residuals were plotted against the observed and the expected values of the independent variables. In addition, predictor variables in Linear Multiple Regression should not be highly correlated with each other. The correlation matrix (see appendix C) was used to diagnose multicollinearity among the predictor variables. However, the variables are not highly correlated with each other.

Table 6.3 Multiple Linear Regression Coefficients (*B*) of Selected Variables

Predictor variable	*B*	*SE*	*p-values*	*Sig.*
Model 1				
Constant	11.93	0.27	.000	***
Women's age at marriage	-0.28	0.01	.000	***
Contraceptives use				
Never used any[1]				
Traditional contraception only	-0.27	0.24	.268	
Modern and traditional contraception	-0.41	0.12	.001	**
School years completed (women)				
Zero to three years[1]				
Four to six years	-0.64	0.12	.000	***
Male employment sector				
Agriculture[1]				
Modern sector	-0.59	0.11	.000	***
Migrant husband/father	0.18	0.13	.183	
Migrant children	0.77	0.16	.000	***
Model 2				
Constant	11.90	0.26	.000	***
Women's age at marriage	-0.28	0.01	.000	***
Contraceptives use				
Never used any[1]				
Modern and traditional contraception	-0.36	0.11	.002	**
School years completed (women)				
Zero to three				
Four to six years	-0.64	0.11	.000	***
Male employment sector				
Agriculture[1]				
Modern sector	-0.59	0.12	.000	***
Migrant husband/father	0.18	0.13	.183	
Migrant children	0.78	0.16	.000	***
Model 3				
Constant	11.90	0.26	.000	***
Women's age at marriage	-0.28	0.01	.000	***
Contraceptives use				
Never used any[1]				
Modern and traditional contraception	-0.36	0.11	.002	**
School years completed (women)				
Zero to three[1]				

Table 6.3 (continued)

Predictor variable	*B*	*SE*	*p-values*	*Sig.*
Four to six years	-0.63	0.11	.000	***
Male employment sector				
Agriculture[1]				
Modern sector	-0.58	0.11	.000	***
Migrant children	0.87	0.14	.000	***

R^2=.254 for Model 1 ($p < .001$), R^2= .253 for Model 2 ($p = .268$), R^2= .253 for Model 3 ($p = .183$).
***$p < .001$, **$p < .01$, *$p < .05$
[1] Category of reference for each categorical variable.
Source: ENADID, 97. Files: ENADID97_carac-muj, ENADID97_dat-gen, ENADID97_mig-int.

6.3 Migration Analysis

Binary Logistic regression is a type of predictive model with an outcome variable that is a dichotomous categorical variable and predictor variables that are either continuous, categorical, or both (Field, 2009).

The previous regression (linear multiple) analysis suggests that there is an association between migration of children and the number of children ever born at age 40. The rest of the independent variables used in the linear multiple regression may also affect the household migration status. The purpose of this analysis is twofold: to test whether fertility, at the household level, has an effect on the migration of children and to test whether this effect is solely the statistical artifact that having more children increases the chances of having at least one migrate. If we assume that all children have exactly the same chances of migrating, a mother of two children would have twice as many chances of having a migrant child than a mother of one. In the model, a linear effect of the number of children ever born at age 40 means that fertility, at the household level, would have no effect on the migration of children. However, the hypothesis would hold if the chances of having one migrant child increase faster than the number of children ever born at age 40. Therefore we look at the results of an equation with a linear relation and then compare it with the equation with a curvilinear relation (the number of children and the square of the number of children). The test thus compares the double of the difference between the likelihoods of the two equations.

I perform two binary logistic regression analyses to predict the odds of living in a household where children have migrated compared to households where no children have

migrated: (1) *no migrant children*; and (2) *migrant children* In the first analysis, the predictor variables are only two: the number of children ever born at age 40, and the square of the number of children ever born at age 40. In the second analysis the predictor variables are six: three continuous predictors: women's age at marriage, the total number of children ever born at age 40, and its square; and four categorical predictors: contraceptive use; female education; male employment sector, and having a migrant father.

For the model in the analyses, the dependent variable is interpreted as the log odds of having at least one child in the household migrate and is expressed as the sum of products of partial regression coefficients (β) and covariate means (X). Each regression coefficient can be interpreted as the log odds of the given variable. Regression coefficients measure the extent to which each variable contributes to migration. The odds of a binary logistic regression produce a relative risk ratio, which represents the odds that an observation falls into the comparison category against the baseline category.

As in linear multiple regression, assumptions of linearity, independence of errors, and multicollinearity need to be met (Field, 2009). The general model is represented by the following equation:

$$P(Y) = \frac{1}{1 + e^{-(\alpha_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i})}}$$

Where:

P (Y) = Probability of belonging to a migrant household;

e = base of natural logarithms;

α = the constant;

β_n = the partial regression coefficients for each of the independent variables;

X_1 = Women's age at marriage;

X_2 = Total number of ever born children at age 40;

X_3 = Contraceptives use;

X_4 = Female education;

X_5 = Male employment sector;

X_6 = Migrant father;

6.3.1 Binary Logistic Regression Results

The Binary Logistic Regression analyses test the effects of selected independent variables (women's age at marriage, number of children ever born at age 40, male employment sector, female years of schooling, having a migrant father, and contraceptives use) on the odds of children migrating. The categories of reference for each categorical variable are the same as in the Linear Multiple Regression analysis.

For the first logistic regression model we use only two independent variables: the total number of children ever born at age 40, and the square number of children ever born at age 40. Table 6.4 shows that the total number of children ever born has a highly significant (p =.000) positive relationship with the migration of children. The total number of children ever born coefficient (B) of 0.3 indicates that for every child a woman has, there is 0.3 increase in the log-odds of children migrating, On the other hand, the variable square number of children ever born has a significant (p =.048) negative relationship with the migration of children which means that the increase is slightly less than linear because the quadratic term is exerting a downward force on the equation. The analysis shows that the likelihood (L=-1177.75) of the curvilinear model is slightly greater than the likelihood of the linear model (L=-1179.80). The difference between the two likelihoods is 2.05 and the double of the difference is 4.1. The value of the random variable following a chi square distribution with 1 degree of freedom at the 0.05 cut-off point is 3.84. This means that the test statistics is greater than the value at the cut-off point. Although there is a curvilinear effect, it is a slight one.

The second logistic regression also predicts the likelihood of children migrating. This time however, we add four more independent variables: contraceptive use; female education; male employment sector; and having a migrant father. Table 6.5 shows two models. Model 1 does not include the square number of children ever born. In this model the lower the age at first marriage (p =.000), male employment sector (modern sector) (p =.004), having a migrant father (p =.000) and the total number of children ever born (p =.000) significantly increase the odds of children migrating. In model 2 however, when the variable square number of children ever born is added the total number of children is no longer significant. Moreover, the analysis shows that the likelihood (L=-696.73) of the curvilinear model is slightly greater than the likelihood of the linear model (L=-696.75). The difference between the two likelihoods is 0.019 and the double of the difference is 0.038. The value of the random variable following a chi square distribution with 1 degree of freedom at the 0.05 cut-off point is 3.84. In this case the test statistics is smaller than the value at the cut-off point therefore there is no curvilinear effect.

The results from the Logistic Regression analysis yield an interesting picture. Households with migrating children seem to be the ones experiencing the greatest pressure: households with higher fertility and where the father worked in agriculture. Households where mothers were using only traditional methods are least likely to have migrant children although this category is not significantly different from those where married women had never used any contraceptives. This suggests that high fertility, despite knowledge and openness to modern contraceptives, was pushing children to migrate to the United States, and it was doing this more often when their father worked in agriculture.

Table 6.4 Logistic Regression Coefficients (*B*), Migrant Children

	B (p-values)	*SE*	*Exp (B)*
Model 1			
Constant	-2.61 (.000)***	0.14	0.07
Total number children	0.15 (.000)***	0.02	1.16
Model 2			
Constant	-3.09 (.000)***	0.28	0.05
Total number of children	0.30 (.000)***	0.81	1.35
Square number of children	-0.01 (.048)*	0.00	0.99

N=2,745, X^2=63.43 ($p < .001$), R^2=.023 (Cox & Snell), R^2=.039 (Nagelkerke) for Model 1, X^2=67.54 ($p < .001$), R^2=.024 (Cox & Snell), R^2=.041 (Nagelkerke), ***$p < .001$, *$p < .05$
Source: ENADID, 97. Files: ENADID97_carac-muj, ENADID97_dat-gen, ENADID97_mig-int

Table 6.5 The Odds of married women 40-49 living in a household where at least one child has migrated to the United States

	B (p-values)	*SE*	*Exp (B)*
Model 1			
Constant	0.72 (.195)	0.59	2.06
Women's age at marriage	0.09 (.000)***	0.02	0.92
Contraceptives use			
Never used any[1]			
Traditional only	0.16 (.337)	0.16	1.17
Traditional and modern	-0.53 (.189)	0.40	0.59
Male employment sector			
Agriculture[1]			
Modern sector	-0.45 (.004)**	0.16	0.64
Female education			
Zero to three[1]			
Four to six years	0.04 (.761)	0.14	0.98
Migrant father	2.38 (.000)***	0.14	10.8
Total number of children ever born	0.12 (.000)***	0.03	1.13
Model 2			
Constant	0.65 (.336)	0.68	1.92
Women's age at marriage	0.09 (.000)***	0.02	0.92
Contraceptives use			
Never used any[1]			
Traditional only	0.15 (.347)	0.16	1.16
Traditional and modern	-0.53 (.185)	0.40	0.59
Male employment sector			
Agriculture[1]			
Modern sector	-0.45 (.004)**	0.16	0.64
Female education			
Zero to three[1]			
Four to six years	0.04 (.758)	0.14	0.96
Migrant father	2.38 (.000)***	0.14	10.8
Total number of children	0.14 (.199)	0.11	1.15
Square number of children	-0.00 (.847)	0.01	0.99

N=2,044, X^2=397.08 for Model 1, X^2=397.12 for Model 2 ($p < .001$).
R^2=.17(Cox & Snell), R^2=.30 (Nagelkerke) for Model 1, R^2=.17(Cox & Snell), R^2=.30 (Nagelkerke) for Model 2. ***$p < .001$, **$p < .01$

[1] Reference category for each categorical variable (odds ratio=1.0).

Source: ENADID, 97. Files: ENADID97_carac-muj, ENADID97_dat-gen, ENADID97_mig-int

6.4 Discussion of the results

In this section we assess the results from both Linear Multiple and Binary Logistic Regressions against the literature and the hypotheses raised in Chapter 3. As expected, results from the Linear Multiple Regression show that women's age at marriage, contraceptives use (used both modern and traditional), and female labour force participation (modern sector) have a significant effect in reducing fertility. Fathers who are employed in the modern sector also significantly reduced the number of children ever born.

The links between marriage and fertility are direct and well known in situations, like rural Mexico, where women were not limiting family size (average 6.2 children at age 40) and not stopping childbearing long before the end of their childbearing period (i.e. before age 40). In these cases delayed age at marriage affects birth rates by reducing the number of years (and often the most productive years) available for childbearing. Thus women who marry latest have the fewest children on average (Smith, 1983). Likewise, women's education has long been recognized as a crucial factor in fertility decline (Cochrane, 1983; Sanderson and Dubrow, 2000; Caldwell). More educated women are, for instance, more likely to delay marriage; choose paid work over early motherhood; object to the burdens of repeated pregnancies; and less likely to be dependent on sons as a source of old-age security; and more likely to practice modern contraception (Sanderson and Dubrow, 2000). A good deal of evidence has also accumulated on the response of fertility to the use of contraceptive methods. Contraceptive practices have increased dramatically, particularly in less developed countries, and this itself has decreased individual fertility (Ross, 1983).

Although female labour force participation was excluded from the analysis because we cannot be sure that current employment represents employment through the childbearing period, it is worth mentioning that there is an association between fertility and female labour force participation in the modern sector which may reflect the incompatibility between childbearing, childrearing and participating in economically productive work that typifies the modern sector, whereas agricultural work and childrearing tasks may be performed more or less simultaneously (Brewster and Rindfuss, 2000). Under these circumstances, women working in the modern sector may limit their fertility. On the other hand, the association between male employment in the modern sector and lower fertility may be explained not necessarily in terms of their desire for fewer children per se, but as Caldwell suggests, relative to those in agriculture where children provide needed labour on the farm, are important for continuing the line and providing security for parents in their old age or in case of infirmity the value of children may be less obvious or immediate for men working in the modern sector. On the other hand, men working in the modern sector may have higher levels of education and desire more schooling and greater opportunities for their children which could make them more receptive to the benefits of smaller families and contraceptive methods. Bivariate correlations indicate that both male labour force in the modern sector and longer male education increase women's contraceptives use[15].

[15] The result shows that male education was significantly related to male labour force, r=.11, and contraceptives use, r=.07; contraceptives use was also related with male labour force, r=.10 (all *ps.* <.001).

Results from the linear multiple regression model suggest that households with migrant children are particularly associated with high fertility. In developing countries, production based on familial organization such as agriculture has been associated with high fertility (Caldwell, 1976; Stark, 1981). After the Mexican Revolution (1910-1920), agricultural land in Mexico became communally owned (De Vany and Sanchez, 1979; McCarty, 2008). *Ejidos*, as they were called, consisted of several families. Rights to use *ejido* crop lands were granted to individual families without granting them individual property rights. The land could not be sold, leased, or mortgaged. Rights to *ejido* lands could be passed on to heirs, but they could also be lost if the land was not under cultivation. Under these circumstances, land retention, and family labour were motives for having many children (De Vany and Sanchez, 1979), thus the economic burden of large families was compensated for by the greater utilities children provided to their parents.

Although there is a slight curvilinear effect of the number of children in the first logistic model without other independent variables, there is none in the model which includes other independent variables. This means that the effect of fertility on migration, at the household level, is limited and probably related to the effects of the other variables included in the equation. Moreover, the fact that we mixed both genders in a single variable (migrant children) may attenuate the effect of migration on fertility. Nevertheless, results from the logistic regression models suggest that high fertility and the presence of migrant fathers increases the likelihood of having children who migrate and supports the notion that access to social capital increases the odds of migration. It has long been recognized that the networks established by family members who migrate is a

strong factor precipitating the migration of other family members and as migration becomes institutionalized this may spread to other community members (Massey and Espinosa, 1997). In this study we found that having migrant parents is highly significant in raising the odds of children becoming migrants

In addition, results from the logistic regression models suggest that the presence of male household heads working in agriculture increase the likelihood of having children who migrate. Mexico-U.S. migration has a long history, however the transition from traditional to capitalist modes of agricultural production often results in dramatic socioeconomic transformations which could increase or decrease migration. In Mexico, the break-up of small land-holding agriculture started in the early 1960s which created the conditions for rural out-migration (Arizpe, 1981). After Mexico joined NAFTA in 1994 *ejido* lands gradually disappeared, Mexican agriculture became a net importer from the U.S., and employment in the sector declined. As a result, many peasants turned to international migration as an economic alternative (McCarty, 2008).

According to Davis' Multiphasic Response (1963), throughout the process of the demographic transition people respond to population pressure and relative socioeconomic deprivation in every demographic manner and out-migration is one of them and often the desired first option. For households where large families had made sense under the *ejido* system the decrease in agricultural income for the parents following capitalization and especially with the breakup of *ejido* lands, may increase the economic pressure on households with young adult children of an age to leave home to choose to emigrate to the U.S. Indeed among this group, a large family may even be seen as providing an

opportunity for having some children migrate and contribute to the household well-being through remittances.

Families in rural Mexico often send members of the family abroad to obtain capital for investment either in a business, land or housing (Mooney, 2004). Most of the remittances sent back from the U.S. to Mexico are destined for household consumption nevertheless some of this money is also invested in housing or on house improvements or furnishings (Stark et al., 1986; Massey and Basem, 1992; Conwey and Cohen, 1998; Martin, 1998; Cohen, 2001, 2002, 2005; Cohen et al., 2003). Through remittances, migrant children may contribute financially to the household economy. The financial benefits from children's remittances to their parents may have over the years contributed to encouraging couples to persist in having large families. From a parental point of view, each child increases the potential of having a migrant child who can contribute to the household economy. This may increase parents' desire for large families, and hence high fertility as Caldwell's Wealth Flow Theory suggests.

Data limitations in the original survey (i.e. on remittances use and investment) prevent us from looking further into the economic benefits parents' may derive from the migration of their children. Nevertheless, information on housing quality indicators such as floor material, water, electricity and W.C. facilities (see table 6.2 in section 6.1) suggests that migrant children may indeed contribute to the household economy.

CHAPTER 7: SUMMARY AND CONCLUSION

This thesis explored the reciprocal relationship between fertility and migration and especially between parental fertility and having migrant children. Using data derived from Mexico's Encuesta Nacional de la Dinámica Demográfica (ENADID) 1997, the research yielded some interesting findings. First fertility is higher in households with migrant children than in non-migrant households and in households with migrant husbands only.

Higher fertility in households with migrant children suggests that as fertility increases so does migration of children. To explain how fertility and migration interact requires identifying the intervening variables through which they operate. To understand potential pathways requires situating these components within two different, but related fertility theories. First, the Multiphasic Response Theory suggests that throughout the process of the demographic transition, people choose from among a variety of demographic responses to population pressure and relative socioeconomic deprivation, including out-migration (Davis, 1963). And second, the Wealth Flow Theory attributes fertility decline to a change in the direction of the flow of wealth between parents and children whether it is in the form of production based on familial organization of labour or monetized labour market (Caldwell, 1976; Stark, 1981).

In the past, rural farm workers in Mexico were able to make a living from the land often because they owned the land and parents could rely on their own children to work the land and increase its productivity, especially in a context where retention of rights to the land depended on passing the land onto their children. In this context having as many

children as possible was an economic advantage because their economic security depended on the number of children they produced.

Mexican migration from rural regions to the U.S. has been going on since the 19th century, but the nature of migration has undergone a series of transformations: Mexican emigration has lost its circular character and become more permanent, as well as spread to include urban areas, outside the traditional regions, and to include more women. In addition, the shift from traditional subsistence modes of agricultural production to monetized (capitalist) production has intensified migration. The modernization of agriculture and its concentration in hands of private owners and large corporations has left many rural farmers and their families landless or unable to compete. Lacking economic opportunities (i.e. access to credit, jobs) in their communities, large families were now surplus to the requirements of the household and local economy, leaving no alternative but for many young people, especially those whose father's depend on agriculture, to leave for the United States in higher numbers. Growing out-migration is a behavioral response to recent population pressure and socioeconomic deprivation that has become much worse in the last few years (since their parents time).

Results from the Regression models suggest that households with migrant children are more likely to depend on agriculture for economic subsistence and have higher fertility. Nevertheless, the following question arises: Is migration a product of high fertility (i.e. push factor) as Davis' Multiphasic response model would suggest; or does high fertility remain an economic advantage as more migrants mean more income as Caldwell's Wealth Flows theory would suggest?

Parents in rural communities may send children abroad to obtain capital for investment either in a business, land or housing. Through remittances, children help parents subsidize household consumption. In rural areas, where sources of employment and credit are limited or nonexistent, children, through migrant remittances, could contribute financially to household economic security. Under this circumstance, having many children makes good sense.

It is impossible to test these alternative explanations for the observed higher fertility in households with migrant children given the nature of the data. Surveys of women 40-49 in 1997 and current socioeconomic characteristics pertain to decisions about when to marry and how many children to have taken over a lifetime (20-30 years) and over a period when change has been very rapid. Moreover, current characteristics for the parents' education and employment could have been different prior to the father's migration and some of these characteristics could have changed after he returned to the community. For this reason we cannot know the direction of the relationship between parental fertility and children's migration.

In this context of changing times, it is tempting to speculate that the Multiphasic Response and Wealth Flow Theories may not be mutually exclusive. In rural communities where children have long assumed important roles for agricultural production parents prefer larger families. The modernization of agriculture combined with excess rural population increases the likelihood of children migrating. Children's migration mitigates population pressure at the same time alleviating socioeconomic deprivation through remittances from abroad. With time, migrant children assume new

economic roles that increase their value and hence may enhance their parent's demand for children, increasing parental fertility still further and perpetuating international migration.

Overall, the results yielded mixed evidence of the effect of fertility on migration at the household level. Suggestions for future research includes differentiating between male and female children since boys more often migrate to test what happens to the curvilinear effect of the number of sons rather than all children or daughters when controlling, one by one, for each of the other independent variables..

Only data that include event history information on the timing and sequencing of migration relative to births as well as the economic status of households over time that allow for longitudinal analyses will make it possible to test whether wealth flows from children to parents, whether higher fertility in migrant children households results from wealth flowing from migrant children to parents or whether children's migration is a behavioural response to population pressure and social deprivation stemming from higher fertility.

This thesis considered some individual level socioeconomic variables, such as parents' labour force participation, and parents' education, that were assumed to influence migration. But the propensity to migrate may equally relate to community and regional level, socioeconomic contexts. For instance, the likelihood of migration may be higher in places with limited opportunities than in those with a fair degree of investment opportunities. These were not considered here.

In a related fashion, the sociocultural context may also matter. In Mexico, responsibilities of children to their parents and communities are much more pronounced than in North America. Remittances have been associated with norms and obligations children feel. Failure to send money to one's immediate family could be interpreted as a form of social as well as economic failure by family and community members (Goldring, 2004). Only in areas where children feel such obligations towards their parents could the wealth flow from children to parents. In some regions, migration has also become a rite of passage from childhood to adulthood, especially for men (Parrado, 2004). In addition, the composition of families, bargaining positions of the parents, and the benefits of migration for those in different stages of the family life cycle may vary across socioeconomic contexts. .

This thesis has shown the need for further research on fertility and migration. Future research on the subject requires looking deeper into the socioeconomic contexts of sending communities and closer attention to the various theories of fertility decline to have a better understanding of the socio-cultural and economic processes through which fertility and reproductive behaviour operate. Perhaps, most importantly future research should incorporate both qualitative and quantitative analyses in order to identify motivation and goals and resolve issues of s cause and effect.

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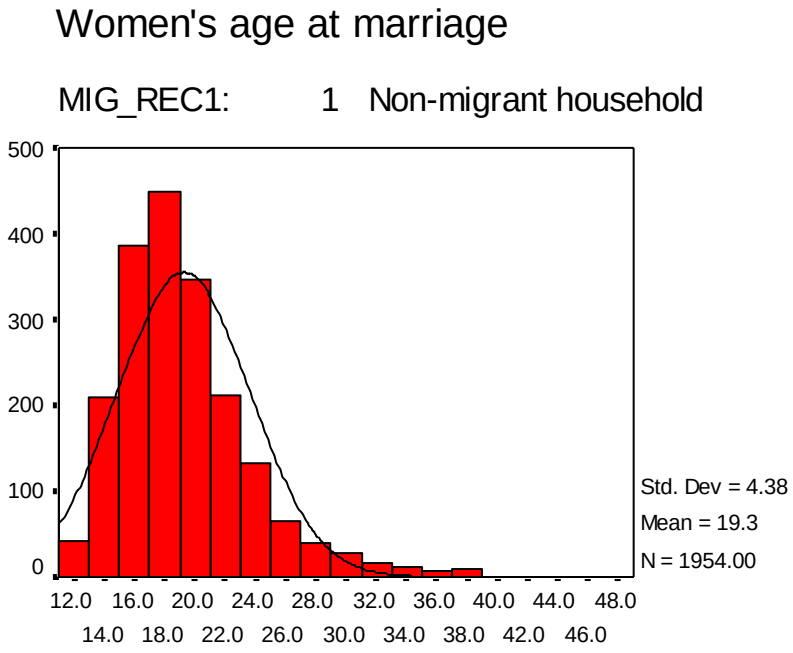
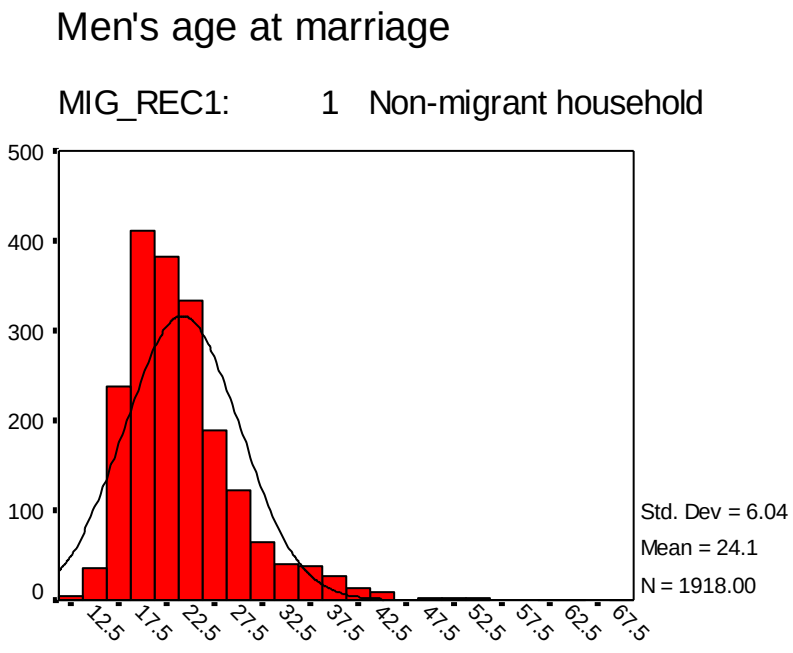
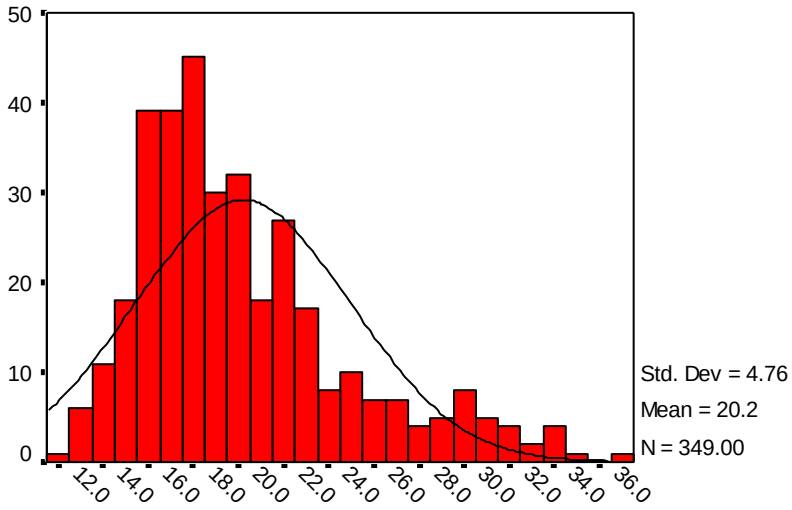
Appendix A. Normal Distributions for Age at Marriage by Sex and Household Migration Status





Women's age at marriage

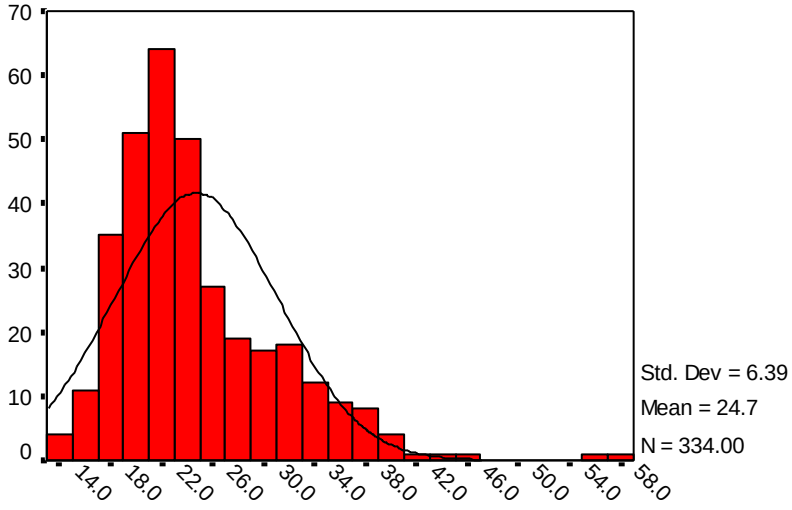
MIG_REC1: 2 Migrant husband only



Women's age at marriage

Men's age at marriage

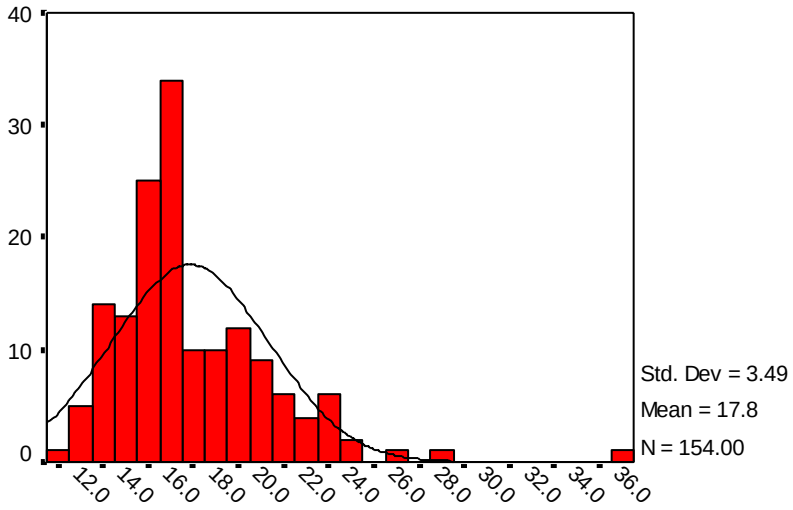
MIG_REC1: 2 Migrant husband only



Men's age at marriage

Women's age at marriage

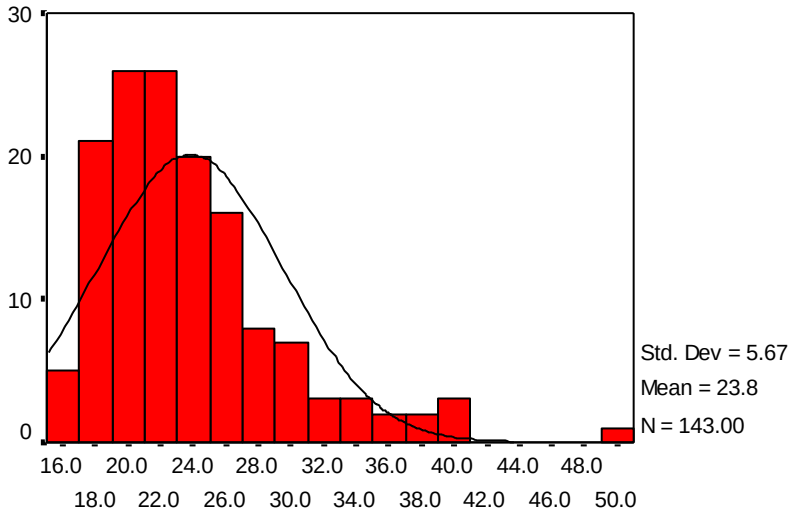
MIG_REC1: 3 Migrant children only



Women's age at marriage

Men's age at marriage

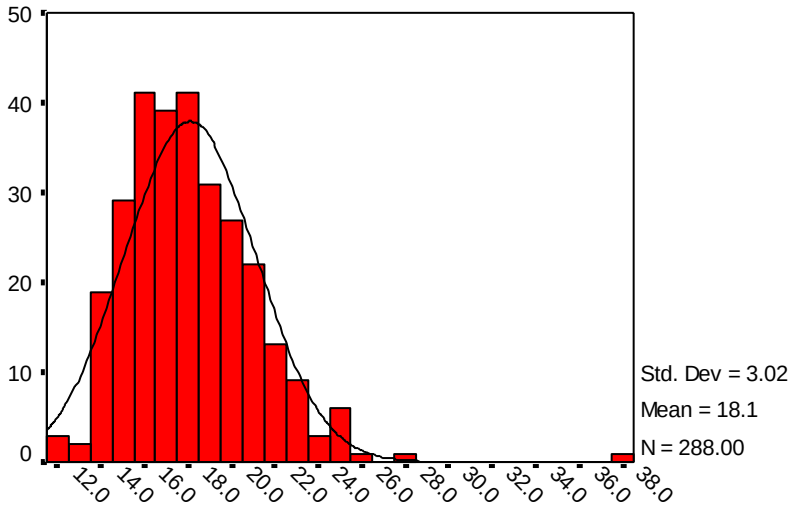
MIG_REC1: 3 Migrant children only



Men's age at marriage

Women's age at marriage

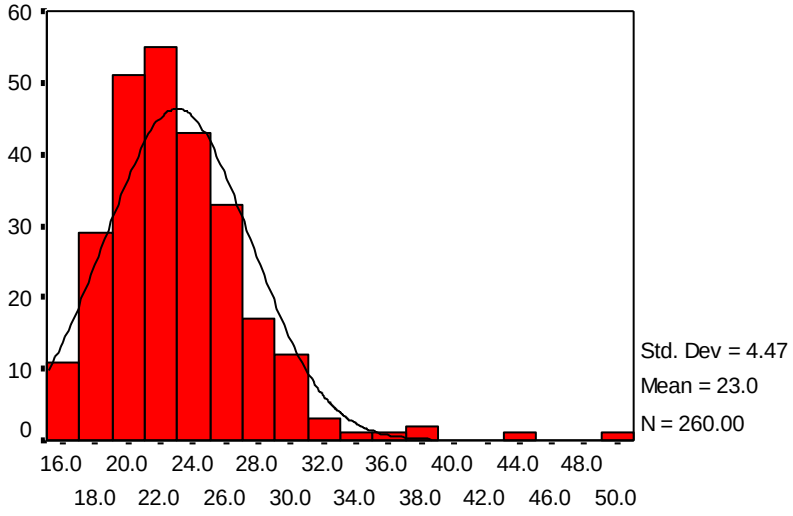
MIG_REC1: 4 Migrant children and husband



Women's age at marriage

Men's age at marriage

MIG_REC1: 4 Migrant children and husband



Men's age at marriage

Appendix B. Linear Multiple Regression Model for Number of Children Ever Born at Age 40

Descriptive Statistics

	Mean	Std. Deviation	N
number of live births at age 40	5.99	2.727	2044
women's age at first union	19.3563	4.23419	2044
none vs traditional contraception	.06	.233	2044
none vs modern contraception	.69	.463	2044
(women) zero to three years vs four to six	.40	.491	2044
agriculture vs industry	.31	.464	2044
husband is migrant	.24	.428	2044
children are migrants	.16	.366	2044

Model Summary[d]

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.504[a]	.254	.251	2.359	.254	98.988	7	2036	.000
2	.503[b]	.253	.251	2.359	.000	1.226	1	2036	.268
3	.503[c]	.253	.251	2.360	-.001	1.774	1	2037	.183

a. Predictors: (Constant), children are migrants, (women) zero to three years vs four to six, none vs traditional contraception, agriculture vs industry, women's age at first union, none vs modern contraception, husband is migrant

b. Predictors: (Constant), children are migrants, (women) zero to three years vs four to six, agriculture vs industry, women's age at first union, none vs modern contraception, husband is migrant

c. Predictors: (Constant), children are migrants, (women) zero to three years vs four to six, agriculture vs industry, women's age at first union, none vs modern contraception

d. Dependent Variable: number of live birhts at age 40

ANOVA[d]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3856.388	7	550.913	98.988	.000[a]
	Residual	11331.229	2036	5.565		
	Total	15187.616	2043			
2	Regression	3849.565	6	641.594	115.269	.000[b]
	Residual	11338.051	2037	5.566		
	Total	15187.616	2043			
3	Regression	3839.691	5	767.938	137.916	.000[c]
	Residual	11347.925	2038	5.568		
	Total	15187.616	2043			

a. Predictors: (Constant), children are migrants, (women) zero to three years vs four to six, none vs traditional contraception, agriculture vs industry, women's age at first union, none vs modern contraception, husband is migrant

b. Predictors: (Constant), children are migrants, (women) zero to three years vs four to six, agriculture vs industry, women's age at first union, none vs modern contraception, husband is migrant

c. Predictors: (Constant), children are migrants, (women) zero to three years vs four to six, agriculture vs industry, women's age at first union, none vs modern contraception

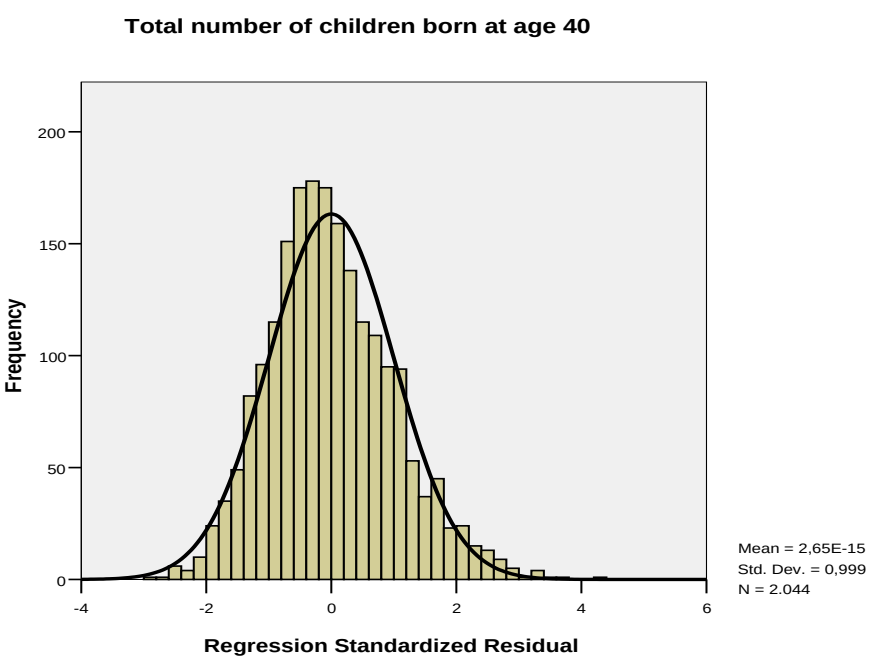
d. Dependent Variable: number of live birhts at age 40

Residuals Statistics[a]

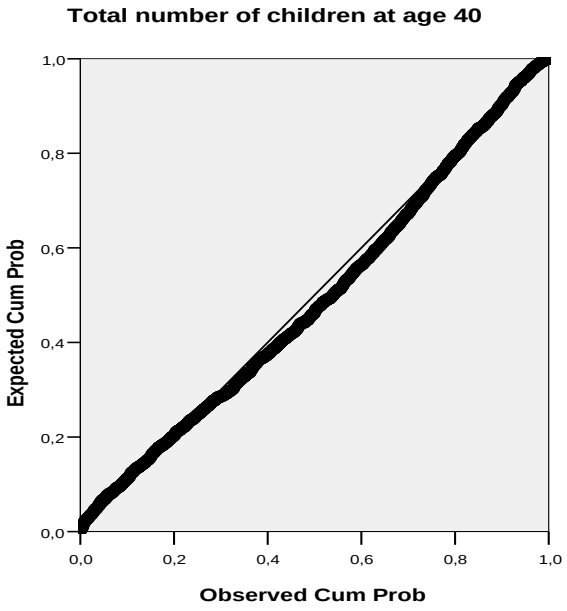
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	-1.95	9.30	5.99	1.371	2044
Std. Predicted Value	-5.792	2.418	.000	1.000	2044
Standard Error of Predicted Value	.090	.379	.125	.028	2044
Adjusted Predicted Value	-2.19	9.30	5.99	1.372	2044
Residual	-6.947	10.037	.000	2.357	2044
Std. Residual	-2.944	4.254	.000	.999	2044
Stud. Residual	-2.948	4.274	.000	1.000	2044
Deleted Residual	-6.966	10.134	.000	2.364	2044
Stud. Deleted Residual	-2.954	4.292	.000	1.001	2044
Mahal. Distance	2.000	51.576	4.998	3.131	2044
Cook's Distance	.000	.065	.001	.002	2044
Centered Leverage Value	.001	.025	.002	.002	2044

a. Dependent Variable: number of live birhts at age 40

Histogram

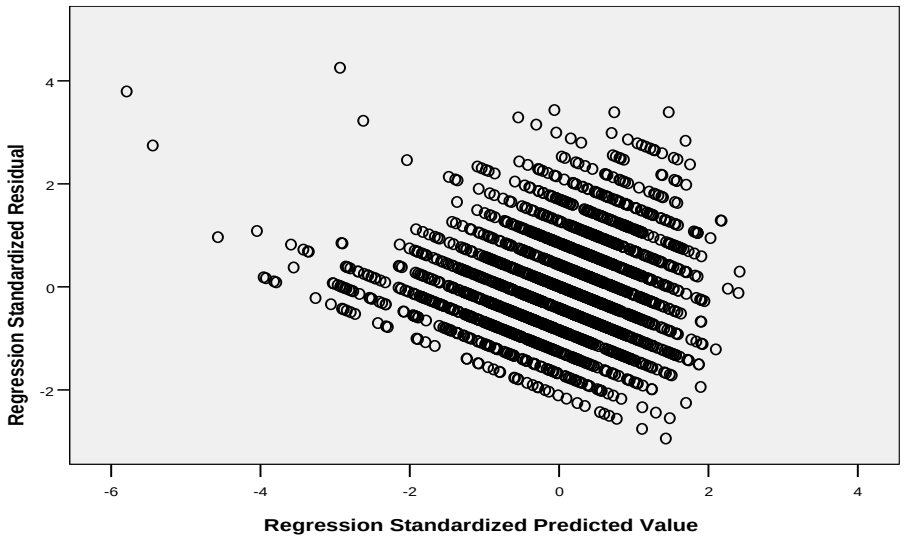


Normal P-P Plot of Regression Standardized Residual



Scatterplot

Total number of children at age 40



Appendix C. Correlation Matrix of Selected Variables for the Number of Children Ever Born at Age 40

	X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8
X1	1	-.456***	-.036	-.067**	-.159***	-.137***	.05*	.176***
X2		1	.085***	-.020	.071**	.038*	-.019	-.129***
X3			1	-.368***	-.016	-.027	-.022	-.056**
X4				1	.103***	.095***	.055**	.050*
X5					1	.079***	.067*	-.004
X6						1	.021	-.063**
X7							1	.419*
X8								1

X1= Number of children ever born at age 40, X2= Women's age at marriage, X3= Traditional contraception only, X4= Modern and traditional contraception, X5= Four to six years of school completed (women), X6= Male employment (modern sector), X7= Migrant husband/father, X8= Migrant children.

***$p < .001$; **$p < .01$; *$p < .05$

Appendix D. Linear and Curvilinear Plots