The Turkish demographic transition.
Fertility and child mortality

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Abstract

The aim of our paper is to investigate links between fertility and child mortality in Turkey during the second half of the 20th century. Demographic trends of this country show a decrease of the TFR and of the infant mortality rate during this period. The context of this decrease is the progressive diffusion of contraceptives and the spread of childcare practices which improve the health of children. Our general hypothesis is that Turkey is currently in a demographic transition from a fertility regime in which prevailed the quantity of children to a fertility regime based on the quality of children. According to this hypothesis, we wish to analyse correlations between fertility and child mortality at the level of individuals. We expect a positive correlation, i.e., that the lower (respectively the higher) is the parity of a woman and the lower (the higher) is the probability that some of her children die. We suppose also that the adoption of the new behaviours of reducing fertility and "modern" childcare practices depend on several factors related to the status of women, like the level of education or type of marriage (arranged or not). Data used are the Turkish Demographic and Health data of 1998. In this survey were collected information on births and child mortality of women aged 15 to 49 years old. These data are analyzed with techniques of Event History Analysis.

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[3] We thank the Swiss Academy of Human Sciences to allow us to present this paper at the EPC2006.

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Introduction

The aim of this paper is to analyse links between fertility and child mortality[4] in the case of Turkey. This country is an interesting case to investigate since it shows a radical change in demographic trends starting from the beginning of sixties. The Turkish TFR decreased from 6,18 children per woman in 1960 to 2,7 in 2001, while the infant mortality rate felt from 200 per thousand to 40 during the same period (Council of Europe 2003).

At the micro level of individuals or families, a decrease of fertility corresponds to the spread of the adoption of contraceptives, while a decrease of child mortality corresponds to the diffusion of the adoption of techniques and behaviours improving the health of children. A parallel decrease of these two processes could mean a transition from a fertility regime based on the *quantity* of children to a fertility regime based on their *quality* (Axinn & Barber 2001). In the hypothesis of such a transition, analytic investigations on correlations between fertility and child mortality have to be conducted at the level of individuals or households. It is expected that the higher is the fertility in a family, the higher is the risk for each child to die. At the opposite, the lower is the fertility and the lower is the risk for one child to die.

In the next section of this paper, we will develop the theoretical framework of our research. We will then present the case of Turkey and present hypotheses. Data and model and estimated results are finally shown.

[4] The term of child mortality will refer in this paper to the mortality of young children in a general manner, without any precisions on their age. The term of infant mortality will refer to the mortality of children before their first birthday.

Theoretical background

A review of the literature shows that links between decreases of child mortality and fertility were first sketched out in term of a causal relation. First, a decrease in child mortality occurs. This decrease is related to the appearance or reappearance of innovations in techniques of child care (breast feeding, milk pasteurization, vaccination, etc.) and their diffusion through populations (Morel, 1991). The issue of this decrease in child mortality is an increasing number of children living in households and communities. Children exceed the replacement threshold allowed by economic resources in families. As a consequence, the decline in child mortality is followed a few years latter by a decrease of fertility. This theoretical point of view in term of causality between child mortality and fertility has received some criticisms. Many authors mentioned also that reductions in mortality did not systematically precede the decline in fertility in many European countries during the 18^{th} or 19^{th} centuries (Coale 1973, Van de Walle 1986).

Another approach to the links between fertility and child mortality is related to the idea of modernity. There are many ways to define the concept of modernity; one of big interest in population sciences is based on the definition of a demographic regime in which Life is "rationalised" by two means, lengthening of the life and low fertility (Livi Bacci 2001). In this respect, the demographic transition is defined as a transition from a demographic regime based on the quantity of children to a regime based on their quality (Axinn and Barber 2001, Praz 2005,). This transition is linked to social change, especially in the organisation of families in which the economic status of children transforms from a status of resource providers to a status of resources consumers. In Europe, this change occurred notably when children work was forbidden and child education and school became compulsory.

This hypothesis is peculiarly interesting to investigate in those countries which are currently in demographic transition, and where decreases in fertility and in infant mortality appear to be synchronised. At the level of individuals or households, this joint decrease corresponds to the simultaneous diffusion of two behaviours: 1) the adoption of contraceptive means in order to limit fertility; 2) the adoption of child care and therapeutic methods which counter the child mortality (Caldwell 1979, Masuy Strobant 2003). In developing countries, the women level of education appears to play a role in the adoption of behaviors in the sense that women with a high level of education are those who have simultaneously the lower fertility and the lower

rate of child mortality. First, Western family values, in which prevail few pampered children are easily diffused in schools through manuals and teaching materials (Axinn and Barber 2001). Second, education has also the effect to increase the status of women and then to disconnect them from traditional family values which emphasize large families. A similar argument is advanced by Caldwell (1979) in the domain of child mortality when he mentions that changes of the traditional balance in family with respect to the education have effects on techniques of child care. This author proposes also that education allows women to be less fatalistic about illness of children. Schools are also places where can be diffused knowledge on contraceptive methods on the one hand, information related to child-care, nutrition, etc., on the other hand.

The Turkish Demographic Transition.

Turkey experienced important changes in its organisation during last decades. This country displays, for example, a dramatic increase of urbanisation related to the transformation of its economy, from 20% of urbanised people in 1950 to 65% of the population in 2000 (Tabutin et Schoumaker 2005). However, despite that Turkey was a pioneering country in the world to give in 1931 right to vote and to be eligible to women, it subsists in this country a traditional view of family, with an unequal status between men and women. The inferior status of women in the Turkish society can be observed, for example, by the practice of arranged marriages, in which the consent of the woman is not always taken into account (Ergöçmen 1997). Moreover, practices of payment of bridesmoney by the family of the future husband are much diffused. In a similar manner, despite that school is compulsory since the twenties, a lot of women are excluded from education and remain illiterate. It could also be mentioned that if there is a social security and possibilities of a paid retirement, this concerns only a few people working as blue or white collars: the economic value of children remains important in Turkey, since children can represent a security for the old age in the Turkish population (Kohlmann, 2002).

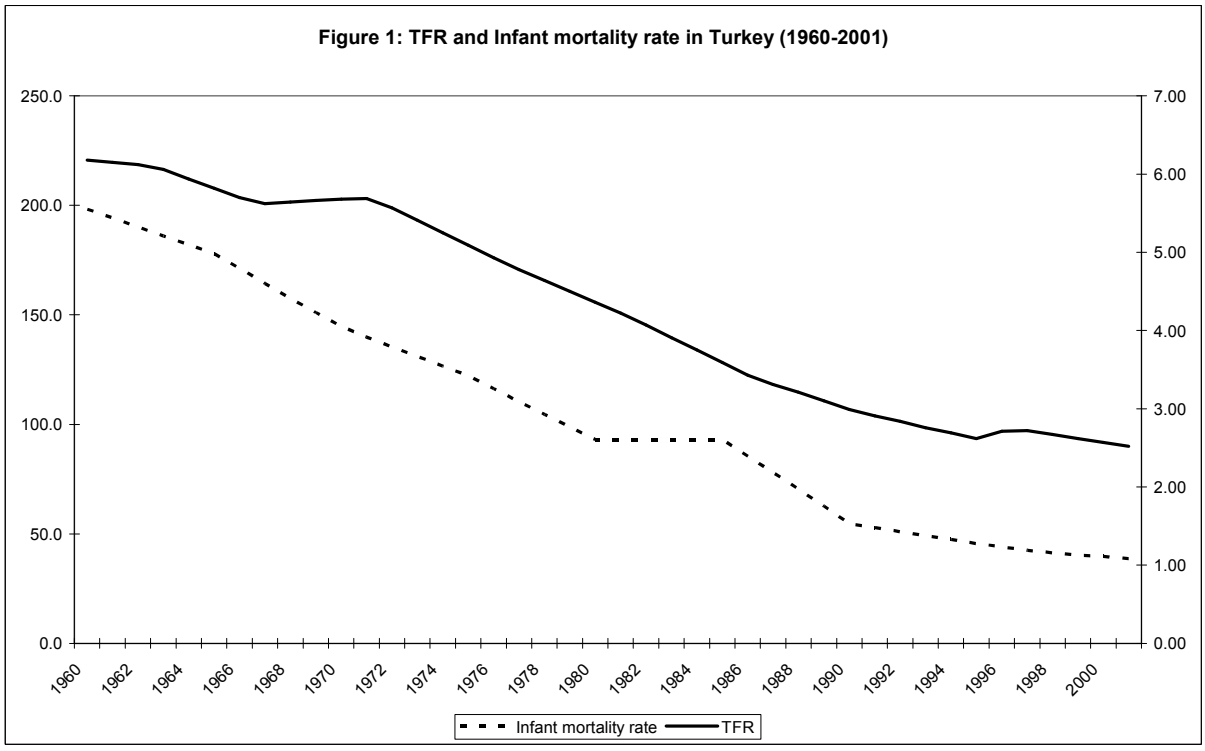
The capital of Ankara was very early to display a fertility transition with a very late age of marriage for women and a fertility of two children during the thirties. However, this pattern was very contrasted to others Turkish cities and rural areas in which fertility was very high (Duben and Behar 1991). From the twenties to the sixties, Turkish policies in the domain of population were pro-natalists. This view came from a Kemalist doctrine in which it was considered that the promotion of population growth will be a factor of progress for the

country (Metiner 1966, Fisek and Schorter 1968). The consequence of this policy leaded Turkey to a rapid population expansion from 13.6 millions in 1927 to 73 millions at the beginning of the second millennium (Üner and Ergöçnen 1999, Council of Europe 2003). This rapid increase conducted policy makers to promote a limited growth of population after 1965, with the argument that this expansion of population could have some damages for the economy of the country. The state developed progressively a network of reproductive health centres through the country, which promote reduced family, the use of contraceptives and modern techniques of child care (Akin & Bertran 1996).

To this new direction in population policies corresponds a rapid decrease in fertility. From 1960 to 2002, the crude birth rate decreased regularly from 45,2 to 21,3 per thousand (Council of Europe 2003). The segment of population which is the most integrated in modernisation and in the process of urbanisation seems to be composed of people who modified more quickly their fertility behaviours. Yavuz's study (2005) on the progression to third birth in Turkey shows that the higher is the status of women, measured by their level of education, their ability to read and the type of marriage, and the lower is their fertility of parity 3.

Last decades show also a decrease in infant mortality in parallel to the decrease of fertility (figure 1). It was also observed that the higher is the level of education of women and the lower is the level of infant mortality (Hancioğlu, 1999).

Figure 1: TFR and Infant mortality rate in Turkey (1960-2001)



Source: Council of Europe 2003.

Hypotheses

If the hypothesis of causality between the decrease of child mortality and the decrease of fertility has been investigated by Suliman (2003), we consider here that these two phenomenons are interrelated. This interrelation results of the diffusion through the Turkish population of a joint process of adoption of limited fertility behaviours and of a progressive adoption of techniques of childcare which improve the life expectancy of children. The term of joint process of adoption means that women who limit their fertility are also those who displays a low infant mortality in their offspring. On the contrary, there will be high child mortality in families with a high parity. This hypothesis implies that we adopt a life course perspective in which we are especially interested to analyse interrelations between women fertility and mortality of their child. According to this perspective, the higher is the risk for a woman to give birth to a supplement child and the higher is the risk of child mortality. We will then consider that the level of each one of these two risks depends on several characteristics related to the status of the woman. These characteristics are: (1) the level of education of women and their ability to read; (2) the character arranged or not of the marriage and if the husband gave a gift to the family of his partner; (3) the level of education of the husband.

First, the role of schooling was mentioned above as to be a vector of diffusion of Western family values and as a place to acquire knowledge on contraceptives and on modern child care techniques. For this reason, we expect that women with a higher level of education will more often adopt behaviour of limiting fertility and lowering child mortality than women with a lower level of education. Moreover, in the case of women with almost not education, we will suppose that the simple ability to read allows to enlarge the independence of women *vis-à-vis* their neighbouring and to take knowledge about techniques of contraception and child care and even about Western family values. These women are expected to have a lower fertility and a lower child mortality in their offspring.

Second, we will consider that the status of marriage reflects the status of women. An arranged marriage or a bridesmoney paid to the family of the woman means traditional family values in which women are “used” to make alliances between families. For this reason, we can consider that these two characteristics indicate a low status for women, associated with large family values. We will thus suppose that women for whom marriage was arranged or for whom the

husband gave a dowry will have a higher parity than women who choose their husband. However, mortality in their offspring will be higher.

Third, the level of education of the husband can be considered as a proxy of his social status. Moreover, it should be mentioned that one of the contraceptive the more employed in Turkey is the withdrawal (Ünalan and Koç 1999). This seems to indicate that fertility limitations behaviours are also a matter of men. We can then expect that a high level of education of men will be associated with a low level of fertility. More generally, we can consider that men with a higher status will be more influenced by Western values towards children than men with a lower status. We can thus expect not only a lower fertility but also low mortality in the offspring in association with a high level of education.

Data and model

Data we will use are Turkish Demographic Health Survey data collected in 1998 (TDHS98). This survey collected biographic information of 8 576 women born between 1948 and 1983. Our analyses will be restricted on women who gave birth to one child at least. We select all women for which this first child was not born before the marriage (5 469 women). Dependent variables are the two processes of fertility (birth of the child parity $n+1$) and child mortality (death of the child of parity n). Our analyses are limited to fertility and infant mortality in the first marriage. In the case of the 255 divorced and widowed women, we should observe them until the end of their first marriage. However, the question on the duration of the first marriage in the TDHS98 survey was imprecise and we could not determinate exactly this duration. As these women are few numerous, we decided not to take into account them. We finally retain a sample of 5 214 women living with their first husband at the moment of the survey. Data are censored at the moment of the survey. In the case of the process of births, starting time are nine months after the birth of the precedent child. In the case of twins or triplets,…, only one birth is taken into account. In the case of the process of child mortality, we limit our analysis to the first two years of the life of each child, since deaths become rare after 2 years and their recording in the TDHS98 become imprecise.

We develop a multilevel and multiprocess hazard model of these two outcomes (Lillard and Panis 2003). The multilevel part of the model refers to the fact that there are two hierarchic levels of analysis; the lower is the level of the child i while the second is the level of her mother, j. The hypothesis is that the birth of child of rank $n+1$ or the death of a child of rank n

is not random according to the mother *j*. We will thus estimate factors of unobserved heterogeneity related to the level of the woman for each outcome (fertility and child mortality). These two factors are considered normally distributed. The multiprocess part of the model refers to the fact that the two outcomes could be interrelated, i.e., that there is a correlation between the two factors of heterogeneity. According to our hypothesis of a transition from a fertility regime based on the quantity of children to a regime based on the quality, we suppose that the term of correlation between the two processes is positive, i.e., the lower is the probability for a woman to give a birth and the lower is the probability that her children will die. Model can be written:

$$\log\left[h_{ijk}(t)\right] = \beta_{0k} + \beta_{1k}x_{ijkt} + \beta_{2k}y_{jk} + a_{ijk}(t) + b_{ijk}(t) + c_{ijk}(t) + u_{jk}$$

Where subscript *k=1* if the process analysed is fertility and *k=2* if the process is child mortality; x_{ijkt} refer to covariates at the level of children, with subscript *t* indicating that covariates related to the level of children could be time varying while y_{jk} refer to covariate at the level of women, all these covariates are fixed. Fixed level 1 covariates taken into account are the sex and the parity of the child *n* or if the woman gave birth to twins or triplets or more. In the case of the analysis of child mortality is taken into account a time varying covariate indicated if the child *n+1* is born while in the process of fertility is introducing a covariate which indicates if the child *n* is dead. Level 2 covariates are levels of education of women and their partner and if the woman can read easily, not easily, or not. Other covariates concern the type of marriage, if it was arranged by the family and if there was a dowry. Different clocks are taken into account, which are considered piecewise linear. These clocks are: the duration since last birth, *a(t)*; the age of the woman, *b(t)*; the calendar time, *c(t)*. U_{jk} is the factor of heterogeneity according to the level of mothers for the process k.

Results

The model was estimated with the version 2 of the software aML (Lillard & Panis, 2003). We will limit here to the description of the results to the correlation between the two heterogeneity factors and to the effects of mother fixed covariates. Results confirm our hypotheses (See table 1).

Table 1 : Estimated coefficients of the model

	Fertility			Infant mortality		
	Estimates		**standard error**	**Estimates**		**standard error**
Constant	-1.2979		1.1174	0.0179		1.3755
months since last birth						
9-24 m	0.908	***	0.0353			
24-36 m	-0.1352	***	0.0426			
36-48	-0.0299		0.0551			
48-60	-0.0011		0.0562			
60+	-0.1642	***	0.0138			
0-6 m				-4.6914	***	0.1634
6-12 m				-2.1768	***	0.2123
12+				-0.1214	***	0.015
Age of woman						
11-15 y	-0.043		0.2463	-0.216		0.1336
15-20 y	0.0709	***	0.0198	-0.1324	***	0.0329
20-25 y	-0.0679	***	0.0087	-0.073	***	0.0217
25-30 y	-0.0808	***	0.0085	-0.068	***	0.0263
30-35 y	-0.11	***	0.0122	0.0069		0.0373
35-40 y	-0.1756	***	0.022	-0.0193		0.0593
40+	-0.2553	***	0.0593	0.0537		0.0918
Calendar year						
61-68	-0.0646		0.0961	0.1541		0.193
68-74	0.0642	***	0.0182	-0.0229		0.0341
74-80	0.0288	***	0.0094	-0.0348		0.0224
80-86	-0.0373	***	0.0073	-0.0593	***	0.02
86-92	-0.0276	***	0.0074	-0.0423	**	0.0205
92-98	-0.0127		0.0093	-0.027		0.0245
Last child dead						
No	0					
yes	0.4863	***	0.0345			
Child n+1 born						
No				0		
yes				-0.6614	***	0.1325
Level of education of woman						
None	0			0		
Obligatory	-0.0983	**	0.0406	0.02		0.1213
secondary	-0.3288	***	0.0683	-0.3177		0.1935
university	-0.3799	***	0.1372	-0.3259		0.3575
Ability to read						
Cannot	0			0		
with difficulty	-0.2733	***	0.0435	-0.1425		0.1333
easyly	-0.4851	***	0.046	-0.3742	***	0.1357
Marriage arranged						
No	0			0		
Yes	0.0833	***	0.026	0.0664		0.0761
Bridesmoney payment						
no	0			0		
yes	0.2612	***	0.0255	0.2663	***	0.0741
Level of education of husband						
None	0			0		
Obligatory	-0.1641	***	0.0371	-0.17		0.112
secondary	-0.2881	***	0.0449	-0.4441	***	0.1327
university	-0.3386	***	0.0732	-0.5736	***	0.2047

Table 1 continued

	Fertility			Infant mortality		
	Estimates		**standard error**	**Estimates**		**standard error**
Child is twin						
No	0			0		
Yes	-0.2996	**	0.1291	1.9067	***	0.1005
Sex of child						
Boy	0			0		
Girl	0.1814	***	0.0197	-0.1836	***	0.0571
Parity						
2	0			0		
3 to 6	-0.3866	***	0.0292	0.0081		0.0693
6+	-0.1103	*	0.059	-0.0203		0.1442
Unobserved heterogeneity	0.3448	***	0.0196	0.8694	***	0.0498
correlation	0.9144	***	0.0607			

Significance: '*'=10%; '**'=5%; '***'=1%.

1) Both factors of heterogeneity are significant, which means that the two processes are related to the level of the woman and not only to the level of the child. As expected, the correlation between these two factors of heterogeneity is positive and very strong (0.91). Women who have the greater risk to give birth have also the greater risk to loose some of their children. This correlation is significant even when mother level covariates are taken into account. This result means that the joint process of fertility and child mortality depends from characteristics of women which are unobserved. These characteristics could be related, for example, to values given to children by women or by couples.

2) The level of education of women has a significant effect in the process of fertility. The higher is the level of education and the lower is the risk of fertility. Level of education does not seem to have directly an effect on infant mortality. In the case of women with a low level of education, the more easily they can read, and the lower are their risk of fertility and child mortality. As expected, abilities to read appear to allow the knowledge of the urban Western family values as well as to give some skills to women in the domain of contraceptive and child care techniques.

3) The status of women, as measured by the type of marriage has also a strong effect. High fertility is associated with arranged marriages and even more if the partner gives a dowry. The dowry is also associated with infant mortality.

4) The higher is the level of education of the partner and the lower is the fertility and child mortality. The diffusion of Western values on children appears to be easier when the man has also some educations.

Conclusion

The example of the Turkey, in which the demographic transition is not far away to be completely accomplished, shows that decrease in fertility and decrease in child mortality could be thought as a joint process. This joint process corresponds to the joint adoption by women, and their partner, of behaviours of limiting fertility and adopting child care techniques which improve the health of children. Couples which adopt these behaviours are the more educated and those who have a life style which allow a better status for women.

However, if this hypothesis of a joint process of adoption appears to be verified in the case of Turkey, we can ask if it remains true in the case of other countries, especially in countries with strong inequalities or, at least, with strong differences in life styles between different social groups. In a similar manner, in a historical perspective, it could be interesting to investigate when and for which reasons the two processes began to coincide.

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