How internal migration shapes the demographic fertility patterns of internal migrants in post-Franco Spain

Tom Havinga, S4103513
Master Population Studies at Rijksuniversiteit Groningen
t.havinga.1@student.rug.nl

Abstract

The aim of this research is to discover the fertility difference between Spanish internal migrants who move between regions and their peers who do not. The focus will be on the fertility gap over time by comparing several groups with a ten-year interval between them. In particular, the focus will be on several theories and their importance to the Spanish context. By comparing the different time intervals, an analysis will be used to show the significance of this difference. The main research question will be: *What migrant fertility theory supports the Spanish context the best?* To answer this question a quantitative analysis will be conducted. Data used for this research will be collected from the IPUMS microdata database, which compiles data from several sources. This paper adds to the existing field by combining the fertility hypothesis of migrants and applying it to a special low-fertility context. The findings indicated that while there is little evidence to support one theory over another in terms of the total number of children, the age at which migrants start to have children is higher than their non-migrating peers. This indicates a delay in fertility, or a disruption. The findings further suggest that over time more support for this disruption hypothesis being dominant exists, with more migrant groups displaying a higher age at first birth.

Keywords: Spain, internal migration, fertility patterns, longitudinal comparison

Introduction

Over the last decades, an increasing amount of research has been done on the phenomenon of urban migrant fertility and its impact on the overall demographic health of countries and societies. Starting as early as the 1950s with research by Goldberg (1959) on American farmers moving to Detroit, there has been interest in researching this particular type of migrant. While those studies found that urban migrants have more or less the same fertility rate as the peers they left behind in the countryside, that narrative has changed. This was dubbed the socialisation hypothesis (Goldberg, 1959). In 1973, research on migrants from Sicily to New York City, USA showed that urban migrants display significantly different fertility patterns than their peers and older family they left behind (Rosenwaike). This theory, the adaptation hypothesis, describes how migrants adapt to the fertility levels of the receiving region. Other hypotheses are the selection hypothesis, which states that people migrate because of pre-existing fertility intentions, instead of having their fertility altered after migration, and the disruption hypothesis, which states that migrants experience fertility postponement after migration due to stress and lack of social support (Kulu, 2006).
The disruption hypothesis has been confirmed repeatedly (Jensen & Ahlburg, 2004; Kulu, 2006; Brahmi, Cossu & Nedjam 2019), and with growing concerns in western countries about ageing populations and a fertility rate below replacement rate, the interest in these fertility changes has increased. Considering this change, this research aims to fill a research gap, looking at fertility drops in Spain. Spain is a unique case, even in the context of Europe, since the country was under an authoritarian regime until 1975, after which it quickly modernised (Encarnacion, 2004). This gives us the opportunity to study changes to demography in a relatively small timeframe. While there are regional differences in fertility rate, this research aims to look at which theory about migrant fertility is most applicable to the Spanish context and how the roles and prominence of these theories have shifted over time. By testing for these several hypotheses, it is possible to determine what specific characteristics of these migrants might be the leading cause for this drop in fertility. If there is a decreasing gap in fertility between the two groups, this knowledge can be used to develop different strategies for future fertility estimations. If differences are found, future strategies might be able to focus on specific groups to target the areas which can be of most benefit for fertility strategies. This can be especially useful for western European countries struggling with decreasing populations and for countries like China, who now have a decreasing population for the first time since the 1960s (United Nations, 2023).

The main research question is thus: *What migrant fertility theory supports the Spanish context the best?*

Theoretical framework

Competing theories

Urbanisation is the transfer of population from permanent residence in rural areas to permanent residence in urban areas. Urban areas can be defined in different ways, be it by population density or population size, function or dependence on agricultural practices or a combination of these different characteristics (Woods, 2003). When looking at research on the impact of urbanisation on fertility rates, there are competing hypotheses.

The main bases for a large portion of research on rural to urban fertility are the socialisation, selection, adaptation, and disruption hypotheses (Kulu, 2005). Different examples of the socialisation hypothesis are visible in the earlier research done on spatial mobility and its effect on fertility. Goldberg's (1959) research focused on the impact of norms and values people are exposed to growing up on fertility rates in later life. Blue-collar rural people moving to the city had a higher fertility rate than urbanites, even when controlling for socio-economic differences. This hypothesis was further proven in the decades after. Rosenwaike (1973) researched migrants moving from rural Sicily, Italy to New York City. These migrants too showed fertility patterns resembling their peers in Sicily as opposed to their new peers in New York City. A surprising finding in this research, however, was that the second-generation migrants display fertility patterns more closely resembling the fertility patterns of their New York city counterparts. This was one of the first hints at an adaptation pattern.

The main idea of the adaptation hypothesis is that migrants display fertility patterns closely resembling the fertility patterns of their peers in the host region. This means that these migrants move away from the norms and values they grew up with and *adapt* to their environment. Recent studies have found results that concur with this. In sub-Saharan Africa, research has shown that migrants moving from the rural to the urban environment show fertility patterns more aligned with their urban counterparts, as opposed to the previous assumption that norms and values are determinant for the fertility patterns of migrants (Chattopadhyay et al, 2006).

The disruption hypothesis focuses on the impact of migration on short term plans to have children. For many migrants, the time right after migration is filled with uncertainty and leads to a postponement of child bearing. This can be due to obtaining education, a primary reason why many people move, or a period of unemployment.

The last of the major hypotheses is the selection hypothesis. This hypothesis states that people who move to urban areas already have fertility intentions similar to those who live there and not their rural counterparts. Due to this difference in fertility intention, they move to the urban area to live with like-minded individuals. This is the reason they display fertility patterns that are similar to those who live there. In the following section, literature to support these hypotheses will be provided, as well as a look into different factors impacting fertility intentions found in the existing body of literature.

Demographic transition model

A further important theory is the demographic transition theory. The essence of the theory is that countries' demographics go through stages, caused by birth and mortality rates, as the country develops economically (Kirk, 1996). The first stage is characterised by high fertility as well as high mortality rates, which causes the population to be stationary, meaning little to no growth in

the population. This stage is commonly found in non-urbanised and non-industrial societies, for example pre-industrial Europe.
The second stage is characterised by a decrease in mortality, often caused by an increase in living standards, which in turn causes higher numbers of children to survive, causing a population growth. In the third stage, the fertility rate starts to decline as wealth grows and urbanisation continues. The decline of fertility causes the growth of the population to slow down. In the fourth stage of the demographic transition, fertility rates have caught up with the low mortality rates and sit at replacement level, which is 2.1 children per woman. This 0.1 in the 2.1 is important since this also accounts for the risk of woman dying before their reproductive age, which would over time cause the population to decline (Kirk, 1996).

Recently, more economic views on the demographic transition model have formulated three stages instead of four, mainly focused on dependency ratios. In the first stage, where the crude death rate falls, the effect is more noticeable in the younger groups in the population. With more children surviving, the group of non-working children grows, increasing the dependency ratio. Over time, with more of these children reaching working age and a gradual decline in fertility, the dependency ratio drops, as more people of working age are available to support the non-working population. Following this stage, the relatively small group of young people that follow due to the falling fertility rate means that once these people of working age reach retirement age there is a different type of dependency ratio. Economists consider the second stage as the time of opportunity, seeing as there is a relatively low number of people who need to be supported and more funds can be allocated into investing into the economy. This period is also called the demographic dividend (Eastwood & Lipton, 2011).

Beyond the demographic transition
The most interesting demographic transition for current day western Europe is 'Europe's second demographic transition' (Van de Kaa, 1987). Different from the first demographic transition model that originated in the beginning of the 19th century and began with a increase in fertility followed by a decline in fertility later, this second transition begins with a decline in fertility to below replacement levels in many western European countries. This stage of the demographic transition has also been labelled 'Beyond the demographic transition.' A key feature of this stage of the demographic transition is a shift towards individualism. This trend can be observed as early as the 1960s, after the baby boom caused by the end of the Second World War ended. The shift towards individualism and the increased status of children and women in the 1960s had a strong impact on realised fertility, as well as relatively high divorce rates which have a strong impact on fertility desires in many developed countries. Not only does divorce itself limit fertility since the relationship gets dissolved, the higher risk of divorce prior to the actual event might also be of impact. With higher individualism, the position of children in the society is elevated and the costs of raising a child increase. The higher childrearing costs and decrease in certainty within marriages caused people to choose not to have children when they would have before. In addition, with less assurance that relationships will withstand hardship, the gendered roles that used to be the norm are also loosened, with more women choosing to orient themselves towards work. Increased female participation in the workforce has an impact on fertility (Ehrhart, 2011). With institutions still being set up to benefit the model of the male

breadwinner in many cases, and many societal structures not being set up for female employment, women often have to choose between work or child care. This leads to a lower fertility level (McDonald, 2000).

Mobility transition

At the crossroads of migration theories and the demographic transition theory lies the mobility transition. With societies entering different stages of the demographic transition, their migratory patterns change as well. However, in many cases a change in migration patterns has an impact on what the demographic makeup of the society looks like.

The first stage of the mobility transition has a starting situation comparable to medieval European mobility patterns, where migration over large distances was uncommon. As populations start to grow with modernisation of production, a migration wave away from rural areas begins. This stage is characterised by large urban migration numbers and emigration. When societies reach the third stage of the demographic transition, the mobility towards the cities slows down gradually and emigration numbers dwindle. In the last stage of the demographic transition, the internal migration has levelled off, and emigration makes room for immigration.

Beyond the demographic transition, the largest internal migration pattern is inter- and intra-urban migration (Zelensky, 1971).

Case context: Spain

The opposite is happening in regions in the south of Europe where, particularly in Spain, the fertility rate decline has meant an increase in dependency ratios. This decline in fertility has coincided with a rapid increase of age at first birth (Kohler et al, 2002). Due to this postponement, women in Spain never “catch up” to the fertility levels seen in other European countries without this postponement.

At the same time as this decline in fertility, Spain has also experienced a reversal in migratory nature. Before the 1990s, Spain was a net emigration nation, with less than 1% of the population being a foreign national in 1990. From the 1980s onwards, Spain experienced more in-migration (Bovar & Velilla ,1997), with as many as 9,3% of the population being a foreign born national in 2006. In many ways, this increased in-migration has paved over the cracks in terms of the demographic problems that started to appear in the 1980s. Without this migration, UN predictions show a decrease of 24% in population between 2000 and 2050, or 9 million in absolute numbers (UN, 2000).

The ageing of the population of Spain is of great concern for many in the country. It is past the second stage of the economic view on the demographic transition and an ever-increasing number of retirees need to be taken care of by a working group that is getting smaller. With life expectancy going up, this burden is expected to only increase. In the 1990s and early 2000s Spain saw a decrease in the dependency ratios because the number of children decreased, but since then, the old age dependency increase has caused this effect to also be negated. People aged 65 and older now make up 20% of the total population, up from 11% in 1980 (Worldbank, 2023).

In many ways, Spain is a unique case, in that the drop in fertility seen in several southern European countries in the 1990s did not affect the fertility of the individual regions homogeneously. The traditionally fertile regions swapped to less fertile over time (Carioli, 2022). In recent years, the fertility rate has even increased slightly, suggesting that the lowest point of fertility is already behind us, increasing from 1.16 in 1998 to 1.46 in 2008 (Sobotka, 2009). One of the ways Spain has attempted to increase fertility is by introducing bonuses for parents who have babies or adopt children.

Since this finding in 2009, a return to lower fertility levels is visible, back down to 1.2 in 2022. A reason for this downward trend is economic hardship during the Great Recession, the economic consequences of which hit the Spanish economy particularly hard. Unemployment and lack of job security caused many Spanish people to postpone or give up on their fertility desires (Matysiak et al., 2021). The high unemployment rates caused by the Great Recession caused postponement of fertility and ultimately a lower fertility rate than before (Sobotka, 2011). After the fall of the Franco regime in 1975, Spain experienced economic turmoil. Going from a conservative economy focused on the internal market to a consumer market with reliance on foreign energy sources and markets made the economy vulnerable. Many became unemployed due to rapid industrialization. The high unemployment of youth in particular in the 1980s and 1990s caused a decline in fertility, with modernization and the need for skilled labour also contributing to this fall in fertility (Noguera et al, 2011). This was mainly because people had to go to school longer to fill the skilled labour positions. This unemployment was particularly new for Spain, which under the Franco regime had low unemployment, averaging 1.5% (Encarnación, 2002).

For Spain, the effects of increasing individualism in the latter part of the 20th century might also have played a large role in the drop in fertility, as seen in many other European countries (Ehrhart, 2011). Until 1981, six years after the death of Franco, divorce was illegal in the country (Washington Post, 1981). Spain now has one of the highest divorce rates in Europe.

In addition to this, the shift from a country with traditional norms and values under Franco, in particular when it comes to married women in the labour force, to a country where females are not only expected to actively participate in the labour market but also in the informal care sector is a major reason why fertility has dropped. In the period from 1981 to 2001, the share of women in the labour force increased from 30% to more than 60% (Jamoutte, 2004).

Furthermore, migration patterns have changed significantly over time, with migration to urban areas in the 1960s and 1970s mainly consisting of low skilled workers migrating to manufacturing jobs. In the 1980s and 1990s, the main group of labour migrants now consisted of skilled workers and non-manual labour workers in search of opportunities (Bover, & Vellila, 1999).

Literature Review

Adaptation

Research shows that rural to rural male migrants display the same level of fertility as their non-migrant rural counterparts, and migrants moving from rural to urban have a significantly lower fertility rate (White et al, 2008). Another interesting finding is that urban to urban migrants showcase a lower fertility rate than urban males who do not move (Menashe-Oren & Sanchez-Paez, 2023). Studies on western African countries found that the fertility patterns rural-urban migrants have shown have spread beyond the urban environment and influenced their families in rural areas, setting in motion a trend of decreasing fertility in light of urbanisation. In Côte d'Ivoire, urbanisation has slowed down and a wave of outmigration has begun. This has decreased the overall urbanisation level of the country (Beauchemin, 2011).

In sub-Saharan Africa, there is a large disparity in fertility rates between migrants to cities and non-migrants. Reasons for this include the relatively high number of non-married individuals, a number of couples being separated due to migrations and an increased usage of contraceptives for women who have migrated to cities (Brockerhoff, 1995).

Disruption

Not only is the fertility rate divergence visible in sub-Saharan Africa, it is also visible in places like Russia (Zakharov & Ivanova, 1996) and Finland (Lianiala & Berg, 2017). In Austria and Poland, the same trends are visible, as well as a downtick in fertility for first births, due to the delayed formation of marital union, and a short-term postponement of birth if participants move to larger cities. This supports the disruption hypothesis (Kulu, 2006).

This disruption or postponement happens due to postponement of first union, particularly due to an increase in female education and urbanisation (Hertrich, 2017). In the sub-Saharan context, education attainment, and even more importantly educational enrolment, have been found to postpone first birth. This was particularly the case for births between the ages of 15-19 (Shapiro & Tambashe, 1999). Later research also found that the improved level of education increases the usage of modern contraceptives (Shapiro, 2017).

Selection

Additional consequences of this disruption are the postponement of first births and population ageing in the rural areas migrants leave behind. Parents sending their children to urban areas for education disrupts fertility in rural areas, as in many cases the children have children outside the rural area. This causes the fertility rate to drop in rural areas due to a lack of young people and an increase in older groups (Childs et al, 2017). Urban areas work as driving forces for economic growth, causing regions without large urban areas to fall behind economically and demographically (Bätzing et al, 1996).

In Spain, there were no residents under 16 in several municipalities in 2006. While out migration itself is no longer the main culprit for depopulation in the rural areas of Spain, this lack of young people and in turn the decline in natural regenerative growth is now seen as the main cause of concern (Pinilla, 2006).

Further reasons for declining fertility mainly include family desires. In developing countries, fertility desire is increasingly lower than realised fertility, as child mortality levels are lower than before. Due to a lack of available contraceptives, the desired fertility is surpassed (Shapiro, 2017). With increasing access to modern contraceptives, achieved fertility will be determined by how many children people *want* (Skirbekk, 2022) (Daskupta et al, 2022).
Family size desires have decreased, especially in cities, due to competing preferences. A higher cost of childrearing and need for childcare are cited as the main reason for this. Due to a lower family desire, the eventual number of children also declines (Coutinho, 2016). An increase in dwelling costs might drive people away from urban centres, particularly residents with a higher fertility desire and need for more space. These residents relocate to rural communities and raise fertility rates there (Lianiala & Berg, 2017; Vidal et al. 2017). This anticipatory relocation of couples with higher fertility desire is called the selection hypothesis (Kulu, 2005).

Socialisation
The relatively high number of children in rural areas can be attributed to socio-cultural contextual factors. Research shows that rural families prefer a higher number of children to help with agricultural production and have a subculture that values large families. Adequate housing is a contributing factor for rural fertility, with larger housing options available providing the space to have more children (Kulu, 2013; Kulu & Washbrook, 2014).
While ideal family size has dropped significantly over the last few decades, it has now plateaued and remained above or around replacement levels for most countries. Surprisingly, this has occurred not only in countries with a higher fertility level, but also in countries with a fertility rate below replacement levels. This means that the fertility desire is higher than the realised fertility rate for these countries (Sobotka and Beaujouan, 2014). Possible reasons for this disparity are a form of “cultural lag” where people still have ideals that do not correlate to the status quo in terms of realised fertility. In certain low-fertility countries the desired fertility rate is now below replacement levels as well (Hagewen & Morgan, 2005).

Many European countries are in the latter stages of the mobility transition. In Sweden (Kulu et al, 2018), internal migration has slowed down significantly, except for migration by young people. Migration rates are also falling in southern Europe, Asia and the United States (Bell et al. 2015; Molloy et al., 2017).

When looking at the demographic transition model, there is a clear difference in pattern in different regions of the world. In the sub-Saharan context, the drop in fertility commonly seen in the second stage of the demographic transition is noticeable, and in many cases, a gradual decline in fertility as well. This mostly occurs in the third stage of the transition model. Many sub-Saharan countries, however, still have a fertility rate well above the replacement level, with countries like Nigeria expected to almost double in population size by 2050, from 206 million to 400 million. Another major effect of this growth is that the working age population of the countries will increase rapidly. Increasing efforts are being made to ensure the demographic dividend that occurs with this declining dependency ratio in sub-Saharan Africa is used, with investments into education for girls and developmental plans in several countries (Brahmi et al, 2019).

Main problem statement

Case selection

The choice to investigate Spain is due to a variety of reasons. From the literature, it appeared that southern European countries in particular deal with fertility decline and ageing populations, due to an increase in life expectancy. While this is a trend in many other developed countries, this increase in life expectancy has been more intense in southern Europe. In addition to this, the literature shows that this fertility decline has been relatively recent. This is due in part to the unique characteristics of Spain, Portugal and Greece, who have all dealt with authoritarian regimes in the 20th century. In Spain's case, literature shows that particularly after the dissolution of this regime, radical political reforms took place in the country and economic prosperity and growth took off. This in turn meant that more people became dependent on industrial labour, and migration to industrialised areas became more prominent.

Following this, it is interesting to investigate whether the gap in fertility between urban and rural areas as a whole has changed over time and what impact this has had on rural to urban migrants, especially since Spain is a unique case. Unlike many western European countries where the second demographic transition happened starting in the 1960s and slowly decreased fertility, in Spain the fertility rate remained relatively high up until the 1970s, after which it dropped from one of the highest in Europe at 2,87 in 1974 to 1,15 by the early 90s. Ever since this decline, the fertility level has remained relatively stable, hovering around 1,3 (United Nations, 2022). The main aim of the research is to see which fertility hypothesis is most visible in each year and showcase how this changes longitudinally.

The main research question is: *What migrant fertility theory supports the Spanish context the best?*
By dividing this into several sub-questions, we can investigate more specific differences.
Is the fertility gap between urban and rural areas observed in the literature visible in Spain and how has this changed?
To what extent have these theories changed roles and relevance over time in the Spanish context?

Hypotheses

1. If the dominant fertility theory present in Spain is the <u>Adaptation</u> theory, it is expected that the fertility of migrants is adapted to the fertility level of the receiving area. Furthermore, this means that the migrants experience significant differences from their non-migrating counterparts.
2. If the dominant fertility theory present in Spain is the <u>Selection</u> theory, it is expected that the fertility of migrants moving to more urbanised areas is lower than their non-moving counterparts.
3. If the dominant fertility theory present in Spain is the <u>Socialisation</u> theory, it is expected that there will be no significant difference between migrants and their non-moving counterparts.

4. If the dominant fertility theory present in Spain is the Disruption theory, it is expected that migrants will have a lower fertility than their non-migrating counterparts.

In the scenario that Adaptation theory is the dominant theory, the expectations derive from the idea that migrants adapt to the receiving area's fertility levels. This would mean that, in Spain, migrants to mostly urban areas conform to the fertility norms of the urban area. This also implies that migrants moving from urban areas to less urbanised areas will conform to fertility levels in the less urbanised area.
Similarly, if the dominant fertility theory is Selection, the results will show a difference between migrants and their non-moving counterparts, since the migrants are a specific subset of the population who already have norms and values and, in turn, fertility desires more closely related to the receiving area. In the event that these migrants move to a more urbanised area, this would entail that before the move they already showcased fertility desires that closely align with urban fertility desire levels. In turn, as seen in the literature, moves from urban areas to more rural areas often occur due to a fertility desire more aligned with the more rural areas.
If the dominant fertility pattern in Spain is the Socialisation theory, this would be visible by the lack of significant fertility difference between migrants and non-migrants from the same sending area. This is due to the norms and values with which the migrants grew up and which still dominate their fertility desires. In this case, when migrants move from urban to rural areas, they would still display fertility patterns similar to urban dwellers who haven't moved, and vice versa.
The last theory, Disruption theory, would show itself as the dominant theory if there is a general lower fertility rate for migrants as compared to non-migrants, due to the strains and social impacts of the move itself. Furthermore, the mean age at first birth would be significantly higher for migrants than for non-migrants, due to the disruption right after their migration and the time needed to fully settle in. This theory might also be closely linked with the Selection theory and the Adaptation theory, making it difficult to distinguish between the dominant theories.

Expected Migrant Fertility per Dominant Theory	
Adaptation	**Migrant fertility similar to receiving area**
Selection	**Migrant fertility similar to receiving area**
Socialisation	**Migrant fertility similar to sending area**
Disruption	**Migrant fertility lower than non-movers**

Table 1: Expected outcome per dominant fertility theory

Conceptual model

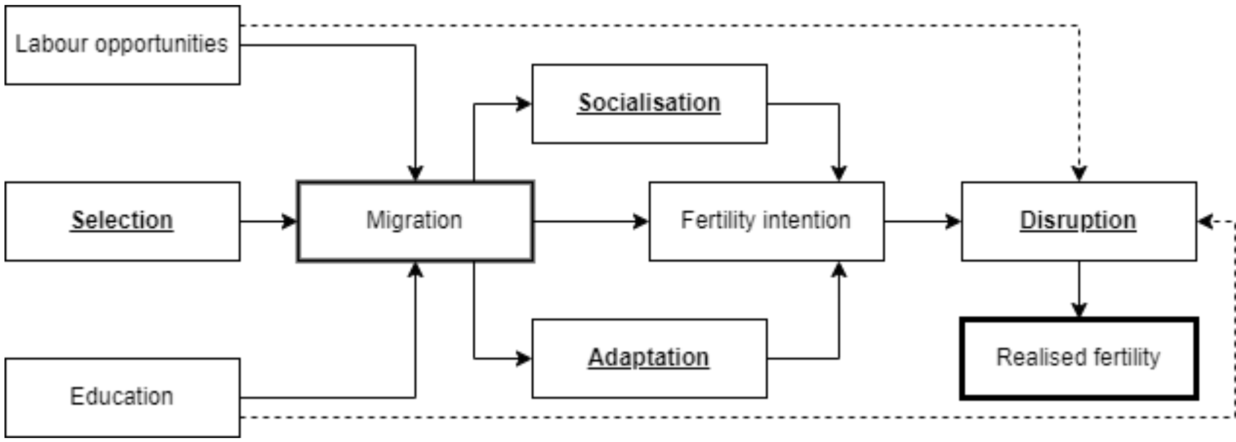

Figure 1: Conceptual model

The conceptual model (figure 1) shows the main hypotheses as to why people migrate. The three reasons mentioned in the literature which impact the initial drive to migrate most are visualised. Many migrants move for educational purposes, in addition to a large part of migrations happening due to better job opportunities when one migrates. The last reason to migrate lines up with one of the migrant fertility theories, the Selection theory. Due to having a different fertility intention than their peers in the place they live, they have more incentive to migrate to a place that showcases similar fertility patterns as the fertility intention they show. After migration occurs, three things can happen. The literature shows that people either adapt to the fertility level of the receiving region, they already possess the fertility level of the receiving region which is due to their selection, or they remain at the fertility level of the region where they migrated from, and maintain the fertility intention they learned in their youth (socialisation). Furthermore, the literature shows that even though people might have the intention to have more children, the disruption that occurs has an impact on the eventual realised fertility of the migrant. The arrows indicating the connection between education and labour opportunities and disruption are meant to showcase the fact that in the literature those two factors are often mentioned not only as a driver of migration but also as some of the main factors that contribute to fertility disruption, particularly right after the migration occurs. Overall, the literature shows that these theories do not exclude one another fully and tend to go hand in hand, meaning that someone who might want to have more children due to their norms and values (socialisation) might not reach their full fertility intention at the end of their reproductive age due to disruption.

Data and Methodology

The country of interest in this research is Spain because it is one of the countries with the lowest fertility rate in Europe. With a fertility rate nearing 1,2 in 2020 and with a low of 1,1 in 1998, research into this decline from almost 3 in 1960 may be beneficial in solving the country's demographic struggles (Worldbank, 2022). Therefore, this analysis considers fertility in Spain, specifically the difference between rural and urban fertility, with a focus on longitudinal aspects. IPUMS-International microdata, a dataset containing census data for several countries, will be used for the analysis. This data is made up of systematic samples of the original census data provided by the country's statistical agencies. The Spain data was collected from 1991 to 2011 in three censuses. The systematic stratified sampling done for the dataset provides a representative sample, taking 0,5% of the census in the years 1991 and 2001 and 1% in 2011. The dataset consists of several variables like number of children in household, migration history, current province of residence and several control variables. The variables are quantitative, meaning the analysis will be a quantitative model. The standardisation of the variables makes it possible to conduct longitudinal analysis, since the variables are formatted the same in all three census years.

The initial data set consists of 8.078.197 observations. However, this data must be transformed to fit the analysis, since there is a need to filter and recode. First, I created a variable that looks at the type of province that residents live in, in terms of urbanisation degree. For this I collected information from the Spanish Institute of Statistics (INE) on the total population sizes in 2011 and the area sizes of the provinces to calculate the density (see figure 2 and figure 3). The total population of the province divided by the size of the province equals the population density of the province, in this case people per square kilometre. There is a large disparity between urban-density provinces and rural-density provinces, ranging from 9 people per square kilometre in Soria all the way to 796 people per square kilometre in Madrid.

The dataset also contains information on two exclaves, Ceuta and Melina. These exclaves are disconnected from the mainland of Spain and are not official provinces of Spain, but rather special administrative zones. Seeing as they are small city exclaves and might skew the results, they will not be included in the analysis.

Having calculated this density, it is possible showcase what type of density province residents live in. Eurostat provides a rural-urban typology, where, using 1 km2 grid cells, they identified rural grid cells and urban grid cells. Within the Nuts-3 regions, which overlap with the Spanish provinces used in the dataset, there are three types of regions: predominantly urban region, where ≥ 80% lives in urban clusters, intermediate zone, where ≥ 50% to > 80% live in urban clusters and lastly predominantly rural region, where ≥ 50% live in rural grids cells. The Eurostat data from 2013 shows 12 predominantly rural provinces, 17 predominantly urban provinces and 23 moderately urbanised provinces. Using these labels, it is possible to determine who has moved from a highly urbanised province to an intermediate or rural-density province and vice-versa. This way we can create a variable that gives us the type of migration, i.e., rural to urban province, urban to urban province or intermediate to rural.

To get this type of migration variable, we combine the place of birth variable and the current province of residence variable. We can combine the type of migration variable with the year of

the census for an interaction variable to show both the year and the type of migration. This way we can analyse the difference between internal migrants and non-migrants and see if there is a difference between migrants in the year groups 1991, 2001 and 2011.
For further analysis we will also use the province of residence 10 years ago, in addition to the place of birth, to give us a different insight into migration. This variable gives an insight into whether people returned to their province of birth, with the province being different 10 years ago than it is now. Additionally, if the current- and birth provinces are the same, we can see a return-migration to the province of birth.

To ensure females have reached their full fertility patterns we filter out women younger than 40 and older than 45. Using the age group of 40 to 45-year-old women, eliminates the effects of non-realised fertility due to the temporal nature of the data. Some women in the data set are in their twenties and thirties, which means saying with certainty that they have reached their potential number of children is impossible. To ensure that the children still live at home, the cap is set at the age the 45, since most Spanish children do not leave their parental home before 27 (Eurostat, 2021). This leaves us with a total of 329.070 cases, of which 234.344 did not move, and 94.726 did. Of these, 6.468 are return migrants, which means that 10 years before, they did not live in the province they were born in *and* live in now.

Methods

Variables

Dependent variables

The main dependent variable is number of own children in household, which in theory equates to the number of children a woman has had in her lifetime. When looking at alternatives for this variable, such as children born, problems arise in the availability of data. For children born, in the sample years 2001 and 2011 no data was collected, whereas the number of own children in household variable was collected for three consecutive censuses.

Further analysis can be conducted on the variable age at first birth, which is generated using the variable age and the variable age of oldest child. If you subtract the age of the oldest child from the age of the mother you will find the age at first birth.

Independent Variables

The first variable to look at is the generated variable that shows if someone migrated. This variable is constructed from the variable bples (province of birth) and the variable current province of residence. This gives us the variable Moved, also including the variable province of residence 10 years ago, to check for return migration.

The most important factor of the migration is the type of migration. To do this we take the rural-urban typology and implement this for both the birthplace province and current residence province. By crossing these two variables 9 options for migration types, i.e., rural-intermediate, urban-rural, etc. show up. These categories give an insight into the migration patterns, as well as, when combined with the variable Moved, migration between two provinces with the same type of typology.

Contextual independent variables

A variable that can impact fertility patterns is education level, which in this dataset is defined by 6 categories, less than primary, primary, lower secondary, upper secondary, post-secondary non-tertiary and university completed.

Another is labour force participation, which in this case is described as simply yes or no. This variable can be interesting for both seeing the impact it has on fertility and its relationship with the changing dynamic of females in the labour force in Spain resulting from the changing norms and values after the 1970s.

The last contextual variable is the marital status variable, which looks at the relationship status of the participant. These consist of single/never married, married/in union, separated/divorced/spouse absent and widowed. This variable is important for looking into divorce and the importance of marriage on fertility, as literature shows that with a higher divorce rate and in turn a higher risk of divorce/uncertainty the number of children generally declines.

Controlling for variable Number of own children in the household compared to children born.

1991	Comparing Variables			
		Observations	Mean	Standard deviation
	Children Born	62,855	2.50	1.27
	Number of children in household	62,855	3.38	1.19

T-Test	Comparing to Number of children in the household				
	Coefficient	Standard error	Probability P > |t|	95% Confidence interval	
Children born	0.805	0.002	0.000	0.801	0.808
constant	0.363	0.005	0.000	0.353	0.374

Table 2: Difference between variable children born ever and number of own children in household for 1991

A paired t-test was conducted on the variables number of own children in the household and number of children born to determine if there is a statistically significant mean difference. The variable number of own children in the household (2.38) is lower than the variable children born (2.51); a significant difference of 0.12, which is about 5 percent.

This difference might be due to mortality within the child's lifetime, meaning that not all children recorded for the children born survive to the recording point used for the census. The UN World Population Projection gives an l(x) of 98 104 out of 100 000 in 1991, at the age of 25. This means that mortality already accounts for almost 2% of the difference between the two variables (WPP, 2022).

An extra point of difference might be the number of children that have moved out of their parental home and thus are not recorded in the number of children in household. Within the age group 15-19 nearly a 100% of children live in the parental home, with this number dropping down to 90% in the age group 20-24 (Ayllón, 2009). With most children being below 20 years old (owing to the age of the woman in the dataset being between 40 and 45, and the mean age at first birth being 25 in 1991) it is possible to conclude that most children are part of the age group of 15-19 or younger. However, the few children that are not might contribute to the difference in the two variables.

Given the available data and the relatively small difference between the two variables (around 5%) the analysis can be conducted with the number of children variable, keeping in mind that this might be slightly lower than the children born variable would be if available.

Recoding

When analysing the impact of migration on fertility, it is essential to minimize the external factors that might contribute to fertility changes. For this analysis that entails limiting the number of categorical differences, such as in the contextual variable of marital status. When analysing, the choice is made to only consider the cases which are either married or divorced, since this effect is most important for the findings. The categories never married and widowed are thus scrapped in the analysis. A further change that is made is the simplification of the educational variable, recoding this variable into three categories, lower, moderate and higher education (less than primary and primary are recoded to lower education, lower secondary and upper secondary to moderate education and post-secondary non tertiary and university to higher educated.) This way the analysis will be less convoluted and more focused on the essential difference migration makes.

Model Design

For this type of analysis, a Poisson regression is used, where the dependent variable is number of children. This model allows us to look at multiple variables independent impact on the number of children in the household. The use of the Poisson model is due to the fact that the dependent variable is nonnegative count data, and it is assumed that the events are independent of one another and cannot occur at the same time.

In addition to looking at the dependent variable number of own children in the household, the analysis will also focus on the variable age at first birth.

For the comparison between the migration types and their sending region, three models have to be made. This is so migration types are only compared to non-migrants in their sending region, not all non-migrants in the period.

To not only compare with the sending region, but with the receiving region as well, a further three models per year have to be made. This is done in a similar manner to the sending region, by filtering for just the receiving region type.

Descriptive statistics

Year	Migrants by sending region			
		Rural	Intermediate	Urban
	1991	62	44	18
	2001	52	38	18
	2011	28	23	20

Table 3: Percentage of migrants per density type and year, as a percentage of the total population

Table 3 shows a shift in migration patterns, with 62% of people in rural density regions migrating in their lifetime in 1991 and 28% of people in rural density regions in 2011 migrating. At the same time, in the intermediate group the number of migrants changed from 55% of the initial population in 1991 to 77% in 2011. In the urban density region, a reverse trend is shown, where the percentage of migrants changed from 18% in 1991 to 20% in 2011.

1991	Sending			
		Rural	Intermediate	Urban
Receiving	Rural	2.1	1.4	0.9
	Intermediate	11.3	8.2	4.0
	Urban	48.4	33.9	13.2
	Total	61.8	43.5	18.1

2001	Sending			
		Rural	Intermediate	Urban
Receiving	Rural	2.4	1.8	1.3
	Intermediate	11.3	8.4	5.2
	Urban	37.8	27.6	11.1
	Total	51.5	37.8	17.6

2011	Sending			
		Rural	Intermediate	Urban
Receiving	Rural	3.1	2.6	4.0
	Intermediate	8.7	7.2	7.8
	Urban	15.6	13.1	7.8
	Total	27.4	22.9	19.6

Table 4: Percentage of migrants per migration type, as a percentage of the total sending population in each density type in 1991, 2001 and 2011

Table 4 shows the relative numbers of migrants, with the percentages shown being the percentage of all migrants for that category out of all people in the sending regions separately in

that sample year. So, for example, in 1991, 48,4% of all rural dwellers migrated to an urban region. The shift in percentages of migrants who migrate from rural to urban areas is particularly striking, as it decreases from 48,4% of the total rural-density population (in 1991) down to 15,6% of the total rural density population (in 2011).
Conversely, the percentage of people migrating from urban to intermediate areas goes up, from 4% up to 7,8% of the total urban region population in their respective years.
Another initial finding is the migration number from the urban to the rural provinces, going from 0,9% in 1991 to 3,97% in 2011. These findings line up with the findings in the literature, which indicated that particularly in the 1980s there was a larger migration from rural to urban provinces, due to rapid modernization and need for skilled labour in dense areas. This increase in migration away from the city that happened from the 1990s on is also described, with a reversal in regions that receive and regions that send during that time.

1991	Sending			
		Rural	Intermediate	Urban
Receiving	Rural	382	-432	-4624
	Intermediate	432	2405	-9336
	Urban	4.624	9336	3.919

2001	Sending			
		Rural	Intermediate	Urban
Receiving	Rural	400	-216	-3.317
	Intermediate	216	2.619	-7148
	Urban	3.317	7.148	4.560

2011	Sending			
		Rural	Intermediate	Urban
Receiving	Rural	805	370	502
	Intermediate	-370	4.098	-1.140
	Urban	-502	1.140	7.404

Table 5: Net migration in 1991, 2001 and 2011

A shift in net migration patterns occurs (table 5), where a net negative migration from rural areas towards urban areas in 2001 gets reversed, meaning more urban migrants move to rural areas than the other way around in 2011. Other types of migration, like rural to intermediate and intermediate to intermediate, remained almost the same between the different years. For the migration to the same typological regions, for example rural to rural, the overall number of migrants is given. This is because there is no net migration, as in and out migration is the same migration.

1991	Sending			
		Rural	Intermediate	Urban
Receiving	Rural	0.05	0.03	0.02
	Intermediate	0.27	0.20	0.09
	Urban	1.14	0.83	0.32

2001	Sending			
		Rural	Intermediate	Urban
Receiving	Rural	0.05	0.04	0.03
	Intermediate	0.26	0.20	0.12
	Urban	0.89	0.65	0.26

2011	Sending			
		Rural	Intermediate	Urban
Receiving	Rural	0.07	0.06	0.09
	Intermediate	0.20	0.17	0.18
	Urban	0.37	0.31	0.18

*Table 6: Migration rate per year in percentages for 1991, 2001 and 2011 (migration/ total starting population in sending region * 100/ person years lived)*

Table 6 shows the migration probability. The annual migration rate is defined as migration divided by the total starting population in the sending region and by the average number of person years lived. In the dataset, all cases have an age between 40 and 45, leaving an average number of person years lived of 42,5 years. Table 6 shows similar results to table 4, however the yearly probability shows the yearly probability that any given individual in the sending regions migrates to any receiving region.
Where urban dwellers had a relatively high rate to migrate to other urban provinces, this has decreased. Meanwhile, the rate of migration to intermediate and especially rural regions has increased from 1991 to 2011. The reverse trend is visible in the other rural dwellers group, with the rate of migrating to a region with a similar rural density type has increased and the probability to migrate to urban regions has decreased between 1991 and 2011. Intermediate dwellers have a lower probability to migrate to another intermediate region and a lower probability to migrate to an urban area. They do however have a higher probability to migrate to a rural region.

Number of children in the household variable
Descriptive statistics

Year	Number of own children in household			
		Observations	Mean	Standard deviation
	1991	70,654	2.190	1.314
	2001	84,203	1.627	1.050
	2011	173,411	1.32	0.960
	Total	328,268		

Table 7: Descriptive statistics variable number of own children in household

1991	Sending				
Receiving		Non-Migrant	Rural	Intermediate	Urban
	Non- Migrant		2.29	2.40	2.42
	Rural	2.29	2.19	2.53	2.21
	Intermediate	2.40	2.24	2.41	2.42
	Urban	2.42	2.25	2.34	2.42

2001	Sending				
Receiving		Non-Migrant	Rural	Intermediate	Urban
	Non-Migrant		1.77	1.86	1.83
	Rural	1.77	1.85	1.84	1.80
	Intermediate	1.86	1.71	1.81	1.78
	Urban	1.83	1.733	1.78	1.82

2011	Sending				
Receiving		Non-Migrant	Rural	Intermediate	Urban
	Non-Migrant		1.52	1.53	1.54
	Rural	1.52	1.44	1.50	1.51
	Intermediate	1.53	1.48	1.53	1.52
	Urban	1.54	1.52	1.49	1.54

Table 8: Mean number of children per migration type in 1991, 2001 and 2011, with green indicating a higher fertility, yellow a higher fertility than the receiving and a similar fertility to the sending region or Socialisation. purple indicates a fertility level lower than the receiving region and similar to the sending region or Socialisation and red showcasing a fertility level lower than both sending and receiving or Disruption. Blue indicates a fertility level lower than the sending and higher than the receiving region, which can point to Adaptation.

When looking at the comparison between sending and migrant fertility (Table 8), there seems to be a negative correlation between fertility and migration. With the exception of a few migration types, most fertility rates are lower than the non-moving counterpart. Migrants moving from intermediate-to-rural density areas in 1991 showcase the biggest positive fertility pattern, going from 2,4 for non-moving to 2,53 children in the intermediate-to-rural migrant group. Together with migrants from intermediate-to-intermediate in 1991, they are the two categories in that year that display a higher fertility than both sending and receiving non-migrants. The only other non-negative fertility means are urban to intermediate and urban to urban, with urban to intermediate displaying the same fertility as the sending region non-migrants and a higher mean than the receiving area of intermediate.
Migrants moving from rural-to-rural in the 2001 population show the biggest positive variation from their non-moving counterparts that year, with a mean of 1,85 compared to 1,77 respectively. The migrant population in 2001 showcases the most negative fertility differences between migration types and non-migrant groups, with only one positive difference. Two other exemptions to this are the categories intermediate-to-rural and urban-to-rural. These categories have a mean that is lower than the sending region, and higher than the receiving area.
The 2011 population showcases no positive fertility differences, but also has two cases of no difference between migrant groups and non-migrants in the intermediate-to-intermediate group and the urban-to-urban group. The only other group that differs is the rural-to-urban group with the same mean as the sending region and a lower mean than the receiving region. The switch from several positive changes in 1991 to few in 2001 and none in 2011 can be an early indication of a change in what migrant fertility pattern is dominant over time.

In 1991, five out of nine migrant groups had a lower mean number of children than both sending- and receiving regions, which can be an indicator of the disruption theory. Another theory that might be at play in 1991 is Socialisation, with migrants from urban-to-intermediate having the same mean as the sending region and higher than the receiving region.
In 2001, Disruption seems to be the dominant hypothesis. Six out of nine means are lower than either the sending or the receiving mean. Interesting in this year are mainly the categories intermediate-to-rural and urban-to-rural, with both having a slightly lower mean than their respective sending region and a higher mean than the receiving region of rural. This can point to the Socialisation hypothesis being present in combination with impact from, for example, Disruption, or slight adaptation to the fertility patterns in the receiving area.
In 2011, the differences between the non-migrants in the different regions is minimal, differing 0,02 between the highest and the lowest. While six out of nine regions have lower fertility means than both sending and receiving regions, the difference with the non-migrants is small. Based on the results, the Disruption hypothesis seems the most dominant.

Education Level

In the descriptive statistics stage a further investigation was conducted into the impact of different education levels on the number of children in the household (see appendix tables 30-32). By separating the three year groups into further smaller groups divided by education level it is visible that, while the education does provide a difference between the different education level groups, there is not a large difference in pattern for the variable number of children. When comparing table 7 to the separated tables per education level, they are not dissimilar. Furthermore, the separation between the educational levels also decreases the number of cases per migration type, decreasing the validity of the results.

Model statistics

Model Results	Migration Type	Coefficients	Standard error	Significance
1991	Rural-Rural	-0.047	0.049	0.334
Rural density	Rural-Intermediate	-0.026	0.023	0.267
Sending	Rural-Urban	-0.020	0.014	0.177
1991	Rural-Rural	-0.047	0.049	0.334
Rural Density	**Intermediate-Rural**	**0.099**	**0.033**	**0.003**
Receiving	Urban-Rural	-0.034	0.044	0.430
1991	Intermediate-Rural	0.055	0.031	0.084
Intermediate density	Intermediate-Intermediate	0.003	0.014	0.795
Sending	**Intermediate-Urban**	**-0.024**	**0.008**	**0.004**
1991	**Rural-Intermediate**	**-0.070**	**0.021**	**0.001**
Intermediate density	Intermediate-Intermediate	0.003	0.014	0.795
Receiving	Urban-Intermediate	0.031	0.020	0.120
1991	**Urban-Rural**	**-0.088**	**0.042**	**0.040**
Urban Density	Urban-Intermediate	0.022	0.019	0.261
Sending	Urban-Urban	0.001	0.011	0.891
1991	**Rural-Urban**	**-0.073**	**0.011**	**0.000**
Urban Density	**Intermediate-Urban**	**-0.033**	**0.008**	**0.000**
receiving	Urban-Urban	0.002	0.011	0.891

Table 9: Results of Poisson regressions for number of children in the household by migration type, compared to their sending and receiving region non-migrants in 1991. Blue represents support for Adaptation hypothesis, yellow represents support for Socialisation hypothesis and red represents support for Disruption hypothesis.

Table 9 gives us the combined results of the Poisson regressions per year and sending and receiving regions (see appendix tables 17 and 18) for 1991. The results give us two negative significant coefficients compared to sending regions. The coefficients being negative means that these two out of nine migration types have a significantly lower number of children than their sending region.

Comparing both sending and receiving models, urban to rural has a lower fertility than the sending area but not a significantly different fertility than the receiving area, pointing to a possible Adaptation. Intermediate to urban has a lower fertility than both the sending and the receiving regions which might point to Disruption.

The rural to intermediate migration type and rural to urban migration type have a fertility that is not significantly different from the sending area but significantly lower than the receiving, which might point to Socialisation being dominant.
The one outlier is the intermediate to rural migration group in comparison to the rural receiving region, which is significant and has a positive coefficient. The corresponding comparison to the sending region is not significant, which could point to Socialisation being dominant.

Model Results	**Migration Type**	**Coefficients**	**Standard error**	**Significance**
2001	Rural-Rural	0.046	0.051	0.367
Rural density	Rural-Intermediate	-0.032	0.026	0.225
Sending	Rural-Urban	-0.018	0.017	0.295
2001	Rural-Rural	0.046	0.051	0.367
Rural Density	Intermediate-Rural	0.041	0.033	0.220
Receiving	Urban-Rural	0.017	0.036	0.627
2001	Intermediate-Rural	-0.011	0.032	0.733
Intermediate density	Intermediate-Intermediate	-0.028	0.016	0.073
Sending	**Intermediate-Urban**	**-0.043**	**0.010**	**0.000**
2001	**Rural-Intermediate**	**-0.085**	**0.024**	**0.001**
Intermediate density	Intermediate-Intermediate	-0.028	0.016	0.073
Receiving	**Urban-Intermediate**	**-0.042**	**0.018**	**0.022**
2001	Urban-Rural	-0.020	0.035	0.564
Urban Density	Urban-Intermediate	-0.027	0.018	0.131
Sending	Urban-Urban	-0.003	0.012	0.815
2001	**Rural-Urban**	**-0.056**	**0.013**	**0.000**
Urban Density	**Intermediate-Urban**	**-0.028**	**0.009**	**0.003**
receiving	Urban-Urban	-0.002	0.012	0.815

Table 10: Results of Poisson regressions for number of children in the household by migration type, compared to their sending and receiving region non-migrants in 2001. Yellow represents support for Socialisation hypothesis and red represents support for Disruption hypothesis.

Table 10 gives us the combined results of the Poisson regressions per year and sending and receiving regions (see appendix tables 19 and 20) for 2001. In the model comparison to sending regions, one significant result can be found. Intermediate to urban migrant fertility has a negative coefficient, and when looking at this group compared to the receiving region, the results show another negative significant result. This can point to the Disruption hypothesis being applicable, since they have lower fertility than both sending and receiving non-migrant counterparts.
Further significant results are visible in the groups comparing against receiving regions. Rural to intermediate and rural to urban migrant groups display significant results, both negative. Since these are both compared to the receiving region and these groups have no significant difference from their sending regions these results might point to a Socialisation hypothesis, since they

have fertilities that are akin to their sending regions and lower than the receiving. The descriptive statistics show that the sending regions of these two groups have a lower mean number of children than the receiving.
The last significant result is the urban to intermediate migrant group. This group has a negative coefficient, however the sending region of urban has a higher mean number of children than the receiving intermediate. With this in mind, the suspected dominant hypothesis for this group might be a Disruption in fertility.

Model Results	**Migration Type**	**Coefficients**	**Standard error**	**Significance**
2011	Rural-Rural	-0.053	0.037	0.160
Rural density	Rural-Intermediate	-0.029	0.023	0.290
Sending	Rural-Urban	-0.001	0.017	0.913
2011	Rural-Rural	-0.053	0.037	0.160
Rural Density	Intermediate-Rural	-0.014	0.023	0.546
Receiving	Urban-Rural	-0.005	0.016	0.772
2011	Intermediate-Rural	-0.019	0.023	0.386
Intermediate density	Intermediate-Intermediate	0.001	0.014	0.955
Sending	**Intermediate-Urban**	**-0.027**	**0.011**	**0.012**
2011	Rural-Intermediate	-0.034	0.022	0.121
Intermediate density	Intermediate-Intermediate	0.001	0.014	0.955
Receiving	Urban-Intermediate	-0.003	0.011	0.753
2011	Urban-Rural	-0.017	0.015	0.252
Urban Density	Urban-Intermediate	-0.010	0.011	0.336
Sending	Urban-Urban	-0.000	0.011	0.971
2011	Rural-Urban	-0.015	0.016	0.378
Urban Density	**Intermediate-Urban**	**-0.035**	**0.011**	**0.001**
receiving	Urban-Urban	-0.000	0.011	0.971

Table 11: Results of Poisson regressions for number of children in the household by migration type, compared to their sending and receiving region non-migrants in 2011. Red represents support for the Disruption hypothesis.

Table 11 gives us the combined results of the Poisson regressions per year and sending and receiving regions (see appendix tables 21 and 22) for 2011. Compared to the number of significant results in previous years, the model for 2011 has only one. Migrants in the intermediate to urban migration group have a significantly lower number of own children in the household, compared to the receiving urban region’s non-migrant group. With the intermediate to urban group also having a significantly different number of children compared to the sending intermediate region’s non-migrant the Dominant hypothesis appears to be disruption.

Interestingly, the intermediate to urban migrant group has a significantly lower number of children than both their sending and receiving regions in all three-year groups, highlighting a longitudinal trend in migrant fertility.

Conclusion based on the variable number of children in the household.

Descriptive statistics

Descriptive statistics on the variable number of children in the household provide a first assessment on the fertility patterns between migrant groups. While the descriptive statistics show several hypotheses, such as Socialisation and Adaptation, the most prominent is Disruption. A further conclusion derived from the descriptive statistics is the fact that while there are differences between non-migrants and migration groups, this difference is rather small and gets smaller over time. The analysis on the education variable to discern further between migrant groups largely showcased the same patterns. Additionally, separating by education level diminished the number of cases per migrant group, making the results unreliable to conduct research on.

Model statistics

Based on the results from the regressions on the number of children in the household for the years 1991, 2001 and 2011, several patterns and hypotheses regarding internal migrant fertility emerge.

In 1991, three separate fertility hypotheses emerge, notably the Disruption, Adaptation and Socialisation hypotheses are visible in the model results.

In 2001, the number of visible fertility hypotheses dropped to two, with support for Disruption and Socialisation.

The Poisson regression in 2011 showcases the same longitudinal trend of Disruption in the intermediate to urban migrant group, a trend that is visible in all three models. However, no other migrant groups have a significant difference from either their sending or receiving regions. This may be explained by the overall smaller differences between migrant groups and their non-migrant peers seen in the descriptive statistics.

Conclusion

Overall, the results show a nuanced relationship between different migration types and fertility. While in earlier years evidence that supports the Socialisation and Adaptation fertility hypotheses emerges, over time the dominant fertility hypothesis that emerges is the Disruption hypothesis, especially for the intermediate to urban migrant group. Additionally, the diminishing number of significant results over time might point to a longitudinal trend towards less migratory impact on fertility.

Age at first birth variable
Descriptive statistics

1991		Sending			
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		25.45	25.22	25.34
	Rural	25.45	25.93	25.17	25.97
	Intermediate	25.22	25.38	25.07	25.28
	Urban	25.34	25.83	25.42	25.28

2001		Sending			
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		25.60	25.35	25.81
	Rural	25.60	25.82	25.66	26.48
	Intermediate	25.35	25.98	25.76	26.09
	Urban	25.81	26.18	25.71	25.96

2011		Sending			
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		27.33	27.60	28.73
	Rural	27.33	27.86	28.45	28.13
	Intermediate	27.60	28.95	28.76	28.70
	Urban	28.73	29.52	29.29	29.35

Table 12: Mean age at first birth of migrants compared to the sending region, with green representing a higher age at first birth than both the sending and receiving region (Disruption). and red representing a lower age at first birth than both the sending and receiving regions. Brown indicates a higher mean age at first birth than the sending region and a lower mean age at first birth than the receiving region (Adaptation). Blue indicates a higher mean age at first birth than the receiving region but a lower mean age at first birth than the sending region (Adaptation).

Table 12 shows the mean age at first birth for the migration groups. The colours provide an overview of the which fertility hypothesis is most likely based on sending and receiving regions age at first birth. Yellow means a lower age at first birth than the sending and a higher age then the receiving, pointing to at least partial adaptation or selection to the receiving region. Green points to a higher age than both regions, pointing to a later fertility pattern, or disruption. Brown corresponds with a higher age than the sending but a lower age than the receiving. This can point to at least a partial Adaptation. As the three tables show, for all years the most common hypothesis is Disruption, with four out of nine in 1991, eight out of nine in 2001 and seven out of nine in 2011.

In 1991, two cases also point to Adaptation, namely the rural to intermediate group and the urban to intermediate group. Intriguingly, there are also two cases where the age at first birth is lower than both the sending and receiving region. This could possibly point to the Selection hypothesis, where people migrate specifically because of their fertility intention. It might also be the case that since the ages between the groups are rather small the differences are arbitrary and not significant, since these two groups do not have an age that is far removed from the sending and receiving regions anyways.
In 2001, the intermediate to high group is the one outlier, where the mean age is lower than the receiving area and higher than the sending. This points to an Adaptation hypothesis being dominant.
In 2011, the two outliers, urban-rural and urban-intermediate represent a different type of Adaptation, where they are adapting to an lower age at first birth in the receiving region as compared to their sending region, instead of adapting up.

Education variable

With regards to the variable education in age at first birth, a bigger difference is visible in and between the different years in the tables (see appendix tables 32-34). Where the tables above (table 12) give a one-sided story, with most migrants having a higher age at first birth than their non-migrant counterparts, a more varied result can be seen in the separated tables by education level. Not least in absolute numbers, with difference in age as large as 25 to 32 in 2011 between lower educated and higher educated migrants. However, while there is a large numerical difference, the patterns between the different education groups are relatively similar. Furthermore, given the separation between the educational levels also decreases the number of cases per migration type, decreasing the test’s significance.

Model statistics

Model Results	Migration Type	Coefficients	Standard error	Significance
1991	Rural-Rural	0.477	0.279	0.087
Rural density	Rural-Intermediate	-0.070	0.135	0.602
Sending	**Rural-Urban**	**0.373**	**0.087**	**0.000**
1991	Rural-Rural	0.477	0.288	0.098
Rural Density	Intermediate-Rural	-0.286	0.208	0.168
Receiving	**Urban-Rural**	**0.518**	**0.264**	**0.050**
1991	Intermediate-Rural	-0.053	0.198	0.789
Intermediate density	Intermediate-Intermediate	-0.148	0.086	0.086
Sending	**Intermediate-Urban**	**0.200**	**0.051**	**0.000**
1991	Rural-Intermediate	0.163	0.126	0.198
Intermediate density	Intermediate-Intermediate	-0.148	0.087	0.088
Receiving	Urban-Intermediate	0.056	0.125	0.653
1991	**Urban-Rural**	**0.637**	**0.250**	**0.011**
Urban Density	Urban-Intermediate	-0.058	0.121	0.631
Sending	Urban-Urban	-0.058	0.070	0.405
1991	**Rural-Urban**	**0.491**	**0.063**	**0.000**
Urban Density	Intermediate-Urban	0.085	0.047	0.070
receiving	Urban-Urban	-0.058	0.069	0.404

Table 13: Results of regressions for age at first birth by migration type, compared to their sending and receiving region non-migrants in 1991. Green represents support for the Disruption hypothesis and blue represents support for the Adaptation hypothesis.

Table 13 gives us the combined results of the age at first birth regressions per year and sending and receiving regions (see appendix tables 23 and 24) for 1991. When looking at the results of the regressions for age at first birth, a significant difference is visible. In 1991, 5 of the migrant groups had a significantly different age at the first birth. All of these instances were positive, meaning a higher age than the sending or receiving region they are compared to. In two cases the group is higher than both the receiving and sending region. This could point to the Disruption hypothesis being dominant for the groups rural to urban and urban to rural. The other category that is significant, intermediate to urban, is only significantly higher than the sending region. This could point to the Adaptation hypothesis.

Model Results	Migration Type	Coefficients	Standard error	Significance
2001	Rural-Rural	0.223	0.349	0.524
Rural density	**Rural-Intermediate**	**0.388**	**0.172**	**0.025**
Sending	**Rural-Urban**	**0.587**	**0.113**	**0.000**
2001	Rural-Rural	0.223	0.345	0.519
Rural Density	Intermediate-Rural	0.066	0.225	0.768
Receiving	**Urban-Rural**	**0.879**	**0.238**	**0.000**
2001	Intermediate-Rural	0.310	0.219	0.157
Intermediate density	**Intermediate-Intermediate**	**0.411**	**0.106**	**0.000**
Sending	**Intermediate-Urban**	**0.360**	**0.0664**	**0.000**
2001	**Rural-Intermediate**	**0.632**	**0.161**	**0.000**
Intermediate density	**Intermediate-Intermediate**	**0.411**	**0.106**	**0.000**
Receiving	**Urban-Intermediate**	**0.735**	**0.124**	**0.000**
2001	**Urban-Rural**	**0.662**	**0.236**	**0.005**
Urban Density	**Urban-Intermediate**	**0.273**	**0.124**	**0.028**
Sending	Urban-Urban	0.146	0.086	0.092
2001	**Rural-Urban**	**0.370**	**0.091**	**0.000**
Urban Density	Intermediate-Urban	-0.101	0.063	0.110
receiving	Urban-Urban	0.146	0.086	0.091

Table 14: Results of regressions for age at first birth by migration type, compared to their sending and receiving region non-migrants in 2001. Green represents support for the Disruption hypothesis and blue represents support for the Adaptation hypothesis.

Table 14 gives us the combined results of the age at first birth regressions per year and sending and receiving regions (see appendix tables 25 and 26) for 2001.
For 2001, an increase in significant results is visible. 11 migration types have a significant difference from the corresponding non-migrant group. Ten of these significant results are for five of the migrant groups, meaning these five are significantly different from both their sending and their receiving region. With all these results being positive, there is strong evidence that supports Disruption, or a delay in fertility.

The one exception to this is the intermediate to urban migration group, which is only significant compared to the sending group, and not significantly different from the receiving group. With this we might be able to see an Adaptation or Selection hypothesis being dominant.

Model Results	Migration Type	Coefficients	Standard error	Significance
2011 Rural density Sending	Rural-Rural	0.534	0.324	0.100
	Rural-Intermediate	**1.621**	**0.201**	**0.000**
	Rural-Urban	**2.196**	**0.154**	**0.000**
2011 Rural Density Receiving	Rural-Rural	0.534	0.326	0.102
	Intermediate-Rural	**1.122**	**0.208**	**0.000**
	Urban-Rural	**0.800**	**0.146**	**0.000**
2011 Intermediate density Sending	**Intermediate-Rural**	**0.848**	**0.202**	**0.000**
	Intermediate-Intermediate	**1.156**	**0.124**	**0.000**
	Intermediate-Urban	**1.686**	**0.096**	**0.000**
2011 Intermediate density Receiving	**Rural-Intermediate**	**1.347**	**0.196**	**0.000**
	Intermediate-Intermediate	**1.156**	**0.124**	**0.000**
	Urban-Intermediate	**1.105**	**0.101**	**0.000**
2011 Urban Density Sending	**Urban-Rural**	**-0.599**	**0.129**	**0.000**
	Urban-Intermediate	-0.021	0.094	0.822
	Urban-Urban	**0.625**	**0.094**	**0.000**
2011 Urban Density receiving	**Rural-Urban**	**0.796**	**0.138**	**0.000**
	Intermediate-Urban	**0.560**	**0.089**	**0.000**
	Urban-Urban	**0.625**	**0.094**	**0.000**

Table 15: Results of regressions for age at first birth by migration type, compared to their sending and receiving region non-migrants in 2011. Green represents support for the Disruption hypothesis and blue represents support for the Adaptation hypothesis.

Table 15 gives us the combined results of the age at first birth regressions per year and sending and receiving regions (See appendix: table 27 and 28) for 2011.
In 2011, this number of significant results only increases, with 15 significant results. Interesting in this year is the age at first birth of the urban to rural migrant group compared to the urban density non-migrant group. This being negative, meaning a younger age at first birth, which might be an indication of Adaptation. In the descriptive statistics (table 12), the rural density non-migrant population has a lower age at first birth than the urban density non-migrant group, lining up with the negative coefficient seen in the urban to rural migrant group.

Additionally, the rural to rural migrants are the only migrant group to not display a difference in age at first birth compared to their non-migrant counterparts, a trend we see in all three years.

Conclusions on the age at first birth variable

Descriptive statistics

Table 12 provides a visualisation of potential fertility hypothesis that can be discerned from the variable age at first birth. The most prominent hypothesis is the Disruption hypothesis, with few other hypotheses being visible at first glance. In 1991, support for Adaptation is visible as well as migrant groups who have lower ages at first birth than both their sending and receiving region non-migrants. The overall variance between migrants and non-migrants as well as between different density regions is rather small however, which can explain the larger number of hypotheses visible. In 2001 and 2011, the Disruption hypothesis emerges as the dominant hypothesis is most migrant groups, as well as the variance between groups growing. Once more, the education variable shows patterns that are akin to the non-separated variables, with the added problem of low case number making it unreliable to separate the groups for further analysis.

Model statistics

The regression analysis confirms the trend seen in the descriptive statistics, with Disruption being the dominant fertility hypothesis in all model years. In 1991, the number of significant results is low, with two fertility hypotheses emerging out of the model (Adaptation and Disruption). In 2001, the number of significant results increases and so does the support for the Disruption hypothesis, with one result pointing to either the Adaptation or Selection hypothesis. A further increase in significant results in 2011 strengthens this longitudinal trend of the Disruption hypothesis being dominant.

Conclusion

The analysis showcases a longitudinal trend of Disruption in migrant fertility, with most migration types having a higher age at first birth than non-migrant counterparts of both the sending and receiving regions. Notable is the increase of significant results over time, with Disruption gaining more support in later years.

Overall, the Disruption hypothesis being dominant displays a persistent delay in childbearing in migrant groups in Spain when compared to non-migrants, with only sporadic instances of other hypotheses being dominant.

Conclusion

The answer to the main research question '*What migrant fertility hypothesis supports the Spanish context the best?'* is twofold.

In terms of the variable 'number of own children in the household', there is insufficient support for one hypothesis being dominant. While there are indications that in certain years some hypotheses might have a slight upper hand, most migration types do not differ significantly from the control group. Nonetheless, there is support for the decrease of differences in fertility over time. With time, the number of significant differences goes down; decreasing from six significant differences to as few as two differences in 2011. This might be due to the overall decreased level of fertility, leaving less room for differences between the migration types and the control group. A trend that prevails longitudinally is the Disruption hypothesis being dominant for migrants moving from intermediate to urban regions, with all years showcasing the same results for this migrant group.

The variable 'age at first birth' provides more support for the different fertility hypotheses. Where initially only a few significant differences show up, there are already a few migration types with a higher age at first birth than both their sending and receiving non-migrant counterparts. This points to a postponement in their fertility desire, indicating that migration itself—rather than the migration's destination or sending region—matters.
This number of significant results rises even further in 2001, as more migration types have higher ages at first birth than non-migrant counterparts in both the sending and receiving regions. Due to this even larger number of these significant differences the support for Disruption as the dominant hypothesis is stronger for 2001.
In 2011, the dominant hypothesis remains the Disruption hypothesis. With a majority of the results being significantly higher than both the sending and the receiving regions, there is a strong relationship between migrating and delaying the birth of the first child.

Combining both variable's results gives a conclusion that while interregional migration in Spain does cause a delay in fertility, the eventual number of children people is in many cases not significantly dissimilar to the non-migrant population in the sending and the receiving regions. The decline of number of children and increase of age at first birth over time do happen simultaneously, with all types of migration and non-migrant groups experiencing the same trend of decreasing fertility and increase of age at first birth over time.

Using these findings, several policies might be useful to implement into the Spanish context.

Policy recommendations

- **Youth employment programs**: Given the high youth unemployment and lack of funds because of this, an increasing number the number of young Spaniards are staying in their parental home. The lack of autonomy and the added financial stress due to uncertainty in the labour market decreases the fertility desire for many young people in Spain. One way to combat this low birth number and delay in fertility can be with employment schemes focussed on getting young adults to join the labour market. This would cause job security to increase and the fertility delay caused by unemployment might be lessened. With more job security, the delay seen in the research can be mitigated.

- **Social security programs**: The trend of pursuing higher education and a shift from non-skilled to skilled labour has decreased overall fertility levels and caused delays in fertility intentions, particularly in women since the 1980s. Due to the relative lack of social security measures concerning maternity leave and childcare costs, fertility often comes at both a financial- and labour marketability cost for mothers. Furthermore, choosing education or the labour market often leads to migration, causing a delay in fertility intentions. Ensuring that there is a comprehensive and extensive social security program that protects the work-life balance for young mothers can take away the necessity to choose between having a child and having a career. By specifically targeting interregional migrant mothers, the effects of migration on fertility can be limited. These programs can consist of cash boosts and improvement of public childcare, of which Spain currently provides little.
- **Regional development**: The results show that migration has an impact on the age at with people start to have children, meaning it would be beneficial to improve regions individually. By improving the living standard and job opportunities in less desirable regions it would incentivise young adults to remain in these regions, instead of migrating in search of job opportunities and education. With this lack of inter-regional migration less fertility disruption would occur since the migrant group would be smaller.
- **Housing Laws**: After the housing crisis in 2008, private renting skyrocketed and with demand the prices rose sharply. The relatively large private housing sector and small public housing sector meant private owners had a near monopoly. The high cost of renting means Spain now has the “highest housing cost overburden in Europe” (Molina, 2023). Comprehensive housing laws passed in 2023 should improve the public housing situation and provide more affordable housing. This in turn would limit the financial burden of renting on many young couples. Providing ample housing further alleviates the stress that often comes from migrating, and in turn limit disruption in the migrant’s life due to uncertainty and financial stress.
- **Fertility Education**: It would be beneficial to provide education on reproductive health and in particular the risks and implications of delaying childbirth. Further knowledge can be spread about existing family planning services and schemes and information can be provided on how to balance work ambition with family-building goals, particularly for families who have migrated and need to re-establish their social network (Balasch & Gratacós, 2012).

While the study gives a clear answer to several questions regarding fertility patterns of inter-regional migrants it would be beneficial to conduct more research that is adjacent to this subject or builds on the study. This future research could consist of studies such as:

- **Research between countries:** For further research it would be good to compare these conclusions with inter-regional migrants in other countries to see if this is representative for inter-regional migrants as a whole, or if these results are only applicable to the Spanish context.

- **Spanish Context:** Further research on Spain is recommended. Adding to the current longitudinal research by looking at new 2021 census data that will get published in due time can extend the current study and give results that are up to date.
- **Adding socio-economic factors:** While education did not provide a different view of the fertility patterns, it would be good to expand the research scope and include more different social and economic variables that might influence the fertility patterns in the Spanish context.
- **Policy Impact Assessment:** Over time, it would be good to conduct a policy impact assessment, to be conducted after policies aimed at fertility increase have been implemented.
- **Qualitative research on migrant desires:** Qualitative research looking into the factors that contribute to the fertility desires and timing of fertility for migrants and how they are affected by the migration can be beneficial to understanding what the underlying mechanisms that cause a delay in fertility in migrant groups are and what can be done to limit fertility decline and delay.

Limitations

The research's main limitation comes in the way of data availability, particularly having to do with the available variables that showcase fertility. With the variable 'children born' only being recorded in 1991, and it not being included in the censes conducted in years after, it is impossible to compare between years with this variable. This meant the variable 'number of children in the household' had to be used.

Furthermore, the age of the subjects in the dataset becomes a problem with this variable, since the number of children in the household goes down after a certain age. Children grow up and leave their parental home. This required a workaround to showcase the closest fertility compared to the actual fertility level, done by selecting only the cases of women between ages 40-45. This way most woman had fulfilled their reproductive desire and the children have not left the parental home in most cases. The problem with looking at completed fertility is that births happen on average 10 years prior to the census. This means the most recent data used, the 2011 census, looks at the period before 2011. Because of this, the data is not up to date and patterns that emerge might be outdated by the time they show up in the research. For the variable 'number of children' this is necessary, since the total realised fertility can only be measured after the fertility is completed. However, future research focussed on age at first birth might make use of women all ages, since this gives a more up to date view of the trends in fertility.

A further limitation that comes from data availability is the lack of recent data, with the IPUMS microdata dataset not having information beyond 2011 yet due to delays because of the Covid-19 pandemic.

References

Ayllón, S. (2009). Poverty and living arrangements among youth in Spain, 1980-2005. *Demographic Research.* 20. 10.4054/DemRes.2009.20.17.

Balasch J, Gratacós E. (2012) Delayed childbearing: effects on fertility and the outcome of pregnancy. *Curr Opin Obstet Gynecol.* 2012 Jun;24(3):187-93. doi: 10.1097/GCO.0b013e3283517908. PMID: 22450043.

Bätzing, W., Perlik, M., & Dekleva, M.,(1996) Urbanization and Depopulation in the Alps. *Mountain Research and Development , Nov., 1996, Vol. 16, No. 4, pp. 335-350* Published by: International Mountain Society

Beauchemin C. (2011) Rural-urban migration in West Africa: towards a reversal? Migration trends and economic situation in Burkina Faso and Côte d'Ivoire. *Popul Space Place*.;17:47–72

Bell, M., Charles-Edwards, E., Ueffing, P., Stillwell, J., Kupiszewski, M., & Kupiszewska, D. (2015). Internal Migration and Development: Comparing Migration Intensities Around the World. *Population and Development Review*, *41*(1), 33–58. http://www.jstor.org/stable/24639395

Bover, O,, & Velilla, P., (1999). Migrations in Spain: Historical Background and Current Trends. *Banco de España Servicio de Estudios, Documentos de Trabajo: 9909.*

Brahmi, A., Cossu, C., Nedjam M., (2019) Demographic transition in Sub-Saharan Africa. *Trésor-economics no. 242 august 2019 p.10*

Brockerhoff M. (1995) Fertility and family planning in African cites: the impact of female migration. *J Biosoc Sci.* Jul;27(3):347-58. doi: 10.1017/s0021932000022872. PMID: 7650052.

Burns, T. (1981) Spain passes divorce law after 40-year ban. *Washington post.* Available at: https://www.washingtonpost.com/archive/politics/1981/06/24/spain-passes-divorce-law-after-40-year-ban/50da980c-feb7-4350-a487-1c3654ffdc41/

Cabré, A. (2003), "Facts and Factors on low fertility in Southern Europe: the case of Spain". *Papers de Demografia*, 222https://ddd.uab.cat/pub/worpap/2003/222223/papdem_a2003n222.pdf

Calioli, A. (2022) Fertility trends and its determinants in Spain and Europe, *Thesis fully internal* (DIV) University of Groningen

Chattopadhyay, A., White, M. J., & Debpuur, C. (2006). Migrant fertility in Ghana: Selection versus adaptation and disruption as causal mechanisms. *Population Studies,* 60(2), 189–203. https://doi. org/10.1080/00324720600646287

Childs, G., Craig, S., Beall C.M., & Basnyat, B. (2014) Depopulating the Himalayan moderlands: Education and Outmigration From Ethnically Tibetan Communities of Nepal. *International Mountain Society (IMS)*

Chislett, W. (2022) Spain – A country in desperate need of children. *Real instituto Elcano.* Available at: https://www.realinstitutoelcano.org/en/blog/spain-a-country-in-pressing-need-of-children/

Coutinho, R. (2016). The transition to low fertility in Brazil. *PhD thesis*, University of North Carolina at Chapel Hill. https://core.ac.uk/reader/210 597355.

Dasgupta, A., Wheldon, M., Kantorová, V., Ueffing, P. (2022) Contraceptive use and fertility transitions: The distinctive experience of sub-Saharan Africa *Demographic researchvolume 46, article 4, pages 97130 published 12 january 2022* https://www.demographic-research.org/Volumes/Vol46/4/ DOI: 10.4054/DemRes.2022.46.4 Research Article

Eastwood, R., & Lipton, M. (2011). Demographic transition in sub-Saharan Africa: How big will the economic dividend be? *Population Studies*, *65*(1), 9–35. http://www.jstor.org/stable/23056726

Encarnación, O.G., (2002). Spain after Franco: Lessons in Democratization *World Policy Journal, Vol. 18, No. 4 (Winter, 2001/2002), pp. 35-44 (10 pages)*

Encarnación, O. (2004). “The Politics of Immigration: Why Spain Is Different.” *Mediterranean Quarterly 15 (4): 167-185.*

Ehrhardt, J., & Kohli, M. (2011). Individualisation and Fertility*. Historical Social Research / Historische Sozialforschung, 36(2 (136)), 35–64. http://www.jstor.org/stable/41151274*

Eurostat. (2010) *A revised urban-rural typology.* Available at: https://ec.europa.eu/eurostat/documents/3217494/5726181/KS-HA-10-001-15-EN.PDF/5499ee07-b61e-4615-9631-ed76e2a31f81?version=1.0

Goldberg D. (1959). The fertility of two-generation urbanites. *Population Studies 12*: 214–222

Goldstein, J.R., Lutz, W. & Testa, M.R., (2003). “The emergence of sub-replacement family size ideals in Europe,” *Population Research and Policy Review 22(5-6): 479–496*.

Goldstein, J.R., Sobotka, T. and Jasilioniene, A. (2009), The End of “Lowest-Low” Fertility?. *Population and Development Review, 35: 663-699*. https://doi.org/10.1111/j.1728-4457.2009.00304.x

Hagewen, K.J. & Morgan, S.P. 2005. “Intended and ideal family size in the United States,” *Population and Development Review 31(3): 507–527.*

Hertrich, V. (2017), Trends in Age at Marriage and the Onset of Fertility Transition in sub-Saharan Africa. *Population and Development Review*, 43: 112-137. https://doi.org/10.1111/padr.12043

Hoggart, K., & Paniagua, A. (2001) The restructuring of rural Spain?,*Journal of Rural Studies,Volume 17, Issue 1,2001,Pages 63-80*,ISSN 0743-0167,https://doi.org/10.1016/S0743-0167(00)00037-1

Jaumotte, F. (2004), ‘Female labour force participation: past trends and main determinants in OECD countries.” OECD Economics Department.

Jensen, E. R., & Ahlburg, D. A. (2004). Why Does Migration Decrease Fertility? Evidence from the Philippines. *Population Studies*, *58*(2), 219–231. http://www.jstor.org/stable/4148231

Kohler, H.-P., Billari, F. C., & Ortega, J. A. (2002). The Emergence of Lowest-Low Fertility in Europe during the 1990s. *Population and Development Review*, *28*(4), 641–680. http://www.jstor.org/stable/3092783

Kulu, H. (2005) Migration and fertility: competing hypotheses re-examined. *European Journal of Population 21*(1),51–87

Kulu, H. (2006), Fertility of internal migrants: comparison between Austria and Poland. *Popul. Space Place, 12*: 147-170. https://doi.org/10.1002/psp.406

Kulu, H., Lundholm, E., & Malmberg, G. (2018). Is spatial mobility on the rise or in decline? An order-specific analysis of the migration of young adults in Sweden. *Population Studies*, *72*(3), 323–337. http://www.jstor.org/stable/45180291

Kulu, H., Washbrook, E. (2014) Residential context, migration and fertility in a modern urban society, *Advances in Life Course Research* (21), 168-182, https://doi.org/10.1016/j.alcr.2014.01.001

Kulu, H. (2010) Why Do Fertility Levels Vary between Urban and Rural Areas? *Regional studies, 47, 895-912*. https://doi.org/10.1080/00343404.2011.581276

Lainiala, L., & Berg, V. (2017). Spatial trends of fertility rates in Finland between 1980 and 2014. *Finnish Yearbook of Population Research, 51, 89–95*. https://doi.org/10.23979/fypr.63337

Lerch, M. (2019), Fertility Decline in Urban and Rural Areas of Developing Countries. *Population and Development Review, 45*: 301-320. https://doi.org/10.1111/padr.12220

Lerch, M. (2020) International Migration and City Growth in the Global South: An Analysis of IPUMS Data for Seven Countries, 1992-2013.” *Population and Development Review*, vol. 46, no. 3, 2020, pp. 557–82. *JSTOR*, http://www.jstor.org/stable/45380193. Accessed 5 June 2023.

Matysiak, A., Sobotka, T. & Vignoli, D. (2021) The *Great Recession* and Fertility in Europe: A Sub-national Analysis. *Eur J Population* 37, 29–64 (2021). https://doi.org/10.1007/s10680-020-09556-y

McDonald, P. Gender equity, social institutions and the future of fertility. *Journal of Population Research* 17, 1–16 (2000). https://doi.org/10.1007/BF03029445

Melguizo, C. & Royuela, V. (2017) “What drives migration moves across urban areas in Spain? Evidence from the Great Recession” *Research institute of applied science, 5-30*

Melkizedeck Leshabari, K. (2021). Demographic Transition in Sub-Saharan Africa: From Grassroots to Ivory Towers. *IntechOpen*. doi: 10.5772/intechopen.98407

Menashe-Oren, A., & Sánchez-Páez, D. A. (2023). Male fertility and internal migration in rural and urban sub-saharan africa. *European Journal of Population, 39(1)*. https://doi.org/10.1007/s10680-023-09659-2

de Molina, E.G. (2023) Spain's snap election could kill its housing revolution before it even gets started , *The Guardian*. Available at: https://www.theguardian.com/commentisfree/2023/jun/05/spain-snap-election-housing-revolution-law-rightwing#:~:text=As%20a%20result%2C%20Spain%20now,eviction%20campaigners%20and%20tenants'%20unions.

Molloy, R., Smith, C. L., & Wozniak, A. (2017). Job Changing and the Decline in Long-Distance Migration in the United States. *Demography*, *54*(2), 631–653. http://www.jstor.org/stable/45047263

Myroniuk, T. W., White, M. J., Gross, M., Wang, R., Ginsburg, C., & Collinson, M. (2018). Does it Take a Village? Migration among Rural South African Youth. *Population Research and Policy Review*, *37*(6), 1079–1108. http://www.jstor.org/stable/45179533

Pinilla, V., & Sáez, L.A., (2017) Rural depopulation in Spain: Genesis of a problem and innovative policies. *SSPA.* Available at: https://www.roldedeestudiosaragoneses.org/wp-content/uploads/Informes-2017-2-Informe-SSPA1_2017_2_EN-GB.pdf

Pinilla, V., Ayuda, M.I., & Sáez, L.A. (2008) Rural Depopulation and the Migration Turnaround In Mediterranean Western Europe: A Case Study of Aragon. *Journal of rural and community development. Volume 3 no1*

Rosenwaite I. (1973). Two generations of Italians inAmerica: their fertility experience. *International Migration Review 7: 271–280.*

Salido, O. & Moreno, L. (2012) Female employment and welfare development in Spain

Statista. (2023) *Population density Spain.* Retetrieved on 1-05-2023 available at: https://www.statista.com/statistics/271154/population-density-in-spain/

Statista. (2023) *Urbanization degree Spain .* Retetrieved on 4-05-2023 available at: https://www.statista.com/statistics/271054/urbanization-in-spain/#:~:text=Urbanization%20in%20Spain%202021&text=In%202021%2C%20the%20share%20of,unchanged%20at%20around%2081.06%20percent.

Serrano Martínez, J.M., (2001) The international migratory model of Spain. Changes and new challenges for the XXI[st] century , *Belgeo, 4 | 2001, 377-398.*

Shapiro, David & Tambashe, Basile. (1999). Fertility Transition in Urban and Rural Areas of Sub-Saharan Africa.. *Population Research Institute Working Paper #99-12*

Shapiro D. (2017), Linkages between Education and Fertility in Sub-Saharan Africa, *AFD Research Paper Series, No. 2017-56*

Sobotka, T., Skirbekk, V. and Philipov, D. (2011), Economic Recession and Fertility in the Developed World. *Population and Development Review,* 37: 267-306. https://doi.org/10.1111/j.1728-4457.2011.00411.x

Sobotka, T. and Beaujouan, É. (2014), Two Is Best? The Persistence of a Two-Child Family Ideal in Europe. *Population and Development Review, 40: 391-419.* https://doi.org/10.1111/j.1728-4457.2014.00691.x

United Nations (2022). World Population Prospects 2022. *Department of Economic and Social Affairs, Population Division*. UN DESA/POP/2022/TR/NO. 3 https://population.un.org/wpp/Download/Standard/MostUsed/

United Nations (2023). India to overtake China as the world's most populous country in April 2023, United Nations projects, *Department of Economic and Social Affairs, Population Division.* Available at: https://www.un.org/en/desa/india-overtake-china-world-most-populous-country-april-2023-united-nations-projects#:~:text=This%20forecast%20is%20based%20on,the%20end%20of%20the%20century.

Van De Kaa, D.J. (1987) Europe's second demographic transition. *Popul Bull.* Mar;42(1):1-59. PMID: 12268395.

Vidal, S., Huinink, J., & Feldhaus, M. (2017). Fertility Intentions and Residential Relocations. *Demography, 54(4), 1305–1330*. http://www.jstor.org/stable/45047297

White, M. J., Salut, M., Catherine, A., Eva, T., Rodney, K., & Holly, R. (2008). Urbanization and fertility: an event-history analysis of coastal Ghana, *Demography 45*(4), 803–816. https://doi.org/10.1353/dem.0.0035

Woods, R. (2003) 'Urbanisation in Europe and China during second millennium: a review of urbanism and demography' *International Journal of Population Geography* 9 3 215–227 10.1002/ijpg.279

Worldbank (2023) *Population ages 65 and above (% of total population).* Available at: https://data.worldbank.org/indicator/SP.POP.65UP.TO.ZS?locations=ES

Yeung, J. (2023) China's population is shrinking. The impact will be felt around the world*, CNN.* retrieved at: https://edition.cnn.com/2023/01/18/china/china-population-drop-explainer-intl-hnk/index.html

Yi, Z., & Vaupel, J. W. (1989). The Impact of Urbanization and Delayed Childbearing on Population Growth and Aging in China. *Population and Development Review*, *15*(3), 425–445. https://doi.org/10.2307/1972441

Zahraei, S. M., Kurniawan, J. H., & Cheah, L. (2020). A foresight study on urban mobility: Singapore in 2040*. Foresight, 22(1), 37–52.* https://doi.org/10.1108/FS-05-2019-0044

Zakharov, S. V., & Ivanova, E. I. (1996). Regional fertility differentiation in Russia: 1959–1994. *Studies on Russian Economic Development, 7(4), 354–368*

Zelinsky, W., (1971). ‘The hypothesis of the mobility transition’. *The Geographical Review 61(2): 219–249.*

Appendix

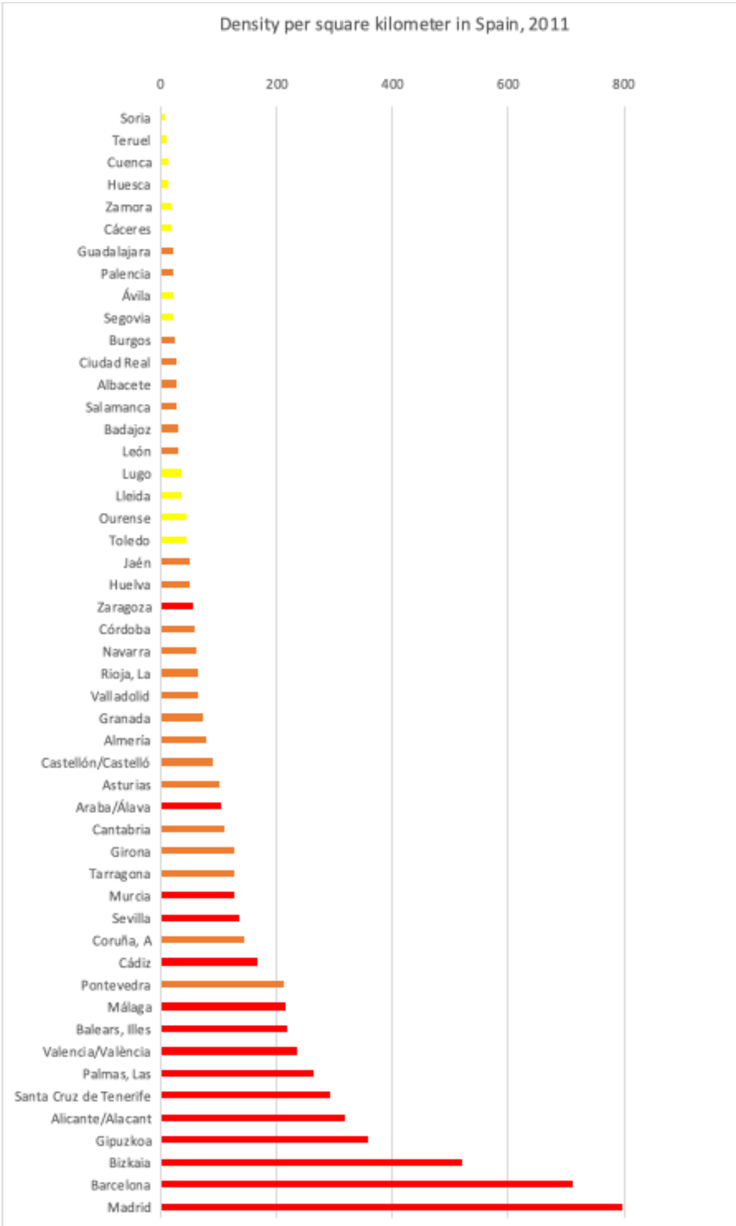

Figure 2: Population Density per Province of Spain, 2011. Yellow indicates Predominantly Rural regions, orange Intermediate Regions and red indicates Predominantly Urban region.

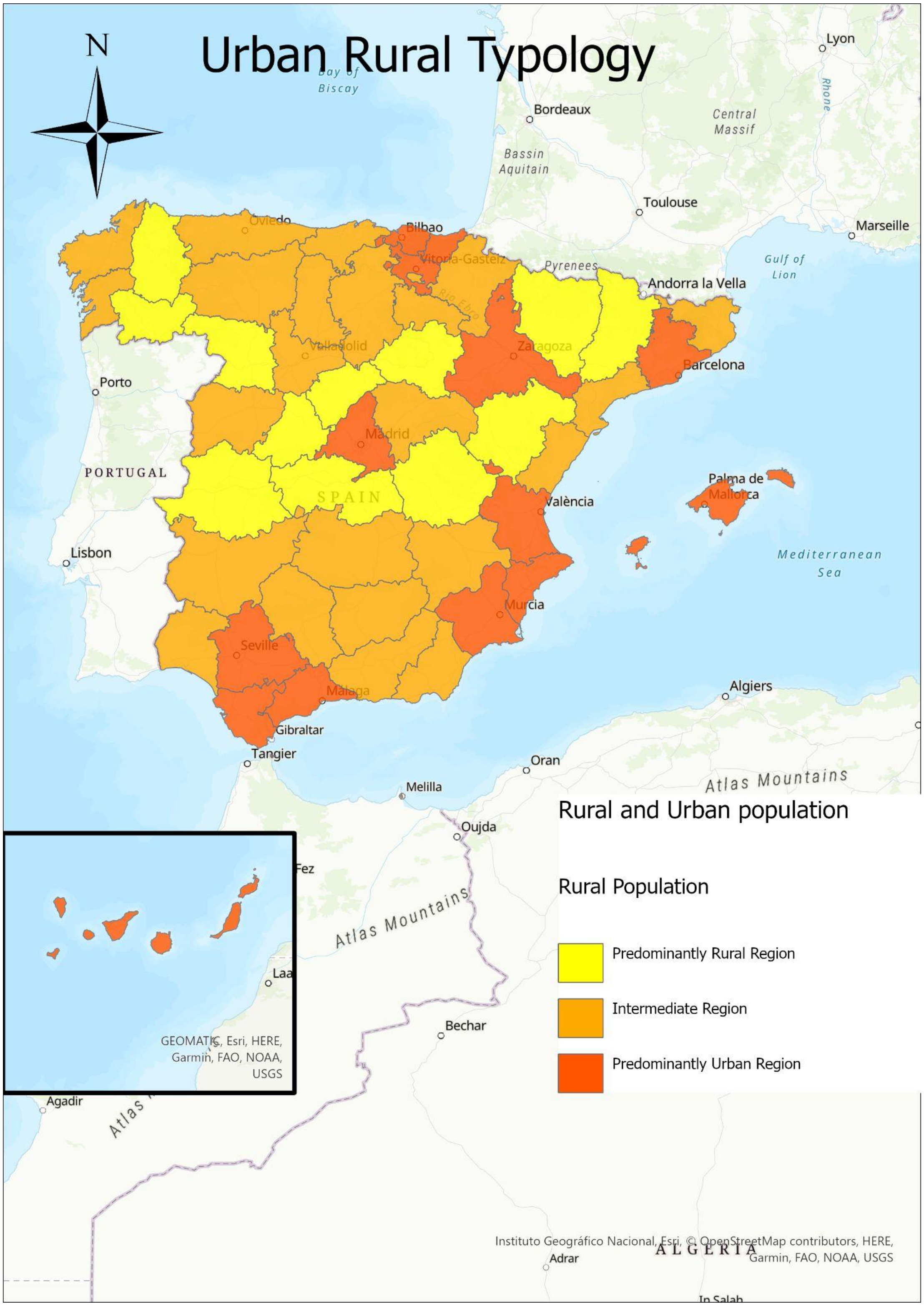

Figure 3: Population density per Province of Spain, 2011

1991	Sending			
		Low	Moderate	High
Recieving	Low	200	401	248
	Moderate	1,042	2342	1,067
	High	4.440	9,652	3,509
	Total	5,682	12,395	4.824

2001	Sending			
		Low	Moderate	High
Recieving	Low	213	533	468
	Moderate	992	2435	1,784
	High	3,320	7,938	3,855
	Total	4,525	10,906	6,107

2011	Sending			
		Low	Moderate	High
Recieving	Low	503	1,308	2,993
	Moderate	1,398	3,622	5,853
	High	2,502	6,539	5,853
	Total	4403	11,469	15,325

Table 16: Number of migrants per migration type in 1991, 2001 and 2011

```
Iteration 0:   log likelihood = -14595.489
Iteration 1:   log likelihood = -14595.489

Poisson regression                                      Number of obs =  9,183
                                                        LR chi2(3)    =   2.79
                                                        Prob > chi2   = 0.4251
Log likelihood = -14595.489                             Pseudo R2     = 0.0001
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf. interval]	
MigrationType						
Low-Low	-.0473545	.0490663	-0.97	0.334	-.1435226	.0488136
Low-Moderate	-.0261006	.0235243	-1.11	0.267	-.0722075	.0200062
Low-High	-.0202257	.0149828	-1.35	0.177	-.0495915	.00914
_cons	.8312561	.0111532	74.53	0.000	.8093962	.8531159

```
Iteration 0:   log likelihood = -44841.288
Iteration 1:   log likelihood = -44841.288

Poisson regression                                      Number of obs = 27,467
                                                        LR chi2(3)    =  12.90
                                                        Prob > chi2   = 0.0049
Log likelihood = -44841.288                             Pseudo R2     = 0.0001
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf. interval]	
MigrationType						
Moderate-Low	.0549556	.031795	1.73	0.084	-.0073615	.1172727
Moderate-Moderate	.0037152	.0143126	0.26	0.795	-.0243369	.0317673
Moderate-High	-.0241145	.0084765	-2.84	0.004	-.0407282	-.0075008
_cons	.8756954	.0052573	166.57	0.000	.8653914	.8859994

```
Iteration 0:   log likelihood = -43253.244
Iteration 1:   log likelihood = -43253.244

Poisson regression                                      Number of obs = 26,088
                                                        LR chi2(3)    =   5.74
                                                        Prob > chi2   = 0.1252
Log likelihood = -43253.244                             Pseudo R2     = 0.0001
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf. interval]	
MigrationType						
High-Low	-.0881739	.0428672	-2.06	0.040	-.172192	-.0041557
High-Moderate	.0224003	.0199443	1.12	0.261	-.0166898	.0614903
High-High	.0015999	.0116997	0.14	0.891	-.0213311	.0245309
_cons	.8846634	.0044063	200.77	0.000	.8760272	.8932996

Table 17: Poisson regression for number of children in the household by migration type, compared to their sending region non-migrants in 1991

```
Iteration 0:   log likelihood = -7080.1284
Iteration 1:   log likelihood = -7080.1284

Poisson regression                                      Number of obs =  4,350
                                                        LR chi2(3)    =  11.08
                                                        Prob > chi2   = 0.0113
Log likelihood = -7080.1284                             Pseudo R2     = 0.0008
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
MigrationType						
Low-Low	-.0473545	.0490663	-0.97	0.334	-.1435226	.0488136
Moderate-Low	.0993949	.0332818	2.99	0.003	.0341638	.164626
High-Low	-.0347665	.0440747	-0.79	0.430	-.1211513	.0516182
_cons	.8312561	.0111532	74.53	0.000	.8093962	.8531159

```
Iteration 0:   log likelihood = -32197.402
Iteration 1:   log likelihood = -32197.402

Poisson regression                                      Number of obs = 19,523
                                                        LR chi2(3)    =  14.43
                                                        Prob > chi2   = 0.0024
Log likelihood = -32197.402                             Pseudo R2     = 0.0002
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
MigrationType						
Low-Moderate	-.07054	.0213691	-3.30	0.001	-.1124227	-.0286573
Moderate-Moderate	.0037152	.0143126	0.26	0.795	-.0243369	.0317673
High-Moderate	.0313683	.0201494	1.56	0.120	-.0081238	.0708603
_cons	.8756954	.0052573	166.57	0.000	.8653914	.8859994

```
Iteration 0:   log likelihood =  -63412.49
Iteration 1:   log likelihood =  -63412.49

Poisson regression                                      Number of obs = 38,865
                                                        LR chi2(3)    =  56.20
                                                        Prob > chi2   = 0.0000
Log likelihood = -63412.49                              Pseudo R2     = 0.0004
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
MigrationType						
Low-High	-.0736331	.0109319	-6.74	0.000	-.0950591	-.052207
Moderate-High	-.0330825	.0079767	-4.15	0.000	-.0487166	-.0174484
High-High	.0015999	.0116997	0.14	0.891	-.0213311	.0245309
_cons	.8846634	.0044063	200.77	0.000	.8760272	.8932996

Table 18: Poisson regression for number of children in the household by migration type, compared to their receiving region non-migrants in 1991

```
Iteration 0:   log likelihood = -8015.2917
Iteration 1:   log likelihood = -8015.2917

Poisson regression                                      Number of obs =  5,474
                                                        LR chi2(3)    =   2.24
                                                        Prob > chi2   = 0.5249
Log likelihood = -8015.2917                             Pseudo R2     = 0.0001
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
MigrationType						
Low-Low	.0466288	.051682	0.90	0.367	-.0546661	.1479237
Moderate-Low	.0416211	.033946	1.23	0.220	-.0249118	.108154
High-Low	.0176934	.0363596	0.49	0.627	-.0535701	.088957
_cons	.5684299	.0115309	49.30	0.000	.5458299	.59103

```
Iteration 0:   log likelihood = -34062.806
Iteration 1:   log likelihood = -34062.806

Poisson regression                                      Number of obs = 23,144
                                                        LR chi2(3)    =  18.15
                                                        Prob > chi2   = 0.0004
Log likelihood = -34062.806                             Pseudo R2     = 0.0003
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
MigrationType						
Low-Moderate	-.0853897	.0248985	-3.43	0.001	-.1341898	-.0365895
Moderate-Moderate	-.0287652	.0160338	-1.79	0.073	-.0601909	.0026604
High-Moderate	-.0424527	.0185535	-2.29	0.022	-.0788169	-.0060885
_cons	.6211046	.005474	113.47	0.000	.6103758	.6318334

```
Iteration 0:   log likelihood = -63791.872
Iteration 1:   log likelihood = -63791.872

Poisson regression                                      Number of obs = 43,596
                                                        LR chi2(3)    =  22.90
                                                        Prob > chi2   = 0.0000
Log likelihood = -63791.872                             Pseudo R2     = 0.0002
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
MigrationType						
Low-High	-.0560922	.0138892	-4.04	0.000	-.0833146	-.0288698
Moderate-High	-.028638	.0094792	-3.02	0.003	-.0472169	-.0100591
High-High	-.0029655	.0126907	-0.23	0.815	-.0278387	.0219078
_cons	.6061964	.004376	138.53	0.000	.5976197	.6147732

Table 19: Poisson regression for number of children in the household by migration type, compared to their receiving region non-migrants in 2001

```
Iteration 0:   log likelihood = -12620.454
Iteration 1:   log likelihood = -12620.454

Poisson regression                                      Number of obs =  8,785
                                                        LR chi2(3)    =   3.26
                                                        Prob > chi2   = 0.3525
Log likelihood = -12620.454                             Pseudo R2     = 0.0001
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
MigrationType						
Low-Low	.0466288	.051682	0.90	0.367	-.0546661	.1479237
Low-Moderate	-.032715	.0268874	-1.22	0.224	-.0854133	.0199833
Low-High	-.0183257	.0175135	-1.05	0.295	-.0526515	.0160002
_cons	.5684299	.0115309	49.30	0.000	.5458299	.59103

```
Iteration 0:   log likelihood = -42295.557
Iteration 1:   log likelihood = -42295.557

Poisson regression                                      Number of obs = 28,839
                                                        LR chi2(3)    =  19.94
                                                        Prob > chi2   = 0.0002
Log likelihood = -42295.557                             Pseudo R2     = 0.0002
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
MigrationType						
Moderate-Low	-.0110536	.0323934	-0.34	0.733	-.0745435	.0524363
Moderate-Moderate	-.0287652	.0160338	-1.79	0.073	-.0601909	.0026604
Moderate-High	-.0435462	.0100335	-4.34	0.000	-.0632114	-.0238809
_cons	.6211046	.005474	113.47	0.000	.6103758	.6318334

```
Iteration 0:   log likelihood = -50953.958
Iteration 1:   log likelihood = -50953.958

Poisson regression                                      Number of obs = 34,590
                                                        LR chi2(3)    =   2.59
                                                        Prob > chi2   = 0.4600
Log likelihood = -50953.958                             Pseudo R2     = 0.0000
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
MigrationType						
High-Low	-.0200731	.0347593	-0.58	0.564	-.0882001	.0480539
High-Moderate	-.0275445	.0182597	-1.51	0.131	-.0633329	.0082438
High-High	-.0029655	.0126907	-0.23	0.815	-.0278387	.0219078
_cons	.6061964	.004376	138.53	0.000	.5976197	.6147732

Table 20: Poisson regression for number of children in the household by migration type, compared to their sending region non-migrants in 2001

Iteration 0: log likelihood = **-22110.749**
Iteration 1: log likelihood = **-22110.749**

Poisson regression	Number of obs = **15,980**
	LR chi2(**3**) = **3.40**
	Prob > chi2 = **0.3336**
Log likelihood = **-22110.749**	Pseudo R2 = **0.0001**

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf. interval]	
MigrationType						
Low-Low	**-.0532402**	**.0378963**	**-1.40**	**0.160**	**-.1275157**	**.0210352**
Low-Moderate	**-.0292185**	**.0232662**	**-1.26**	**0.209**	**-.0748195**	**.0163825**
Low-High	**-.0019642**	**.0178957**	**-0.11**	**0.913**	**-.0370392**	**.0331107**
_cons	**.4188217**	**.007538**	**55.56**	**0.000**	**.4040475**	**.4335959**

Iteration 0: log likelihood = **-69471.203**
Iteration 1: log likelihood = **-69471.203**

Poisson regression	Number of obs = **49,874**
	LR chi2(**3**) = **7.04**
	Prob > chi2 = **0.0706**
Log likelihood = **-69471.203**	Pseudo R2 = **0.0001**

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf. interval]	
MigrationType						
Moderate-Low	**-.0199091**	**.0229617**	**-0.87**	**0.386**	**-.0649131**	**.025095**
Moderate-Moderate	**.0007944**	**.0140537**	**0.06**	**0.955**	**-.0267504**	**.0283391**
Moderate-High	**-.0276443**	**.0109491**	**-2.52**	**0.012**	**-.0491042**	**-.0061845**
_cons	**.4243543**	**.0041272**	**102.82**	**0.000**	**.4162651**	**.4324435**

Iteration 0: log likelihood = **-104351.89**
Iteration 1: log likelihood = **-104351.89**

Poisson regression	Number of obs = **74,644**
	LR chi2(**3**) = **2.13**
	Prob > chi2 = **0.5462**
Log likelihood = **-104351.89**	Pseudo R2 = **0.0000**

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf. interval]	
MigrationType						
High-Low	**-.01745**	**.0152212**	**-1.15**	**0.252**	**-.047283**	**.0123829**
High-Moderate	**-.0106732**	**.0110908**	**-0.96**	**0.336**	**-.0324109**	**.0110644**
High-High	**-.0004064**	**.0110391**	**-0.04**	**0.971**	**-.0220426**	**.0212297**
_cons	**.4314541**	**.0032918**	**131.07**	**0.000**	**.4250023**	**.437906**

Table 21: Poisson regression for number of children in the household by migration type, compared to their sending region non-migrants in 2011

```
Iteration 0:   log likelihood = -22773.477
Iteration 1:   log likelihood = -22773.477

Poisson regression                                      Number of obs = 16,381
                                                        LR chi2(3)    =   2.28
                                                        Prob > chi2   = 0.5165
Log likelihood = -22773.477                             Pseudo R2     = 0.0001
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
MigrationType						
Low-Low	-.0532402	.0378963	-1.40	0.160	-.1275157	.0210352
Moderate-Low	-.0143765	.0238123	-0.60	0.546	-.0610477	.0322948
High-Low	-.0048176	.0166634	-0.29	0.772	-.0374773	.0278421
_cons	.4188217	.007538	55.56	0.000	.4040475	.4335959

```
Iteration 0:   log likelihood = -68731.005
Iteration 1:   log likelihood = -68731.005

Poisson regression                                      Number of obs = 49,278
                                                        LR chi2(3)    =   2.51
                                                        Prob > chi2   = 0.4744
Log likelihood = -68731.005                             Pseudo R2     = 0.0000
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
MigrationType						
Low-Moderate	-.0347511	.0223949	-1.55	0.121	-.0786442	.0091421
Moderate-Moderate	.0007944	.0140537	0.06	0.955	-.0267504	.0283391
High-Moderate	-.0035734	.0113668	-0.31	0.753	-.0258519	.0187052
_cons	.4243543	.0041272	102.82	0.000	.4162651	.4324435

```
Iteration 0:   log likelihood = -104429.36
Iteration 1:   log likelihood = -104429.36

Poisson regression                                      Number of obs = 74,839
                                                        LR chi2(3)    =  11.28
                                                        Prob > chi2   = 0.0103
Log likelihood = -104429.36                             Pseudo R2     = 0.0001
```

nchild	Coefficient	Std. err.	z	P>|z|	[95% conf.	interval]
MigrationType						
Low-High	-.0145967	.0165611	-0.88	0.378	-.0470559	.0178626
Moderate-High	-.0347442	.0106623	-3.26	0.001	-.0556419	-.0138464
High-High	-.0004064	.0110391	-0.04	0.971	-.0220426	.0212297
_cons	.4314541	.0032918	131.07	0.000	.4250023	.437906

Table 22: Poisson regression for number of children in the household by migration type, compared to their receiving region non-migrants in 2011

Source	SS	df	MS		
Model	343.813786	3	114.604595	Number of obs =	8,726
Residual	121436.339	8,722	13.9229923	F(3, 8722) =	8.23
				Prob > F =	0.0000
Total	121780.152	8,725	13.9576106	R-squared =	0.0028
				Adj R-squared =	0.0025
				Root MSE =	3.7314

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Low-Low	.4773827	.2790459	1.71	0.087	-.0696131	1.024379
Low-Moderate	-.0706871	.1353539	-0.52	0.602	-.3360127	.1946385
Low-High	.3730278	.0865264	4.31	0.000	.2034156	.54264
_cons	25.45913	.0648074	392.84	0.000	25.33209	25.58616

Source	SS	df	MS		
Model	335.409843	3	111.803281	Number of obs =	26,174
Residual	383087.653	26,170	14.6384277	F(3, 26170) =	7.64
				Prob > F =	0.0000
Total	383423.063	26,173	14.6495649	R-squared =	0.0009
				Adj R-squared =	0.0008
				Root MSE =	3.826

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Moderate-Low	-.0530981	.1980937	-0.27	0.789	-.4413725	.3351764
Moderate-Moderate	-.1488413	.0868229	-1.71	0.086	-.319019	.0213365
Moderate-High	.2003089	.0511007	3.92	0.000	.1001487	.3004691
_cons	25.22542	.0319479	789.58	0.000	25.1628	25.28804

Source	SS	df	MS		
Model	106.561011	3	35.5203369	Number of obs =	24,726
Residual	347904.585	24,722	14.0726715	F(3, 24722) =	2.52
				Prob > F =	0.0558
Total	348011.146	24,725	14.0752739	R-squared =	0.0003
				Adj R-squared =	0.0002
				Root MSE =	3.7514

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
High-Low	.6375185	.2503832	2.55	0.011	.1467524	1.128285
High-Moderate	-.0584551	.121533	-0.48	0.631	-.296667	.1797569
High-High	-.0584346	.0702048	-0.83	0.405	-.1960402	.0791709
_cons	25.34046	.0264121	959.43	0.000	25.28869	25.39222

Table 23: Regression analysis for mean age at first birth by migration type, compared to their sending region non-migrants in 1991

Source	SS	df	MS			
Model	133.342887	3	44.447629	Number of obs	=	4,114
Residual	61089.9661	4,110	14.8637387	F(3, 4110)	=	2.99
Total	61223.3089	4,113	14.885317	Prob > F	=	0.0298
				R-squared	=	0.0022
				Adj R-squared	=	0.0014
				Root MSE	=	3.8554

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Low-Low	.4773827	.2883191	1.66	0.098	-.0878788	1.042644
Moderate-Low	-.2868014	.2080685	-1.38	0.168	-.6947283	.1211255
High-Low	.5188484	.2645048	1.96	0.050	.0002757	1.037421
_cons	25.45913	.0669611	380.21	0.000	25.32785	25.59041

Source	SS	df	MS			
Model	78.4237991	3	26.1412664	Number of obs	=	18,574
Residual	275123.744	18,570	14.8154951	F(3, 18570)	=	1.76
Total	275202.167	18,573	14.8173245	Prob > F	=	0.1516
				R-squared	=	0.0003
				Adj R-squared	=	0.0001
				Root MSE	=	3.8491

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Low-Moderate	.1630163	.1267236	1.29	0.198	-.0853736	.4114062
Moderate-Moderate	-.1488413	.0873465	-1.70	0.088	-.3200483	.0223658
High-Moderate	.0565782	.1258909	0.45	0.653	-.1901795	.3033358
_cons	25.22542	.0321405	784.85	0.000	25.16242	25.28842

Source	SS	df	MS			
Model	908.935444	3	302.978481	Number of obs	=	36,938
Residual	516214.867	36,934	13.9766846	F(3, 36934)	=	21.68
Total	517123.803	36,937	14.0001571	Prob > F	=	0.0000
				R-squared	=	0.0018
				Adj R-squared	=	0.0017
				Root MSE	=	3.7385

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Low-High	.4916979	.063185	7.78	0.000	.3678536	.6155423
Moderate-High	.0852757	.0470271	1.81	0.070	-.0068988	.1774502
High-High	-.0584346	.0699649	-0.84	0.404	-.1955679	.0786986
_cons	25.34046	.0263219	962.71	0.000	25.28886	25.39205

Table 24: Regression analysis for mean age at first birth by migration type, compared to their receiving region non-migrants in 1991

Source	SS	df	MS			
				Number of obs	=	7,968
				F(3, 7964)	=	9.20
Model	600.306163	3	200.102054	Prob > F	=	0.0000
Residual	173203.443	7,964	21.7482977	R-squared	=	0.0035
				Adj R-squared	=	0.0031
Total	173803.749	7,967	21.8154574	Root MSE	=	4.6635

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Low-Low	.2226431	.3492429	0.64	0.524	-.4619644	.9072506
Low-Moderate	.3880025	.1727261	2.25	0.025	.0494142	.7265909
Low-High	.5879478	.1131893	5.19	0.000	.3660671	.8098285
_cons	25.60089	.0752962	340.00	0.000	25.45329	25.74849

Source	SS	df	MS			
				Number of obs	=	26,421
				F(3, 26417)	=	12.83
Model	850.442139	3	283.480713	Prob > F	=	0.0000
Residual	583788.276	26,417	22.0989619	R-squared	=	0.0015
				Adj R-squared	=	0.0013
Total	584638.719	26,420	22.1286419	Root MSE	=	4.701

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Moderate-Low	.3102862	.2194488	1.41	0.157	-.1198453	.7404177
Moderate-Moderate	.4110358	.1062448	3.87	0.000	.2027903	.6192814
Moderate-High	.3602896	.0663519	5.43	0.000	.2302364	.4903428
_cons	25.35709	.036578	693.23	0.000	25.28539	25.42878

Source	SS	df	MS			
				Number of obs	=	31,546
				F(3, 31542)	=	4.77
Model	327.183406	3	109.061135	Prob > F	=	0.0025
Residual	721508.612	31,542	22.8745359	R-squared	=	0.0005
				Adj R-squared	=	0.0004
Total	721835.796	31,545	22.8827325	Root MSE	=	4.7827

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
High-Low	.6620094	.2363535	2.80	0.005	.1987473	1.125272
High-Moderate	.2733622	.1241324	2.20	0.028	.0300577	.5166666
High-High	.1461372	.0866729	1.69	0.092	-.023745	.3160194
_cons	25.81876	.0295993	872.28	0.000	25.76074	25.87678

Table 25: Regression analysis for mean age at first birth by migration type, compared to their sending region non-migrants in 2001

Source	SS	df	MS			
Model	294.169542	3	98.056514	Number of obs	=	4,911
Residual	104319.757	4,907	21.2593758	F(3, 4907)	=	4.61
				Prob > F	=	0.0032
Total	104613.927	4,910	21.3062987	R-squared	=	0.0028
				Adj R-squared	=	0.0022
				Root MSE	=	4.6108

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Low-Low	.2226431	.3452949	0.64	0.519	-.4542895	.8995756
Moderate-Low	.0664865	.2249069	0.30	0.768	-.3744317	.5074047
High-Low	.8798829	.2380049	3.70	0.000	.4132867	1.346479
_cons	25.60089	.0744451	343.89	0.000	25.45494	25.74683

Source	SS	df	MS			
Model	1256.70151	3	418.900503	Number of obs	=	21,212
Residual	470765.017	21,208	22.1975206	F(3, 21208)	=	18.87
				Prob > F	=	0.0000
Total	472021.719	21,211	22.2536287	R-squared	=	0.0027
				Adj R-squared	=	0.0025
				Root MSE	=	4.7114

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Low-Moderate	.6318023	.1612694	3.92	0.000	.3157019	.9479026
Moderate-Moderate	.4110358	.1064815	3.86	0.000	.2023241	.6197476
High-Moderate	.7350353	.1242841	5.91	0.000	.4914291	.9786416
_cons	25.35709	.0366595	691.69	0.000	25.28523	25.42894

Source	SS	df	MS			
Model	544.437072	3	181.479024	Number of obs	=	39,812
Residual	903415.557	39,808	22.6943217	F(3, 39808)	=	8.00
				Prob > F	=	0.0000
Total	903959.994	39,811	22.7062871	R-squared	=	0.0006
				Adj R-squared	=	0.0005
				Root MSE	=	4.7639

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Low-High	.3700743	.0912261	4.06	0.000	.1912691	.5488796
Moderate-High	-.1013836	.063375	-1.60	0.110	-.2256002	.022833
High-High	.1461372	.0863308	1.69	0.091	-.0230732	.3153476
_cons	25.81876	.0294824	875.73	0.000	25.76097	25.87655

Table 26: Regression analysis for mean age at first birth by migration type, compared to their receiving region non-migrants in 2001

Source	SS	df	MS			
Model	10067.7185	3	3355.90616	Number of obs	=	13,448
Residual	561152.989	13,444	41.7400319	F(3, 13444)	=	80.40
Total	571220.708	13,447	42.4794161	Prob > F	=	0.0000
				R-squared	=	0.0176
				Adj R-squared	=	0.0174
				Root MSE	=	6.4607

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Low-Low	.5340882	.3245848	1.65	0.100	-.1021436	1.17032
Low-Moderate	1.621364	.2007577	8.08	0.000	1.227851	2.014877
Low-High	2.196708	.1540778	14.26	0.000	1.894694	2.498723
_cons	27.33032	.0654968	417.28	0.000	27.20194	27.4587

Source	SS	df	MS			
Model	15806.8605	3	5268.9535	Number of obs	=	41,993
Residual	1804365.54	41,989	42.972339	F(3, 41989)	=	122.61
Total	1820172.4	41,992	43.3456945	Prob > F	=	0.0000
				R-squared	=	0.0087
				Adj R-squared	=	0.0086
				Root MSE	=	6.5553

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Moderate-Low	.8483166	.2026681	4.19	0.000	.4510829	1.24555
Moderate-Moderate	1.156236	.1247802	9.27	0.000	.9116644	1.400808
Moderate-High	1.686681	.0964084	17.50	0.000	1.497719	1.875644
_cons	27.60404	.0363591	759.21	0.000	27.53278	27.67531

Source	SS	df	MS			
Model	2757.81644	3	919.272147	Number of obs	=	63,191
Residual	2494770.06	63,187	39.4823312	F(3, 63187)	=	23.28
Total	2497527.88	63,190	39.5241	Prob > F	=	0.0000
				R-squared	=	0.0011
				Adj R-squared	=	0.0011
				Root MSE	=	6.2835

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
High-Low	-.5995759	.1298319	-4.62	0.000	-.8540466	-.3451052
High-Moderate	-.0212327	.0945061	-0.22	0.822	-.2064649	.1639995
High-High	.6252788	.0941605	6.64	0.000	.440724	.8098335
_cons	28.73074	.0278192	1032.77	0.000	28.67621	28.78526

Table 27: Regression analysis for mean age at first birth by migration type, compared to their sending region non-migrants in 2011

Source	SS	df	MS			
Model	2208.39184	3	736.130612	Number of obs	=	13,679
Residual	578286.325	13,675	42.2878483	F(3, 13675)	=	17.41
				Prob > F	=	0.0000
				R-squared	=	0.0038
				Adj R-squared	=	0.0036
Total	580494.717	13,678	42.440029	Root MSE	=	6.5029

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Low-Low	.5340882	.3267078	1.63	0.102	-.1063041	1.17448
Moderate-Low	1.12204	.2084834	5.38	0.000	.7133842	1.530696
High-Low	.8008423	.1468718	5.45	0.000	.5129534	1.088731
_cons	27.33032	.0659252	414.57	0.000	27.2011	27.45954

Source	SS	df	MS			
Model	9446.91172	3	3148.97057	Number of obs	=	41,521
Residual	1785405.17	41,517	43.0041951	F(3, 41517)	=	73.22
				Prob > F	=	0.0000
				R-squared	=	0.0053
				Adj R-squared	=	0.0052
Total	1794852.08	41,520	43.2286146	Root MSE	=	6.5578

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Low-Moderate	1.34764	.1960294	6.87	0.000	.9634184	1.731862
Moderate-Moderate	1.156236	.1248265	9.26	0.000	.9115737	1.400899
High-Moderate	1.105462	.1010353	10.94	0.000	.9074305	1.303493
_cons	27.60404	.0363725	758.93	0.000	27.53275	27.67533

Source	SS	df	MS			
Model	4004.80495	3	1334.93498	Number of obs	=	63,432
Residual	2496597.1	63,428	39.3611197	F(3, 63428)	=	33.92
				Prob > F	=	0.0000
				R-squared	=	0.0016
				Adj R-squared	=	0.0016
Total	2500601.91	63,431	39.4223945	Root MSE	=	6.2738

AgeAtFB	Coefficient	Std. err.	t	P>|t|	[95% conf.	interval]
MigrationType						
Low-High	.7962902	.1382503	5.76	0.000	.5253194	1.067261
Moderate-High	.5599867	.0898563	6.23	0.000	.3838683	.7361052
High-High	.6252788	.0940159	6.65	0.000	.4410075	.80955
_cons	28.73074	.0277764	1034.36	0.000	28.67629	28.78518

Table 28: Regression analysis for mean age at first birth by migration type, compared to their receiving region non-migrants in 2011

1991	Education level			
		Lower	Moderate	Higher
Receiving	Non- Migrant	2.48	2.25	2.10
	Migrant	2.41	2.22	2.15

1991	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		2.32	2.44	2.53
	Rural	2.32	2.17	2.69	2.17
	Intermediate	2.44	2.24	2.47	2.58
	Urban	2.53	2.31	2.41	2.51

Lower Educated

1991	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		2.22	2.27	2.23
	Rural	2.22	2.07	2.0	2.29
	Intermediate	2.27	2.21	2.32	2.28
	Urban	2.23	2.15	2.19	2.33

Moderate Educated

1991	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		2.14	2.15	2.07
	Rural	2.14	2.48	2.633	2.19
	Intermediate	2.15	2.26	2.12	2.50
	Urban	2.07	1.96	2.14	2.14

High Educated

Table 29.: Mean number of own children in the household by migration type and education, in 1991 with green representing a higher fertility than both the sending and receiving region and red representing a lower fertility than both the sending and receiving regions

2001	Education level			
		Low	Moderate	High
Receiving	Non- Migrant	2.03	1.79	1.67
	Migrant	1.93	1.75	1.70

2001	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		1.91	2.02	2.05
	Rural	1.91	1.87	2.03	1.76
	Intermediate	2.02	1.76	1.96	1.87
	Urban	2.05	2.31	1.89	1.99

Lower educated

2001	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		1.73	1.81	1.77
	Rural	1.73	1.85	1.80	1.78
	Intermediate	1.81	1.69	1.73	1.72
	Urban	1.77	1.73	1.75	1.76

Moderate Educated

2001	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		1.56	1.69	1.67
	Rural	1.56	1.65	1.63	1.70
	Intermediate	1.69	1.58	1.67	1.76
	Urban	1.67	1.58	1.65	1.73

High Educated

Table 30: Mean number of own children in the household by migration type and education, in 2001 with green representing a higher fertility than both the sending and receiving region and red representing a lower fertility than both the sending and receiving regions. Brown represents a higher fertility than the sending region and a lower fertility than the receiving region. Blue represents a lower fertility than the sending region and a higher fertility than the receiving region.

2011	Education level			
		Low	Moderate	High
Receiving	Non- Migrant	1.54	1.53	1.53
	Migrant	1.47	1.49	1.54

2011	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		1.46	1.57	1.55
	Rural	1.46	1.45	1.45	1.31
	Intermediate	1.57	1.61	1.50	1.60
	Urban	1.55	1.50	1.44	1.36

Lower Educated

2011	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		1.53	1.53	1.53
	Rural	1.53	1.40	1.49	1.52
	Intermediate	1.53	1.48	1.53	1.49
	Urban	1.53	1.47	1.45	1.51

Moderate Educated

2011	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		1.50	1.51	1.54
	Rural	1.50	1.51	1.53	1.52
	Intermediate	1.51	1.44	1.53	1.55
	Urban	1.54	1.57	1.53	1.59

High Educated

Table 31.: Mean number of own children in the household by migration type and education, in 2011 with green representing a higher fertility than both the sending and receiving region and red representing a lower fertility than both the sending and receiving regions. Blue represents a lower fertility than the sending region and a higher fertility than the receiving region.

1991	Sending				
Receiving		Non-Migrant	Rural	Intermediate	Urban
	Non- Migrant		25.31	24.97	25.01
	Rural	25.31	25.58	24.66	25.31
	Intermediate	24.97	25.05	24.66	24.87
	Urban	25.01	25.49	25.08	24.81

Lower Educated

1991	Sending				
Receiving		Non-Migrant	Rural	Intermediate	Urban
	Non- Migrant		25.76	25.70	25.70
	Rural	25.76	25.90	26.00	26.48
	Intermediate	25.70	25.69	25.56	25.37
	Urban	25.70	26.34	25.95	25.66

Moderate Educated

1991	Sending				
Receiving		Non-Migrant	Rural	Intermediate	Urban
	Non- Migrant		26.88	27.31	27.20
	Rural	26.88	27.72	27.67	27.33
	Intermediate	27.31	26.59	27.22	27.13
	Urban	27.20	27.97	27.54	27.32

High Educated

Table 32.: Mean age at first birth by migration type and education, in 1991 with green representing a higher fertility than both the sending and receiving region and red representing a lower fertility than both the sending and receiving regions. Blue represents a lower fertility than the sending region and a higher fertility than the receiving region. Yellow represent a similar fertility higher than the sending and similar to the receiving region.

2001	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		24.58	24.19	24.21
	Rural	24.58	24.76	24.16	24.98
	Intermediate	24.19	24.30	24.02	24.01
	Urban	24.21	24.84	24.39	23.99

Lower Educated

2001	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		25.48	25.16	25.61
	Rural	24.58	25.25	25.18	25.90
	Intermediate	25.16	25.43	25.30	25.52
	Urban	25.61	25.71	25.44	25.58

Moderate Educated

2001	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		28.04	28.32	28.68
	Rural	28.04	28.75	28.45	28.70
	Intermediate	28.32	28.72	29.14	28.80
	Urban	28.68	29.61	28.99	28.93

High Educated

Table 33: Mean age at first birth by migration type and education, in 2001 with green representing a higher fertility than both the sending and receiving region and red representing a lower fertility than both the sending and receiving regions. Brown represents a higher fertility than the sending region and a lower fertility than the receiving region. Blue represents a lower fertility than the sending region and a higher fertility than the receiving region.

2011	Sending				
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		25.28	25.03	25.37
	Rural	25.28	24.68	25.67	25.73
	Intermediate	25.03	25.85	25.13	25.96
	Urban	25.37	25.23	26.15	26.29

Lower Educated

2011		Sending			
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		26.59	26.75	27.78
	Rural	26.59	27.43	27.12	27.08
	Intermediate	26.75	27.19	27.37	27.56
	Urban	27.78	28.39	27.89	27.77

Moderate Educated

2011		Sending			
		Non-Migrant	Rural	Intermediate	Urban
Receiving	Non- Migrant		30.12	30.39	31.04
	Rural	30.12	30.10	31.62	30.48
	Intermediate	30.39	32.00	31.69	30.86
	Urban	31.04	31.68	31.74	31.53

High Educated

Table 34 : Mean age at first birth by migration type and education, in 2011 with green representing a higher fertility than both the sending and receiving region and red representing a lower fertility than both the sending and receiving regions. Blue represents a higher fertility than the sending region and a lower fertility than the receiving region. Yellow represents a lower fertility than the sending region and a higher fertility than the receiving region.