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The Mexican Demographic Transitions (1930-1970-2015): Analysis of Socioeconomic and Cultural Factors

ABSTRACT

Mexico's demographic transition is generally described as "late and fast". Mexico is a very diverse country, so it is difficult to believe that there is only one model of demographic transition. This research presents an analysis of the family socioeconomic level, the rurality and the indigeneity as factors explaining the decline in fertility. A disaggregated analysis was conducted using microdata from three censuses (1930, 1970 et 2015), these years representing the three stages of the classic demographic transition model. The results show that the country has followed the classic transition pattern. However, there are distinctions between states and municipalities, underlining that the fertility decline has occurred at different times and with different intensities. Finally, the indigenous population tells its own story of demographic transition, both over time and over space.

KEYWORDS

Demographic transition, Historical demographics, Mexico, Socioeconomic factors, Indigenous people

RÉSUMÉ

La transition démographique du Mexique est généralement décrite comme « tardive et rapide ». Le Mexique étant un pays très diversifié, il est donc difficile de croire qu'il n'existe qu'un seul modèle de transition démographique. Cette recherche présente une analyse du niveau socio-économique de la famille, la ruralité et de l'indigénisme comme facteurs expliquant la baisse de la fécondité, réalisée à l'aide de microdonnées de trois recensements (1930, 1970 et 2015) qui représentent les trois étapes du modèle classique de transition démographique. Les résultats montrent que le pays a suivi le schéma de transition classique. Toutefois, il existe des distinctions entre les états et les municipalités soulignant que la baisse de la fécondité s'est produite à des moments différents et avec des intensités différentes. Enfin, la population indigène raconte sa propre histoire de la transition démographique, à la fois dans le temps et dans l'espace.

MOTS CLÉS

transition démographique, démographie historique, Mexique, facteurs socio-économiques, population autochtone

RESUMEN

La transición demográfica de México es descrita de manera general como "tardía y rápida". México es un país megadiverso y por ende es difícil creer que sólo exista un modelo de transición demográfica. Esta investigación presenta un análisis del nivel socioeconómico de la familia, la ruralidad y el indigenismo como factores que explican el declive de la fecundidad. Se realizó un análisis desagregado con los microdatos de tres censos: 1930, 1970 y 2015, que representan las tres etapas del modelo clásico de transición demográfica. Los resultados muestran que el país siguió el esquema clásico de transición. Sin embargo, existen distinciones entre los estados y municipios, estas distinciones han provocado que el declive de la fecundidad se haya desarrollado en distintos tiempos y con intensidades distintas. Finalmente, la población indígena cuenta su propia transición demográfica, tanto en tiempo como espacio.

PALABRAS CLAVES

Transición demográfica, demografía histórica, México, factores socioeconómicos, población indígena.

INTRODUCTION

In Mexico, the demographic transition is described as "late and fast", as it is one of the last countries in America that have initiated it, and one of the countries where this process took place the most rapidly. The intense drop in the mortality rate and the permanence of a high fertility rate for 40 years caused the population to double three times in less than a century (Véron, 1995). Although this population explosion caused concern in the late 1970s, Mexico is now very close to the replacement rate. Demographers argue that modernisation and the implementation of rigid demographic policies caused the transition to unfold in this way. However, although the national scenario is clear, Páez and Zavala-Cosío (2017) indicate that the process should be described in more detail. Thus, it is necessary to consider internal distinctions, such as traditions, cultural contexts and especially social inequalities, implying that the transition in Mexico is different for each region of the country, between different socioeconomic strata and across generations. Mier y Terán and Rabell (1993) believe that at least two major dynamics can be identified: Urban societies that have followed the classic pattern of modernisation (Notestein, 1945), and traditionalist societies on which public policies imposed the family planning model.

Education and socioeconomic levels have been related to the decline of fertility, as shown in several European countries (Dribe *et al.*, 2014). However, researchers insist on the importance of more detailed research in Latin American countries to consider the different stages of the demographic transition (Fieder *et al.,* 2011). Several studies analyse the determinants of the demographic transition in Mexico from a historical perspective, mostly on the period 1960-2000 and based on census data at the national and state levels. The main limitation for conducting disaggregated research has been the availability of data (especially from 1930) and the complexity to manage census microdata. We go back to the 1930 Census to describe the first stage of the demographic transition; then we use the microdata to do the household level analysis.

Mexico has changed dramatically during the 20th century: Its vast territory and great cultural diversity complicate the analysis of the factors that encouraged the fertility decline. Inspired by the work of Coale & Watkins (2017), we decided to explore these factors and their relationship with fertility in different geographical and cultural contexts. Thus, this research carries an analysis in three times that we have considered representative of the three phases of Notestein's 1945 classical demographic transition: 1930, 1970 and 2015. The main objective is to determine the relationship between socioeconomic and cultural factors with the change in Mexican women's reproductive behaviour. We studied these factors at three territorial levels: national, state and municipal, in order to describe the Mexican demographic transition from a historical, geographical and demographic perspective.

Finally, our results indicate that the national context does indeed fit the classic model of transition, i.e. a process of urbanisation and economic growth determine fertility decline. However, we also found that the indigenous population dynamics differ in terms of the time it took to begin and to complete its demographic transition. Also striking are the significant differences between states, which are due both, to the speed of change from rural to urban society, and to the change in the socioeconomic level of its inhabitants. Municipal analyses show that the socioeconomic factor has a negative influence on fertility.

1. METHODOLOGY

The population under study is married women aged 15 to 49. As a measure of the birth rate, we use the number of own children under 5 living in the household. We first proceeded with a descriptive analysis before running Poisson regressions to determine the influence of socioeconomic variables on women's fertility.

1.1 Data and Time

In this research, we used 10% of the microdata from the 1930 Mexican Population Census from the National Institute of Statistics and Geography of Mexico (INEGI) (Zamudio *et al.*, 2015), 1% of the microdata from the 1970 census, and 10% of the microdata from the 2015 intercensal survey; these last two bases were obtained from International Minnesota Population Center (IPUMS, 2018). Its website has uploaded the census from more than 98 countries around the world with the aim of preserving, documenting, harmonising and disseminating data, As a result, we were able to make a long-term cross-sectional comparative analysis.

1.2 Demographic Variables

The independent variables exploited in the analysis are the mother's age, indigeneity, which is measured by family, and rurality that was calculated at municipality level. We use *InSoc* as a measure of the family's socioeconomic status, a weighted average calculated by family that integrates six subindexes: proportion of

family members employed, occupational sector[1], family dependency, average age of the family, family's real estate properties, and literacy of each member in the family. The range of this index is [0.1,]; a value close to 1 indicates better economic conditions, and a value close to 0 worse economic conditions. The *InSoc* was an index proposed by Zamudio Sánchez *et al.* (2018) and for this research we adjust the weights of each subindex in order to make comparisons between the three years analysed.

1.3 Territory

We conducted a national analysis and then focused on two states that are representative of certain realities: The state of Mexico, characterised by its mostly urban and non-indigenous population; on the contrary, the state of Chiapas is characterised by its high percentage of rural and indigenous populations. We then focused on four municipalities in each state with the following characteristics: 1) rural-indigenous, 2) rural-non indigenous, 3) urban-indigenous, and 4) urban-non indigenous.

2. RESULTS

We present the picture of the population at the three studied moments by a descriptive analysis and the analysing of coefficients from the Poisson regression to summarise the direction and intensity of the socioeconomic factors on fertility.

2.1 Descriptive Analysis

The results of table 1 describe the women's families in our sample. We can see that the indicator of socioeconomic levels (*InSoc*) ranged from 0.31 to 0.49, which represents an increase of 60% in socioeconomic conditions in the 1930-1970 period. Between 1970 and 2015, it changes from 0.49 to 0.63, an increase of 29%. On the other hand, the population under study in 1930 is mostly rural (78%) and 24% indigenous. In 1970, the rural population decreased significantly, standing at 42%, and in 2015 it remained almost the same (44%). It is important to remember that the analysed sub-population is women of reproductive age, and the figures are close to the Mexican population.

The average number of own children under 5 in 1930 was 0.86 children/woman; in 1970 it grew by 24% to reach 1.07; finally, it fell by 54% in 2015 (0.48 children/woman). This pattern is generally preserved in ethnic, rural, and urban sub-populations.

Table 1. Descriptive results by year for Mexican women aged 15 to 49.

	1930	1970	2015
N (women)	201,747	72,786	2,042,383
InSoc	0.31	0.49	0.63
Rural	78%	42%	44%
Indigenous	24%	9%	16%
Own children under 5			
National	0.86	1.07	0.48
Indigenous	0.80	0.88	0.63
Non-indigenous	0.88	1.09	0.45
Rural	0.88	1.11	0.54
Urban	0.80	1.04	0.43

2.2 Fertility, Socioeconomic Level and Indigenous Population

In figure 1, we observe two situations: The first underlines that fertility is negatively related to socioeconomic levels; the second situation refers to the fact that in 1930 and 1970, while the fertility of non-indigenous women is higher than that of indigenous women, this pattern is inverted in 2015. This helps us understand why the indigenous population has lost its presence in recent years.

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1 Production sectors: primary (agriculture, farming and fishing), secondary (manufacturing) and tertiary (services).

1930

Error Bars: 95% CI

1970

Error Bars: 95% CI

2015

Error Bars: 95% CI

Figure 1. Number of own children under 5 per women, by socioeconomic levels
Note: In 1930 and 1970 the medium-high level is not shown, because there are very few observations.
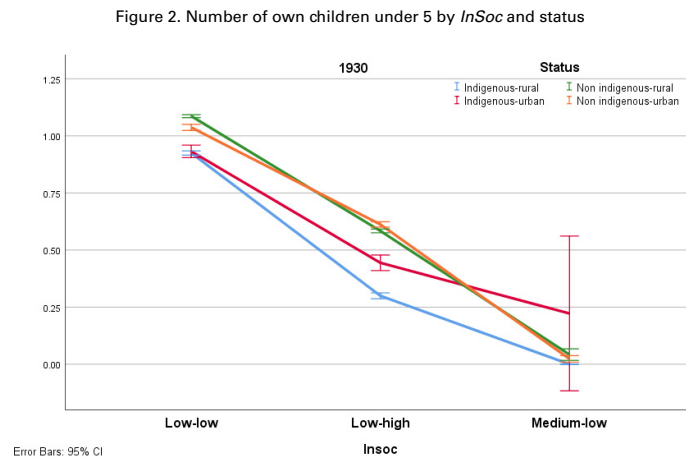
Figure 2. Number of own children under 5 by *InSoc* and status

1930

Error Bars: 95% CI

2.3. Interaction Analysis

The results of the regression model in table 2 show that the triple interaction for 1930 is significant: As *InSoc* grows, fertility decreases, this negative effect will be smaller for non-indigenous-urban women than for indigenous-rural women. As the interactions are significant, it is necessary to discount the effect associated with the interactions. Then, since the analysis in this table is dynamic, the interpretation of regression coefficients has to be done by fixing the level for each dichotomy variable (rurality and indigeneity), so that we have four different combinations. The effect associated to each coefficient depends of theses combinations. Figure 2 enables us to understand this pattern.

In 1970, the interactions are not significant; then the non-indigenous urban women had more children than indigenous-rural women. In all cases, *InSoc* is significant, i.e. the socioeconomic level is inversely related to the number of children in the household. Its value indicates that, for example, in 1930, the number of children is more affected by the increase in socioeconomic status (-4.97) than in 2015 (-2.23); and that in 1970 was less important for women's fertility (-1.54).

2.4. Fertility by Territory and Over Time

Beyond the difficulty of interpreting the results, we also face that of analysing the phenomenon in the different regions and over time. Table 3 shows the descriptive results for the states of Chiapas and state of Mexico, where there are currently two very different realities, although this has not always been the case. In 1930, both rurality and indigenous were very similar in both places, therefore the number of children was very similar. However, in 2015, the rural population was drastically reduced in the state of Mexico (from 92% to 29%); the same happened with its indigenous population, dropping from 35% to only 3%. At the same time, Chiapas also reduced its rural population, but to a lesser degree, with a change in proportion from 88% to 65%; as for its indigenous population, from 32% to 23%.

The change in the population composition in the state of Mexico promoted the increase in fertility in 1970.

Table 2. Estimated Poisson's regression coefficients

	1930	**Std. Error**	**1970**	**Std. Error**	**2015**	**Std. Error**
Intercept	-0.80	-3.07	-3.07	0.0190	-1.60	0.02
Age	0.15	0.27	0.27	0.01	0.23	0.00
Age2	-0.003	-0.01	-0.005	0.0	-0.005	0.000
Non-indigenous	-0.25	0.36	0.36	0.01	-0.04	0.01
Urban	-0.33	0.27	0.27	0.02	-0.14	0.02
InSoc	-4.97	-1.54	-1.54	0.02	-2.23	0.02
Non-indigenous:urban	0.23	-0.03			-0.07	0.02
Non-indigenous:InSoc	2.14	0.06				0.00
Urban: InSoc	1.73	-0.01			0.61	0.04
Non-indigenous:urban:InSoc	-1.29	-0.25			0.09	0.04
Deviance	0.92		0.99		0.69	
Omnibus test	0.0		0.0		0.00	
Akaike's Information Criterion (AIC)	449,751		179,699		3,092,028	

Note: Only significant coefficients under 5% error are shown.

Although this effect was not expected, we think that in 1970 women were more willing to have children, regardless of their socioeconomic status. In 2015 we notice a dramatic reduction in fertility in all categories in both states, however, smaller in Chiapas where women have an average of 0.81 compared to 0.57 children in the state of Mexico.

Table 3. Descriptive results for the states of Mexico and Chiapas

	Rurality			**Indigenous**		
	1930	1970	2015	1930	1970	2015
State of Mexico						
% population	92%	37%	29%	35%	7%	3%
Children	0.91	1.15	0.49	0.88	0.95	0.57
Chiapas						
% population	88%	73%	65%	32%	25%	23%
Children	0.94	0.99	0.71	0.84	0.89	0.81
	Urban			**Non-indigenous**		
	1930	1970	2015	1930	1970	2015
Children						
State of Mexico	0.89	1.15	0.38	0.72	0.81	0.50
State of Chiapas	0.89	0.85	0.51	0.84	0.86	0.54

Note. The proportions of urban & non-indigenous populations are the complement of rural & indigenous populations.

In table 4, we show the number of own children under 5 and on the *InSoc* index. Each municipality represents one "status" in 1930. We observe that realities change over time due to industrialisation and the reduction of the indigenous population. Thus, in 1930, the *InSoc* coefficient of Acambay is -4.6 and that of Ocosingo is -5.6: The average number of children in Acambay is higher than in Ocosingo. On the other hand, if we look

2015 and compare Zumpango and Tuxtla, we see that the coefficients are very similar (respectively -1.7 and -1.8), with a similar number of children (0.4).

Table 4. Estimated Poisson's regression coefficients

		Children			Coefficient *InSoc*			
	Status in 1930	1930	1970	2015	1930	1970	2015	Status in 2015
State of Mexico								
Acambay	**Rural-indigenous**	0.94	0.88	0.51	-4.6	0.3	-1.8	Rural non-indigenous
Ecatepec	**Rural non-indigenous**	0.97	1.22	0.34	-3.9	-1.5	-1.8	Urban non-indigenous
Jatlaco	**Urban-indigenous**	1.03	0.46	0.45	-6.0	1.9	-1.2	Urban non-indigenous
Zumpango	**Urban non-indigenous**	0.80	1.16	0.40	-3.9	-1.0	-1.7	Urban non-indigenous
Chiapas								
Ocosingo	**Rural-indigenous**	0.73	1.02	0.81	-5.6	-1.6	-2.1	Rural-indigenous
San Cristobal	**Rural non-indigenous**	0.88	1.07	0.48	-2.3	-1.4	-1.9	Urban-indigenous
Las Rosas	**Urban-indigenous**	0.80	1.00	0.56	-3.2	-1.1	-1.6	Urban non-indigenous
Tuxtla Gtz.	**Urban non-indigenous**	0.81	0.85	0.43	-2.8	-1.5	-1.8	Urban non-indigenous

Note: Each coefficient is derived from a Poisson regression which model is: number of children under 5 = int, age, age2, InSoc+e.
All coefficients are significant under 5%.

CONCLUSIONS AND DISCUSSION

There are at least four initial dynamics in the demographic transition in Mexico: rural-indigenous, urban-indigenous, urban-non indigenous and rural-non indigenous. These dynamics and families' socioeconomic level determine the average number of children in the household.

The negative relationship between socioeconomic level with fertility was clearly characterised at all geographical levels. However, its impact differs by years and by municipalities.

Indigenous women are less influenced by socioeconomic level than non-indigenous women in 2015, which means that they are less sensitive to the reduction of their fertility as to their socioeconomic level increase. However, this relationship was inverse from 1930 to 1970.

This research is the first to consider the starting point of Mexico's demographic transition in 1930, and therefore provides unprecedented details of this process. We believe that it is a valuable contribution to the demographic characterisation of the Mexican population. However, we recognise that an exhaustive characterisation of all the municipalities in the country is still necessary, this work will be presented in an upcoming research. It is also necessary to add elements that provide more information about infant mortality, which may be responsible for the loss of children in the poorest households in the first stages of the transition and in the most disadvantaged populations.

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