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A Comparative Analysis of Adolescent Fertility in Morocco, Egypt and Turkey

Fas, Mısır ve Türkiye'de adelosan doğurganlığının karşılaştırmalı bir analizi

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Öz: *Bu çalışma Fas, Mısır ve Türkiye'de adölesan (ergen) doğurganlığındaki zaman içindeki değişimin ve adölesan doğurganlığında belirleyicileri olan unsurların içyüzünü anlamayı hedeflemektedir. Çalışmada, sosyoekonomik ve kültürel özellikler kontrol edildikten sonra, adölesan kadınlardaki ilk doğumun zamanlaması ve ilk doğumda belirleyici olan unsurların hesaplanması için Nüfus ve Sağlık Araştırması verileri kullanılmıştır. Erken evlilik, kadının eğitim düzeyinin düşük olması, düşük refah düzeyi ve eşler arasındaki yaş farkının yüksek olması adölesan dönemde çocuk doğurmayı çabuklaştıran başlıca unsurlardır. Bulgular, bu ülkelerde adölesan dönemdeki doğurganlığı düşürmeyi hedefleyen politika ve programların, kadınların ilköğretim sonrası eğitimlerini de desteklemesi gerektiğine işaret etmektedir. Ayrıca, bütün üreme sağlığı programları koca (eş) boyutunu da içermelidir.*
Anahtar Kelimeler*: Adölesan, Doğurganlık, Fas, Mısır, Türkiye*

Abstract: *The present study aims to gain insights into trends and determinant factors of adolescent fertility in Morocco, Egypt and Turkey. The study uses Demographic and Health Surveys data to estimate the timing and determinants of first births among adolescent women after controlling for the effects of socioeconomic and cultural characteristics. Early marriage, low educational attainment of women, poor welfare status and high spousal age difference constitute the major factors facilitating adolescent childbearing. The findings suggest that policies and programs toward decreasing fertility during adolescence in these countries should also be directed to promote female education beyond the primary level. Also all types of reproductive assistance programs should have a husband dimension.*
Keywords*: Adolescent, Fertility, Morocco, Egypt ,Turkey*

1. Introduction

Over the last three decades, countries of the South and East shores of the Mediterranean basin have undergone significant social, economic and political changes that have had a profound impact on individuals' lives. These changes include urbanization, rising income levels, increases in women's educational attainment, improvement of health conditions and globalization, with its new social and cultural dimensions (D'Addato et al., 2008).

Although countries in the South and East Mediterranean region currently display different magnitudes of fertility decline, the last decades have been critical in terms of convergence toward smaller family size. Some recent studies have shown that in the three emblematic countries of the region--Morocco, Egypt and Turkey—the propensity to establish smaller family size has spread across different segments of society (D'Addato et al., 2008). Although recent general fertility trends in these

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countries have been well documented through analysis of demographic sample surveys (Courbage, 1999; Eltigani, 2000 and 2003; D'Addato, 2006; Vignoli, 2006; Yavuz, 2006), adolescent reproductive behavior has not been extensively examined.

Adolescence is a period with special importance in the life course of an individual. As the period of childhood is disappearing, adolescents are presented with various choices for their future lives. Many important life events and health-damaging behaviors start during adolescence (Khan and Mishra, 2008). Today, the effect of rapid social change on adolescents is more visible than ever. The enormous impact of globalization, the spread of information and communication technologies, the influence of HIV/AIDS, profound changes in family structures and conflict and change in intergenerational relations are becoming part of life for adolescents everywhere (United Nations, 2007).

In relation to these social changes, young people have increasingly been the focus of international attention, especially since the adoption of the World Programme of Action for Youth in 1995 by the United Nations General Assembly (United Nations, 1996). This program and the subsequently adopted Millennium Development Goals (MDG) in 2000 encompass the principal set of guidelines and target areas for youth policies (United Nations, 2004; United Nations, 2005; United Nations, 2007). As these plans have served as the reference point for many governments around the world in policies and programs focused on young people, important changes have taken place since the mid-1990s. Considering the demographic effect of such policies, the age at first marriage has risen to the mid-to-late twenties in many areas due to extended school attendance and delayed entry into the labor market, particularly for young women. There has also been a trend among adolescents toward delaying childbearing and having fewer children (United Nations, 2005).

Despite the process of social change toward modernization in Morocco, Egypt and Turkey, social norms in the three countries still strongly prescribe marriage and having at least one child. When marriage and childbearing occur in adolescence, they have far-reaching individual and social consequences. Early marriage and subsequent early childbearing have adverse social and health consequences particularly for females—including dropping out of school, marginalization in the job market, ongoing dependence on males and greater risk of maternal death and loss of their children. Regarding its long-term adverse impact on the quality of life of women and children, adolescent reproductive behavior prevails as one of the major youth policy concerns in Morocco, Egypt and Turkey (UNDP, 2006).

Married adolescent women in these countries face several challenges that make it difficult to protect their health and well-being. They often have low educational attainment and no further schooling options, limited control over resources, highly restricted mobility, shrinking social networks and limited power in their new households (Population Council, 2009a). For these reasons married adolescent girls are the most vulnerable group of adolescents and thus deserve special attention in policies and programs. The present study aims to gain further insights into the specifics of adolescent reproductive behavior in the three countries by looking at trends and determinants of adolescent childbearing. The study focuses upon married adolescent girls, who have significantly different experiences than their unmarried counterparts.

Analysis focuses upon two research questions: First, the study explores how the entry into motherhood among women who married in adolesence has changed in the last decades in Morocco, Egypt and Turkey. Second, we analyze the factors that influence first birth before age 20 for women who married during adolesence.

The study is organized into several sections: *Background* describes changes in the social conditions of the adolescent population in Morocco, Egypt and Turkey from the mid-1990s onwards and provides an overview of selected social and economic determinants of adolescent fertility. *Methodology* explains the data, methods and variables used in the empirical part of the study. The

Results section presents the adolescent childbearing trends and patterns of the three countries, through hazard models. *Discussion* explores these findings further and offers conclusions.

2. Background: Changes in The Social Conditions of The Adolescent Population Since The Mid-1990s

Morocco, Egypt and Turkey are three predominantly Muslim countries in the South and East Mediterranean region. According to the *World Population Prospects: The 2008 Revision* (United Nations, 2009), the population of Morocco in 2010 is estimated at 32.4 million, Egypt at 84.5 million, and Turkey at 75.7 million. Adolescents age 10-19 comprise almost one-fifth of the total population in Morocco, Egypt, and Turkey, as of 2010 (Table 1).

Table 1. Total population and adolescent population (age 10-19) in Morocco, Egypt, and Turkey, 1995 and 2010

		Morocco		Egypt		Turkey	
	Age	1995	2010	1995	2010	1995	2010
Total population (thousands)		26,951	32,381	63,858	84,474	61,206	75,705
Adolescent population (000)	10-14	3,386	3,032	8,052	8,464	6,930	6,886
	15-19	2,947	3,178	6,934	8,079	6,642	6,812
Total adolescent population (000)	10-19	6,333	6,210	14,986	16,543	13,572	13,698
Adolescents as percentage of total population (%)	10-14	12.6	9.4	12.6	10.0	11.3	9.1
	15-19	10.9	9.8	10.9	9.6	10.9	9.0
Percentage change in adolescent population 1995-2010 (%)	10-14	-10.5		5.1		-0.6	
	15-19	7.8		16.5		2.6	
	10-19	-1.9		10.4		0.9	

Source: United Nations, 2009

Turkey scores in the high range of the Human Development Index[1] (HDI at 0.806) as per the Human Development Report 2009 (UNDP, 2009). Egypt and Morocco exhibit similar levels of development and are classified in the middle range of the HDI (Egypt 0.703, Morocco 0.654). Among the three countries, the HDI has grown fastest in Morocco since the 1990s. The per capita gross domestic product (GDP), which has constantly increased in the three countries in recent decades, is substantially higher in Turkey (US$ 12,955) than in Egypt (US$ 5,349) or Morocco (US$ 4,108).

Socioeconomic developments have played a significant role in driving both rising age at marriage and desire for smaller families in Morocco, Egypt and Turkey, which in turn have resulted in fertility declines. In the mid-1990s the Total Fertility Rate (TFR) was 3.6 children per woman in Morocco, 3.9 children per woman in Egypt and 2.9 children per woman in Turkey. Following a decade of rapid fertility decline in Morocco and Turkey, the TFR now is approaching the replacement level (TFR 2.4 in Morocco and 2.1 in Turkey in 2007). In Egypt the fertility decline has been slower over the same period (TFR 2.9 in 2007) (see Appendix Table A1).

As empirical studies have shown, urbanization has a potentially important influence on the societal environments of adolescents. Changes in socioeconomic structural factors have a stronger impact in urban areas than rural areas. Urbanization usually is associated with rising income levels, growing opportunities for education and employment, cultural diversity, openness to change, and family planning program efforts (Rodriguez and Cleland, 1981). Nevertheless, in urban areas poor adolescents may not be able to easily take advantage of available key development resources. For example, studies have shown that urban poor adolescents have lower school enrollment rates than their wealthier counterparts (Population Council, 2009a).

In Turkey nearly 70 percent of the population lives in urban areas, compared with 55 percent of Morocco's population and 43 percent of Egypt's population (see Appendix Table A1). According to Eltigani (2000), over the last several decades the pace of urban growth has slowed in Egypt as rural-to-urban migration has been replaced by the daily flow of people between rural and urban areas. In Morocco and Turkey, however, migration from regions that are relatively socially and economically less developed to urban areas that are more developed has constituted one of the major population trends (Eltigani, 2000; Kocaman, 2008).

Educational attainment reflects human capital, which plays an important role in the social and economic outcomes of individuals and societies. Education is also one of the most critical components of a healthy transition to adulthood for adolescents. In terms of demographic outcomes, schooling of adolescents has been associated with delays in the age at first sex, marriage, and childbearing (Population Council, 2009a).

Rates of school attendance by adolescents in the three countries show substantial increases between the mid-1990s and mid-2000s. As Table 2 shows, the percentage of adolescents, especially age 10-14, attending school at any level has increased considerably. Among girls age 15-19, however, attendance at secondary school or higher levels is only 35 percent in Morocco and 33 percent in Turkey, compared with almost 80 percent in Egypt, as of 2005. In all three countries gender differentials in school attendance favor boys. The gap in school attendance between girls and boys is smaller at age 10-14 but becomes more evident at age 15-19.

Table 2. School attendance among adolescents age 10-14 and 15-19 in Morocco (1992 and 2003/04), Egypt (1992 and 2005), and Turkey (1993 and 2003/04)

		School attendance* among girls and boys age 10-14 (in percent)					
		Girls			Boys		
		Not in school	Attending primary	Attending secondary	Not in school	Attending primary	Attending secondary
Morocco	1992	58.9	31.8	9.3	39.8	47.5	12.6
	2003	25.4	54.7	19.9	17.3	62.9	19.8
Egypt	1995	27.1	27.9	45.0	17.4	31.2	51.4
	2005	7.2	52.7	40.2	2.1	56.9	41.0
Turkey	1993	36.8	36.6	26.6	20.8	44.0	35.2
	2003	13.5	29.8	56.8	4.5	33.8	61.7

		School attendance* among girls and boys age 15-19 (in percent)					
		Girls			Boys		
		Not in school or attending primary	Attending secondary	Attending higher	Not in school or attending primary	Attending secondary	Attending higher
Morocco	1992	78.1	21.7	0.3	68.3	31.4	0.3
	2003	65.1	33.1	1.7	59.5	38.8	1.7
Egypt	1995	56.9	37.1	6.1	45.4	47.6	7.1
	2005	18.9	64.6	16.5	7.0	76.9	16.0
Turkey	1993	76.3	21.5	2.3	61.0	36.5	2.5
	2003	64.0	29.5	6.5	50.7	41.9	7.4

Note: Figures presented on the table are based on analysis of DHS data of each country
* Attendance at any time during school year
Sources: Population Council 2001a, 2001b, 2002, 2009a, 2009b, and 2009c

In Morocco, Egypt and Turkey marriage is a principal indicator of women's exposure to the risk of childbearing. Early marriage often leads to a higher total number of lifetime births due to a longer period of exposure to the risk of pregnancy. According to recent DHS surveys in all three countries, slightly more than 10 percent of adolescent women age 15-19 are ever-married (Table 3).

Making decisions on contraceptive use and method selection based on adequate information is a crucial factor in family planning. In order to gain access to and use the right contraceptive method women must first be familiar with contraceptive methods. Knowledge of at least one family planning method is almost universal among adolescent women in the three countries, and almost all adolescent women know at least one modern contraception method.

Changes in contraceptive prevalence and method use among adolescent women vary by country (Table 3). The percentage of married adolescent women using contraception declined between 1993 and 2003 in Morocco but rose substantially in Egypt and Turkey. In Morocco and Egypt married adolescent women mainly use modern methods, whereas in Turkey married adolescent women rely heavily on traditional or folk methods.

The proportion of ever-married adolescent women who have began childbearing (or are pregnant with a first child) is 6.4 percent in Morocco, 9.4 percent in Egypt and 7.5 percent in Turkey, according to DHS surveys conducted in the mid-2000s. Compared with findings from surveys in the early 1990s, some decline in the proportion of adolescents who have begun childbearing is seen in Morocco and Turkey, but little decline in Egypt. In all three countries the proportion of adolescent women starting to have children increases rapidly after age 17.

Table 3. Marital status, contraceptive knowledge and use, and childbearing among adolescent women age 15-19 in Morocco (1992 and 2003/04), Egypt (1992 and 2005), and Turkey (1993 and 2003/04)

	Morocco		Egypt		Turkey	
	MDHS 1992	MDHS 2003/04	EDHS 1992	EDHS 2005	TDHS 1993	TDHS 2003/04
Marital Status (%)						
Never married	89.5	89.0	86.1	87.5	86.5	88.1
Ever married	10.5	11.0	13.9	12.5	13.5	11.9
Knowledge of contraception (%)						
Any method	98.8	99.7	98.2	99.9*	98.5	98.4
Modern method	98.8	99.7	97.9	99.9*	98.3	98.0
Current Use of contraception (%)**						
Any method	43.1	38.4	13.3	26.3	24.1	44.3
Any modern method	39.9	35.9	12.7	24.1	9.3	16.9
Any traditional or folk method	4.3	2.5	0.6	2.2	14.8	27.5
Adolescents who have began childbearing by age (%)						
15	0.7	1.4	1.2	0.5	1.0	0.2
16	4.2	1.7	3.9	2.2	3.4	1.3
17	6.3	5.8	6.1	6.5	8.1	5.3
18	9.3	8.9	12.8	15.0	14.5	11.4
19	16.0	15.3	20.8	22.7	23.1	20.7
Total	7.1	6.4	9.9	9.4	9.3	7.5

Source: *Morocco*: Azelmat et al., 1993, Ministère de la Santé et al., 2005: *Egypt*: EI-Zanaty et al., 1994, EI-Zanaty and Way, 2006; *Turkey*: Ministry of Health, 1994; HUIPS, 2005

* Ever-married women age 15-49

** Married adolescent women at survey date

Adolescents who have began childbearing (%) is the percentage of ever-married women age 15-19 who had children or were pregnant with their first child at survey date

3. Theoretical Considerations on Adolescent Fertility

Individual and household-level explanatory factors that affect fertility in general and adolescent fertility in particular in Morocco, Egypt and Turkey can be grouped under two broad headings: socioeconomic and cultural factors.

Among socioeconomic factors, findings on adolescent reproductive behavior in developing countries have consistently shown that an increase in educational attainment is one of the strongest factors associated with decreasing adolescent fertility (Gupta and Leite, 1999; Koç and Ünalan, 2001; Cesar and Vignoli, 2006; Nahar and Min, 2008; Khan and Mishra, 2008). Fertility decline in fact is mostly initiated and maintained by women who are relatively more educated and urbanized and from more affluent households. But analyses of fertility determinants also have shown that the influence of women's education on fertility is not independent from her husband's education (Martin and Juarez, 1995). In Morocco, Egypt and Turkey men on average are more educated than women and, at all educational levels, are more actively participating in the labor force. Because more education typically brings more income, the husband's educational attainment can be seen as an appropriate proxy for the socioeconomic level of families. Thus the effect of women's education on fertility behavior can be better examined when the independent effects of men's education are considered as well (Kravdal, 2000).

Adolescent women's place of residence is another socioeconomic factor associated with fertility behavior. In most developing countries, levels of teenage pregnancy are higher in rural areas than urban areas (United Nations, 2005; Khan and Mishra, 2008). Explanations of this discrepancy are related to differential opportunities in education and employment between rural and urban areas.

Social and cultural factors are also important. Fertility behavior is an eminently social behavior and, as such, is influenced both by the decisions of individuals and couples and also by the social context. That is, the socioeconomic factors that affect fertility, such as women's education, cannot be regarded as independent of the cultural setting that conditions them. In patriarchal settings as in Morocco, Egypt and Turkey, marriage has broad implications for women's changing roles and status. A newly married woman may bear a child-and preferably a son-as soon as possible in order to strengthen the bond with her husband and to establish her status in the family and society in general. From the perspective of a couple, the transition to motherhood/fatherhood can change the interpersonal relationships with relatives and other members of the society. Entry into parenthood can improve a young couple's social status and can simplify access to supportive resources that help to reduce the cost of having children, thus stabilizing the economic situation of a household (Bühler, 2006).

Prevailing gender norms in a society affect individual perceptions about women's own control over decision-making. Unequal gender relations, internalized by individuals often very early in life, may create significant barriers to the empowerment of women and women's autonomy in all social spheres of life. This kind of gender norm may prevent women from using contraception and other means to achieve their desired timing and spacing of children. As documented in the literature, for example, women who agree that there are circumstances under which it is acceptable for a husband to beat his wife are more likely than other women to report unintended pregnancies (Population Council, 2009a).

Cultural variables are difficult to measure with comparable indicators over different countries. In order to examine this dimension in the empirical analysis, a researcher should find relevant proxy variables. In the context of Morocco, Egypt and Turkey, the social environment of women can be categorized as more or less "traditional" regarding certain characteristics of their marriages. Women's status is assumed to be relatively lower for more traditionalistic marriage types than in more egalitarian marriage types. Spousal age difference can be a relevant proxy in this sense, because the young age of a woman combined with the older age of her partner intensifies power differentials in the relationship. A large age difference between husband and wife may worsen a young bride's disadvantage in negotiating with her husband on matters such as her own health care needs or contraceptive use (Rahsad et al., 2005)

Consanguineous marriage (marriage between relatives), a common characteristic of the South and East shores of the Mediterranean basin, can be another proxy for the cultural dimension. These

unions tend to occur at earlier ages and are more prevalent among poor, less educated and traditional families (Koç, 2008). In relation to these characteristics, fertility is higher among women in consanguineous marriages than in non-consanguineous marriages (Bittles, 2001).

4. Data, Method, Variables and Study Population

The study is based on retrospective survey data from the Morocco DHS (MDHS) 2003/04, Egypt DHS (EDHS) 2005 and Turkey DHS (TDHS) 2003. All three surveys were based on nationally representative samples that were selected with a weighted, stratified cluster sampling approach. The MDHS-2003/04 interviewed 7,074 never-married women and 9,724 ever-married women age 15-49 (Ministère de la Santé et al., 2005). The EDHS 2005 covered 19,474 ever-married women age 15-49 (EI-Zanaty and Way, 2006), while the TDHS 2003 conducted interviews with 8,075 ever-married women age 15-49. Also, in the TDHS household questionnaire a short module provided further information on never-married women age 15-49 (HUIPS, 2005).

The method used in this analysis should be able to ascertain how and to what extent the entry into motherhood is systematically related to an adolescent woman's individual and household-level characteristics. One appropriate way of analyzing such data is to apply proportional-hazard models that deal with rates of transition from one social status to another, combining aspects of the life table and regression techniques (Blossfeld and Rohwer, 2002). By using hazard models it will be possible to evaluate how married adolescent women's first-birth transition rates are dependent on their demographic, socioeconomic and socio-cultural characteristics. Transition rates of first births are estimated with a *piecewise constant intensity regression model* where an adolescent woman's first-birth rate is defined as the probability of her experiencing a first birth within the next month based on her individual-level characteristics and given that she has not given birth by the beginning of the month. The basic process time variable of the hazard regression is the number of months elapsed since an adolescent woman turns age 10. The baseline duration of hazard is categorized into several time intervals where the hazard rates are assumed to be constant within each time interval but may vary across such intervals. The hazard models are estimated in STATA, using the STPIECE module for piecewise constant hazard rate models (Sorensen 1999).

Even though the DHS included a wide range of retrospective questions on birth histories of women, most background characteristics were not collected with individual life histories. That is, many useful attributes of women, such as type of place of residence and contraceptive use, are difficult to examine in conjunction with first births. Besides this limitation, selection of the variables was conditioned by the availability of comparable data for the three countries under study.

Two different data sets and two different hazard regression models were obtained to address two research questions in this study. The samples are analyzed separately for the three countries. The first dataset includes both never-married and ever-married women. Because the Egypt and Turkey surveys are based on the ever-married women sample, a different procedure was followed in order to include never-married women in the analysis. All variables pertaining to never-married women age 10-49 are taken from the household member data set of these countries. In the household member data file the completed age of never-married women in the survey year was recorded. This 'age of the household member' variable is used to estimate year-of-birth information for each never-married woman. A random variable was generated to assign a month of birth to each never-married woman. Using 'year of birth' and 'month of birth' variables, we calculated a Century Month Code (CMC)[2] variable, which is used in estimation of the basic process time variable of the hazard regressions.

Because having a birth outside marriage is very rare in the three countries, in the dataset that we constructed we assumed that never-married women have not given birth.

4.1. Model 1- Trends for the Entry into Motherhood:

The first model is used to examine the trend of the entry into motherhood before age 20 among women who had married during adolesence. Table 4 provides a description of the study population used for Model 1, where we estimated the hazard of a having a first birth before age 20 for all women age 15-49 over the calendar period. As the table shows, among women age 15-49 one-third in Morocco and nearly one-fourth in Egypt and Turkey were married during adolescence. In all three countries, among women who married before age 20 almost 35 percent gave birth before age 20.

Table 4. Descriptive statistics of the Model 1, women age 15-49 in Morocco (2003/04), Egypt (2005), and Turkey (2003/04)

	Morocco		Egypt		Turkey	
	Number	**%**	**Number**	**%**	**Number**	**%**
Marital Status						
Never married	7,074	42.1	9,544	32,9	3,824	32.4
Married before age 20	5,548	33.0	10,804	37.3	4,570	38.7
Married after age 20	4,175	24.9	8,622	29.8	3,419	28.9
Birth Status[1]						
Has given birth before age 20	3,436	35.3	6,812	35.1	2,955	37.0
Has given birth after age 20	5,194	53.4	10,775	55.4	4,340	54.3
Has not given birth	1,094	11.3	1,839	9.5	694	8.7
Total[2]	16,797	100.0	28,970	100.0	11,813	100.0

[1] Among ever-married women 15-49
[2] Data shown is weighted using sample weight

We included two independent variables in this model[3]: Calendar period and educational attainment of woman. In each variable the level selected as the reference category is given in ***bold italics*** below:

1. *Calendar period (time-varying)*: This variable intends to capture the influence of the overall social milieu on the first birth intensities. There are six levels: ***'Before 1990',*** '1990-1992', '1993-1995', '1996-1998', '1999-00', and '2001-2003/04'.
2. *Educational attainment of woman*: This variable is recorded as years of schooling completed. There are two levels: 'No education (0 years of schooling)' and '***Primary incomplete or higher (at least 1 year of schooling)***'. As for other covariates, educational attainment refers to the level obtained by the date of the survey. It is assumed that educational characteristics obtained before first birth are not prone to significant change subsequently. Women who marry early, and especially in adolescence, typically leave school at a younger age than women who marry later.

4.2. Model 2- First Birth during Adolescence by Background Characteristics:

The second model and dataset are used to explore determinants of first birth before age 20. The fertility experience of the cohort age 15-19 was not completed at the survey date, as the women were still in adolescence. In order to better examine timing of childbearing before age 20, we also included those respondents age 20-24 in the analysis too. As marriage remains the predominant social norm in Morocco, Egypt and Turkey and nearly all births occur within marital unions, the study focused on women in (first) marital union who had married during adolescence. We assumed that the

individual and household-level characteristics of married adolescent women before the first birth at the time of survey were not radically different.

The determinants of first birth before age 20 examined with a separate hazard regression model. The study population of Model 2 is composed of currently married women age 15-24 who married before age 20. Distributions of these women by age at marriage in Morocco, Egypt and Turkey indicate that in all three countries nearly three of every four women were married before age 20 (see Table 5).

Table 5 also presents that among currently married adolescents age 15-24 who married before age 20, the proportion giving birth during adolescence is almost identical in the three countries.

Table 5. Currently married women age 15-24 by whether they married before age 20 and have given a birth by the survey date, in Morocco (2003/04), Egypt (2005), and Turkey (2003/04)

	Morocco		Egypt		Turkey	
	Number	**%**	**Number**	**%**	**Number**	**%**
Married before age 20						
Has not given birth	279	26.0	610	22.7	191	21.3
Has given birth before age 20	610	56.8	1,536	57.2	538	59.8
Has given birth after age 20	185	17.2	539	20.1	170	18.9
Total*	1,074	100.0	2,685	100.0	899	100.0
Married before age 20	1,074	76.2	2,685	73.5	899	72.5
Married after age 20	336	23.8	969	26.5	341	27.5
Total*	1,409	100.0	3,655	100.0	1,240	100.0

***** Data shown is weighted using sample weight

In the second hazard regression model[4] we employed seven independent variables. As before, in each variable the level selected as reference category is given below in ***bold italics***:

<u>*Demographic variable:*</u>

1. *Age at marriage*: There are two levels: 'Less than 18' and ***'18 or higher'***.

<u>*Socioeconomic variables:*</u>

2. *Educational attainment of woman:* There are three levels: '0-4 years', '5-7 years', and ***'8 or more years'***.

3. *Educational attainment of husband:* There are four levels: '0-4 years', '5-7 years', ***'8 or more years',*** and 'Missing'.

4. *Wealth status of household:* This index, available in original datasets, is created by using information on household ownership of a number of consumer items and on dwelling characteristics (Rutstein, 2006). Although the original variable is presented in quintiles, we introduced this variable in hazard regression with two levels: 'Below middle' (poorest and poorer) and ***'Middle or over'*** (middle, rich and richest).

<u>*Socio-cultural variables:*</u>

5. *Consanquinity*: There are three levels: '***Not related'***, 'Related', and 'Missing'.

6. *Spousal age difference*: There are three levels: '***0 to 4 years***', '5 years or more', and 'Missing'.

7. *Women's attitudes toward wife beating*: All respondents in the three surveys were asked whether they thought a husband would be justified in beating his wife in each of the following five situations: if she burns the food, if she argues with him, if she goes out without telling him, if she neglects the children, and if she refuses to have sexual relations. Using information collected from these five variables, we formed a new variable: women's attitudes toward wife beating. There are three levels: ***'Not accepting'*** (if a woman answered no to all five questions), 'Accepted at least one of the reasons' (if a woman answered yes to at least one of the five questions), and 'Missing'.

5. Trends and Determinants of Adolescent Childbearing

The results of the first hazard model (Table 6) seem to be generally robust in illustrating the effect of calendar period and educational characteristics of women on the hazard of having a first birth during adolescence. The hazard of experiencing childbearing during adolescence decreases over time in all three countries, while the extent of the decrease varies by country.

Among women age 15-49 in Morocco, results of the Model 1 shows a faster decline in the risk of having a first birth by age 20 until the mid-1990s than the decline from the mid-1990s to 2003/04. In Egypt and Morocco the relative risk declined swiftly until the mid-1990s compared to its level before 1990. Since then, however, the hazard of progression to first birth during adolescence shows only a minor change. Overall, compared to its level before 1990, in Egypt the relative risk is 22 percent lower in the period 2001-2003/04. In Turkey, unlike Morocco and Egypt, the relative risk declined with an almost constant pace until the beginning of the 2000s. The pace of decline seems to be particularly faster since then. In the last period, 2001-2003/04, the relative risk is almost 80 percent lower than in the period before 1990.

Table 6. Results of the Model 1: Relative risks and 95% confidence intervals (CI) showing the effect of calendar period and education on first birth by age 20 among women age 15-49 in Morocco (2003/04), Egypt (2005), and Turkey (2003/04)

	Morocco			Egypt			Turkey		
	Relative risk	95% CI		Relative risk	95% CI		Relative risk	95% CI	
Calendar Period									
Before 1990	***1.00***			***1.00***			***1.00***		
1990-1992	0.73***	0.65	0.82	0.93*	0.86	1.00	0.87***	0.77	0.99
1993-1995	0.64***	0.56	0.72	0.76***	0.70	0.83	0.77***	0.67	0.88
1996-1998	0.62***	0.55	0.70	0.81***	0.75	0.88	0.59***	0.51	0.68
1999-2000	0.57***	0.49	0.67	0.75***	0.68	0.82	0.52***	0.44	0.63
2001--2003/04	0.50***	0.44	0.57	0.78***	0.72	0.85	0.24***	0.19	0.30
Educational Attainment of Woman									
No education (0 year)	2.71***	2.49	2.94	2.77***	2.64	2.91	1.87***	1.71	2.05
Primary incomplete or more (at least 1 year)	***1.00***			***1.00***			***1.00***		
Log pseudo-likelihood	-7806.27			-13078.173			-5698.45		

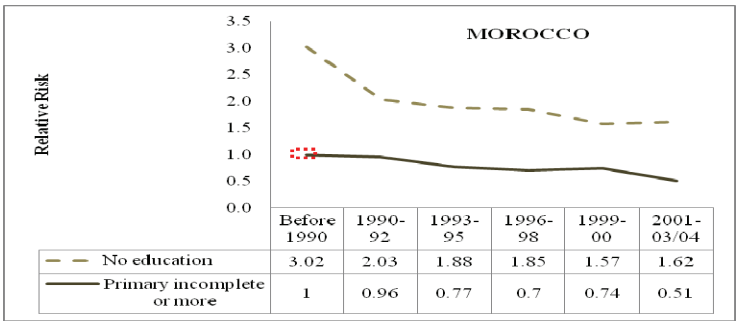
*** p < 0.01, ** p < 0.05, * p < 0.1

In all three countries the hazard of having a first birth during adolescence declines considerably as women's educational attainment increases. The difference between relative risks of women with no education and women with some educational attainment is more pronounced in Morocco and Egypt than in Turkey.

The process of decline in childbearing during adolescence can be better examined with an interaction model fitted between the calendar period and educational attainment of women (Figure 1-3, and see also Appendix Table A4). In Morocco the likelihood of giving birth during adolescence was reduced nearly by half from the beginning of the 1990s to 2001-2003/04, regardless of women's educational attainment. The results show that the relative risks decreased with a highly similar pace over time for the two educational groups of women.

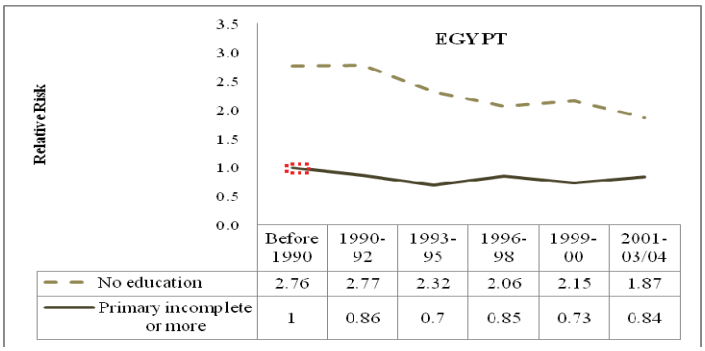
In Egypt trends for women with and without educational attainment followed different paths. The hazard of childbearing during adolescence for the group with no education declined constantly from the beginning of 1990s to the most recent period. For women with some educational attainment, at first the hazard declined until the mid-1990s, but since then this trend loses its momentum. Overall, the relative risk declined only 16 percent for women with some educational attainment from the first to the last period.

In Turkey, for both women with and without educational attainment, the results show considerable decline in the likelihood of experiencing adolescent childbearing over the study period. As shown on Figure 3, in Turkey the relative decline in hazard for women with no educational attainment was moderately stronger than the relative decline in hazard for women with some educational attainment. In the last calendar period (2001-2003/04) the relative risk is lower by 90 percent for women with no education, and 70 percent for women with some educational attainment, than for the corresponding relative risk up to 1990.



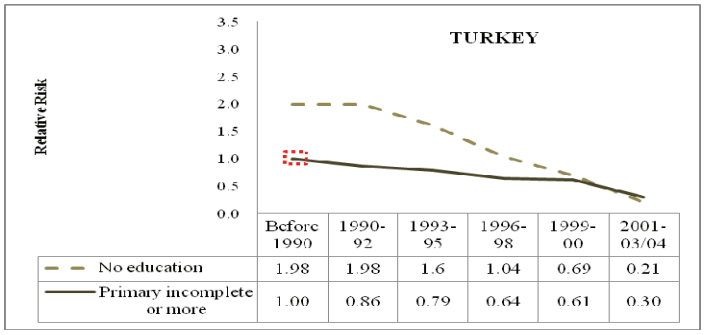
	Before 1990	1990-92	1993-95	1996-98	1999-00	2001-03/04
No education	3.02	2.03	1.88	1.85	1.57	1.62
Primary incomplete or more	1	0.96	0.77	0.7	0.74	0.51

Figure 1. Relative risks of first birth by age 20 among women age 15-49, by interaction between calendar period and educational attainment of woman. Risk relative to calendar period 'Before 1990' and 'Primary incomplete or more' categories, in Morocco (2003/04)



	Before 1990	1990-92	1993-95	1996-98	1999-00	2001-03/04
No education	2.76	2.77	2.32	2.06	2.15	1.87
Primary incomplete or more	1	0.86	0.7	0.85	0.73	0.84

Figure 2. Relative risks of first birth by age 20 among women age 15-49, by interaction between calendar period and educational attainment of woman. Risk relative to calendar period 'Before 1990' and 'Primary incomplete or more' categories, in Egypt (2005)



	Before 1990	1990-92	1993-95	1996-98	1999-00	2001-03/04
No education	1.98	1.98	1.6	1.04	0.69	0.21
Primary incomplete or more	1.00	0.86	0.79	0.64	0.61	0.30

Figure 3. Relative risks of first birth by age 20 among women age 15-49, by interaction between calendar period and educational attainment of woman. Risk relative to calendar period 'Before 1990' and 'Primary incomplete or more' categories, in Turkey (2003/04)

Table 7 presents the effects of demographic, socioeconomic and socio-cultural characteristics on the hazard of childbearing before age 20 among currently married women age 15-24. As expected, marriage before age 18 notably increases the chance of having a first birth during adolescence. In all three countries women's educational attainment, especially 8 or more years of schooling, appears to be an important determining factor of adolescent childbearing, whereas husband's educational attainment does not have a similar influence. In Morocco and Egypt, middle-or-higher level household wealth status has a reducing impact on adolescent childbearing. Among the covariates that control for the socio-cultural dimension, only spousal age difference is found to have an impact on progression to first birth during adolescence. Relative risks of experiencing adolescent births for women who have five or more years age difference with their husbands are almost 20 percent higher compared to women the same age or who have less than five years age difference with their husbands, in all three countries.

Table 7. Results of the Model 2: Relative risks and 95% confidence intervals (CI) of first birth in adolescence among currently married women age 15-24 who married before age 20, in Morocco (2003/04), Egypt (2005), and Turkey (2003/04)

	Morocco			Egypt			Turkey		
	Relative risk	95% CI		Relative risk	95% CI		Relative risk	95% CI	
Age at marriage									
Less than 18 (<18)	5.92***	4.86	7.20	3.64***	3.20	4.14	6.57***	5.31	8.12
18 or higher (18≤)	***1.00***			***1.00***			***1.00***		
Educational attainment of woman									
0-4 years	1.52**	1.13	2.04	1.17*	0.99	1.39	1.23	0.89	1.70
5-7 years	1.21	0.84	1.71	1.24**	1.00	1.55	1.19	0.94	1.50
8 or more years	***1.00***			***1.00***			***1.00***		
Educational attainment of husband									
0-4 years	1.03	0.82	1.29	0.99	0.84	1.18	1.28	0.88	1.86
5-7 years	0.96	0.74	1.25	1.02	0.84	1.24	1.04	0.85	1.27
8 or more years	***1.00***			***1.00***			***1.00***		
Wealth status of household									
Below middle	1.22*	1.02	1.45	1.20*	1.04	1.39	1.11	0.91	1.35
Middle or over	***1.00***			***1.00***			***1.00***		
Consanguinity									
Not related	***1.00***			***1.00***			***1.00***		
Related	0.95	0.81	1.12	0.99	0.87	1.13	1.05	0.85	1.28
Spousal age difference									
0 to 4 years	***1.00***			***1.00***			***1.00***		
5 years or more	1.21*	1.00	1.47	1.16**	0.99	1.35	1.22*	1.00	1.49
Women's attitudes toward wife beating									
Not accepting	***1.00***			***1.00***			***1.00***		
Accepted at least one of the reasons	1.02	0.84	1.23	0.99	0.87	1.15	0.99	0.82	1.20
Log pseudo-likelihood	-287.62			-801.29			-172.19		

*** p < 0.01, ** p < 0.05, * p < 0.1

6. Discussion

Young people constitute the largest component of the total population in Morocco, Egypt and Turkey. Integration of youth, especially adolescents ages 10-19, into the general development is one of the major challenges of these countries (UNDP, 2006). Early marriage and subsequent early childbearing constitute another predicament that especially concerns adolescent girls. When these demographic events occur in adolescence, they can have far-reaching adverse social and health consequences for females. Additionally, in terms of its demographic outcomes, continued prevalence of adolescent childbearing is of particular concern to Morocco, Egypt and Turkey because shorter spans between generations are a key factor in rapid population momentum and growth.

In this study, we first explored changes in the progression to first birth among women who married in adolescence over the past two decades. The probability of having a first birth before age 20 has declined substantially since the mid-1990s in Morocco and in Turkey but only moderately in

Egypt. Further exploration of the observed trends in each country suggests that the decline in adolescent childbearing has been a general trend in Morocco and Turkey, as the processes were driven by women from all socioeconomic segments. In Egypt, however, the decline in adolescent childbearing over the last decade has been driven mainly by women with the lowest educational attainment, that is, women from lower socioeconomic segments of the society.

Second, the results show that age at first marriage, as defining the beginning of exposure to the risk of giving birth, appears to be the strongest determinant of adolescent childbearing in the social context of Morocco, Egypt and Turkey. Lower age at first marriage (below age 18) obviously increases the probability of becoming an adolescent mother. Besides early marriage, low educational attainment of women, poor welfare status and high spousal age difference constitute major socioeconomic and socio-cultural factors associated with adolescent childbearing in all three countries.

Opinion leaders in Morocco, Egypt and Turkey have been singling out adolescent marriage and childbearing as an independent issue and increasingly have begun to deal with it. Findings of this study point out that policies and programs designed to delay marriage can accelerate a decline in adolescent childbearing. In fact, in the last decade changes in this direction have occurred in the juridical sphere of these countries. Despite the criticism of conservatives, as a result of ongoing efforts to improve the status of women the minimum marriageable age for girls has risen from 15 to 18 in all three countries[5]. These new legal arrangements, however helpful they will be, may not alone satisfyingly settle the matter. Behind adolescent marriage are several societal factors that could keep women from enjoying these new rights[6]. It is worth mentioning that adolescent marriages are more widespread in the rural and socioeconomically less developed parts of these countries, where societal changes may lag behind the juridical modernization.

As several previous studies have shown, the more education an adolescent in these countries receives, the less likely she is to marry during adolescence (Population Council 2001a, 2001b and 2002). Our study additionally shows that the educational attainment of an adolescent girl at marriage has an impact on her subsequent childbearing. The higher the educational attainment of an adolescent before marriage, the less likely she is to give birth before age 20. In this respect, along with juridical reforms the three countries should adhere to policies that improve access to education for adolescents, and especially for girls.

Our study also suggests that programming efforts should be directed to education beyond the primary level. Increasing the proportion of the adolescent population attaining a secondary-level education (eight or more years of schooling) will further raise age at marriage and thereby will reduce the likelihood of giving a birth during adolescence. Of course, for Morocco a focus upon making progress in primary school attendance should have more priority due to fact that in Morocco primary-level attendance lags behind that in Egypt and Turkey. The experience of Turkey could set a good example, where compulsory schooling was raised from five to eight years at the beginning of the 1997-1998 school years. The fact that we found accelerated decline in adolescent childbearing in Turkey in 2001 onwards appears related to this policy change.

For married adolescents, improving access to effective contraceptive methods can be an additional policy option. Hence, the programming efforts of reproductive health programs should be reconsidered especially in Egypt and Turkey, where modern contraceptive method use among married adolescents is at lower levels than in Morocco. Moreover, as in all three countries our analysis shows that the large age difference between husbands and wives brings elevated risk of adolescent childbearing, all types of programs aimed at decreasing childbearing during adolescence should have a husband dimension.

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Notes

1. The Human Development Index (HDI) is a composite index measuring average achievement by three basic dimensions of human development: a long and healthy life (life expectancy index); knowledge (education index); and a decent standard of living (GDP development). For the change in HDI over time and in selected social and economic development indicators, see Appendix Table A1.
2. In order to form Century Month Codes (CMC) variable we followed standard DHS procedure (see Rutstein and Rojas, 2006).
3. The distribution of person-months (exposures) and number of first births (events) across categorical variables of the Model 1 is presented in Appendix Table A2.
4. The distribution of person-months (exposures) and number of first births (events) across categorical variables of the Model 1 is presented in Appendix Table A3.
5. The minimum age at marriage for both sexes is set at 18 years with a new Family Code, adopted at the beginning of 2004 in Morocco (Bordat and Kouzzi, 2004), with amendments to the Child Law that were adopted in June 2008 in Egypt (Samaan, 2008), and with reformation of the Civil Code at the beginning of 2002 in Turkey (Ilkkaracan and Bertay, 2002).
6. For the challenges of implementing legal arrangements in these countries, see (Bordat and Kouzzi, 2004; Kulu, 2009).

References

Azelmat, M., M. Ayad, and E.A. Housni. (1993) *Enquête Nationale sur la Population et la Santé Familiale (ENPS-II) 1992.* Ministère de la Santé Publique (Maroc), Macro International Inc. and Ligue des États Arabes.

Bordat, S.W. and S. Kouzzi. (2004) The Challenge of Implementing Morocco's New Personal Status Law. *Carnegie Endowment for International Peace's Arab Reform Bulletin* 2(8): September 20, 2004.

Büchler, C. (2006) On the Structural Value of Children and Its Implication on Intended Fertility in Bulgaria. MPIDR Working Papers WP 2005-003.

Bittles A. (2001) Consanguinity and Its Relevance to Clinical Genetics. *Clinical Genetics* 60: 89-98.

Blossfeld, H.P. and G. Rohwer. (2002) *Techniques of Event History Modeling: New Approaches to Causal Analysis (second edition).* Lawrence Erlbaum Associates: London.

Cesare, M. and R. Vignoli. (2006) Micro Analysis of Adolescent Fertility Determinants: The Case of Brazil and Colombia. *Papeles de Poblacion* 12(48): 93-121.

Courbage, Y. (1999) New Demographic Scenarios in the Mediterranean Region. *Chaier* 142, Ined/Puf. VI-200 p. (Travaux et documents).

D'Addato, A.V., D. Vignoli, and S. Yavuz. (2008) Towards Smaller Family Size in Egypt, Morocco and Turkey: Overall Change Over Time or Socio-economic Compositional Effect? *Population Review* 47(1): 21-40.

D'Addato, A.V. (2006) Progression to Third Birth in Morocco in the Context of Fertility Transition. *Demographic Research* 15(19): 517-536.

Eltigani, E.E. (2000) Changes in Family-Building Patterns in Egypt and Morocco: A Comparative Analysis. *International Family Planning Perspectives* 26(2): 73-78.

Eltigani, E.E. (2003) Stalled Fertility Decline in Egypt, Why? *Population and Environment* 25(1): 41-59.

EI-Zanaty, F.H., H.A.A. Sayed, H.H.M. Zaky, and A.A. Way. (1994) *Egypt Demographic and Health Survey 1992.* National Population Council: Cairo, Egypt.

El-Zanaty, F.H. and A.A. Way. (2006) *Egypt Demographic and Health Survey 2005.* Ministry of Health and Population, National Population Council, El-Zanaty and Associates, and ORC Macro: Cairo, Egypt.

Gupta, N. and I.C. Leite. (1999) Adolescent Fertility Behavior: Trends and Determinants in Northeastern Brazil. *International Family Planning Perspectives* 25(3): 125-130.

Hacettepe University Institute of Population Studies [HUIPS]. (2005) *Turkey Demographic and Health Survey 2003.* Hacettepe University Institute of Population Studies, Ministry of Health General Directorate of Mother and Child Health and Family Planning, State Planning Organization and European Union: Ankara, Turkey.

Ilkkaracan, P. and A. Berktay. (2002) Women in Turkey Finally Gain Full Equality in the Family: The New Civil Code in Turkey. *The Middle East Women's Studies Review* 22(March).

Kocaman, T. (2008) *Türkiye'de İç Göçler ve Göç Edenlerin Nitelikleri (1965-2000).* T.C. Başbakanlık Devlet Planlama Teşkilatı, Sosyal Sektörler ve Koordinasyon Genel Müdürlüğü: Ankara, Türkiye.

Koç, İ. and T. Ünalan. (2001) Adolescent Reproductive Behaviour in Turkey. *The Turkish Journal of Population Studies* 22: 37-55.

Koç, İ. (2008) Prevalence and Sociodemographic Correlates of Consanguineous Marriages in Turkey. *J.biosoc.Sci* 40: 137–148.

Kulu, Ş. (2009) Average Marriage Age on the Rise, But Early Marriages Still Persist in Turkey. *Sunday's Zaman* (http://www.sundayszaman.com/sunday/detaylar.do?load=detay&link =167644) February 22.

Khan, S. and V. Mishra. (2008) Youth Reproductive and Sexual Health. DHS Comparative Reports No. 19. Macro International Inc.: Calverton, Maryland, USA.

Kravdal, O. (2000) A Search for Aggregate-Level Effects Education on Fertility, Using Data from Zimbabwe. *Demographic Research* 3(3).
Martin, C. T and F. Juarez. (1995) The Impact on Women's Education on Fertility in Latin America: Searching for Explanations. *International Family Planning Perspectives* 21(2): 52-80.
Ministry of Health [Turkey], Hacettepe University Institute of Population Studies, and Macro International Inc. (1994) *Turkish Demographic and Health Survey 1993.* Ankara, Turkey.
Ministère de la Santé [Maroc], ORC Macro, et Ligue des États Arabes. (2005) *Enquête sur la Population et la Santé Familiale (EPSF) 2003-2004.* Ministère de la Santé et ORC Macro: Calverton, Maryland, USA.
Nahar, Q. and H. Min, (2008) Trends and Determinants of Adolescent Childbearing in Bangladesh. DHS Working Papers No. 48.
Population Council. (2001a) *Facts about Adolescents from the Demographic and Health Survey -Statistical Tables for Program Planning: Egypt 1995.* New York.
Population Council. (2001b) Facts about *Adolescents from the Demographic and Health Survey -Statistical Tables for Program Planning: Morocco 1992.* New York.
Population Council. (2002) Facts about *Adolescents from the Demographic and Health Survey -Statistical Tables for Program Planning: Turkey 1993.* New York.
Population Council. (2009a) *The Adolescent Experience In-Depth: Using Data to Identify and Reach the Most Vulnerable Young People: Egypt 2005.* New York.
Population Council. (2009b) *The Adolescent Experience In-Depth: Using Data to Identify and Reach the Most Vulnerable Young People: Morocco 2003/04.* New York.
Population Council. (2009c) *The Adolescent Experience In-Depth: Using Data to Identify and Reach the Most Vulnerable Young People: Turkey 2003.* New York.
Rahsad, H., M. Osman, and F. Rouidi-Fahimi. (2005) *Marriage in the Arab World.* Population Reference Bureau: Washington D.C.
Rodriguez, G. and J. Cleland. (1981) The Effects of Socioeconomic Characteristics on Fertility in 20 Countries. *International Family Planning Perspectives* 7(3): 93-101.
Rutstein, S.O. and G. Rojas. (2006) *Guide to DHS Statistics.* Demographic and Health Surveys, ORC MACRO: Calverton, Maryland.
Samaan, M. (2008) Shoura Council Passes Child Law Criminalizes FGM. Daily News English, May 12.
Sorensen, J. (1999) *STPIECE: Stata module to estimate piecewise-constant hazard rate models*. http://fmwww.bc.edu/repec/bocode/s/stpiece.hlp.
United Nations [UN]. (1996) World Programme of Action for Youth to the Year 2000 and Beyond. General Assembly resolution A/RES/50/81, 13 March.
United Nations [UN]. (2004) *World Youth Report 2003: The Global Situation of Young People.* Department of Economic and Social Affairs: New York.
United Nations [UN]. (2005) *World Youth Report 2005: Young People Today and in 2015.* Department of Economic and Social Affairs: New York.
United Nations [UN]. (2007) *World Youth Report 2007, Young People's Transition to Adulthood: Progress and Challenges.* Department of Economic and Social Affairs: New York.
United Nations [UN]. (2009) *World Population Prospects: The 2008 Revision.* Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (http://esa.un.org/unpp) December 09, 2009.
United Nations [UN]. (2010) *World Population Prospects: The 2006 Revision and World Urbanization Prospects: The 2007 Revision.* Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat (http://esa.un.org/unup) January 08, 2010.
United Nations Development Programme [UNDP]. (1998) *Human Development Report 1998.* Oxford University Press: New York.
United Nations Development Programme [UNDP]. (2006) *Regional Bureau for Arab States (RBAS), Arab Youth Strategizing for the Millennium Development Goals (MDGs).* Al Talaie Printing House: New York.
United Nations Development Programme [UNDP]. (2007) *Human Development Report 2007/2008, Fighting Climate Change: Human Solidarity in a Divided World.* Palgrave Macmillan: New York.
United Nations Development Programme [UNDP]. (2009) *Human Development Report 2009, Overcoming Barriers: Human Mobility and Development.* Palgrave Macmillan: New York.
Vignoli, D. (2006) Fertility Change in Egypt: From Second to Third Birth. *Demographic Research* 15(18): 499-516.
Yavuz, S. (2006) Completing the Fertility Transition: Third Birth Developments by Language Groups in Turkey. *Demographic Research* 15(15): 435-460.

APPENDIX

Table A1. Comparison of selected socioeconomic development indicators and demographic indicators of Morocco, Egypt, and Turkey, 1995 - 2007

					Annual average growth rate (%)	
	1995	2000	2005	2007	1990-2007	2000-2007
Morocco						
Human Development Index Value (HDI)	0.562	0.583	0.640	0.654	1.37	1.63
Gender Related Development Index (GDI)				0.625		
Adult Literacy Rate: Female (% age 15 and above)	31.00	36.10	39.60	31.00		
Adult Literacy Rate: Male (% age 15 and above)	56.60	61.80	65.70	56.60		
GDP per Capita, PPP (constant 2007 international $)	2,817	3,156	3,800	4,108	2.00	
Urban Population (%)	51.70	53.30	55.00			
Total Fertility Rate (TFR) (births per woman)	3.66	2.97	2.52	2.38		
Infant Mortality Rate (per 1,000 live births)	58.00	47.00	37.50	30.60		
Egypt						
Human Development Index Value (HDI)	0.631	0.665	0.696	0.703	1.13	0.81
Gender Related Development Index (GDI)				--		
Adult Literacy Rate: Female (% age 15 and above)	38.80	43.80	59.40	57.80		
Adult Literacy Rate: Male (% age 15 and above)	63.60	66.60	83.00	74.60		
GDP per Capita, PPP (constant 2007 international $)	3,797	4,459	4,844	5,349	2.50	
Urban Population (%)	42.80	42.60	42.60			
Total Fertility Rate (TFR) (births per woman)	3.91	3.50	3.16	2.89		
Infant Mortality Rate (per 1,000 live births)	63.70	48.00	39.50	34.80		
Turkey						
Human Development Index Value (HDI)	0.730	0.758	0.796	0.806	0.79	0.87
Gender Related Development Index (GDI)				0.788		
Adult Literacy Rate: Female (% age 15 and above)	72.40	76.50	79.60	81.30		
Adult Literacy Rate: Male (% age 15 and above)	91.70	93.50	95.30	96.20		
GDP per Capita, PPP (constant 2007 international $)	9,100	10,161	11,877	12,955		
Urban Population (%)	62.10	64.70	67.30			
Total Fertility Rate (TFR) (births per woman)	2.90	2.57	2.23	2.13		
Infant Mortality Rate (per 1,000 live births)	53.60	40.40	31.40	27.50		

Sources: UNDP, 1998, 2007, 2009 and United Nations, 2009 and 2010

Table A2.. Sample Statistics for the Model 1: Person months (exposures) and first births (events) by variables

	Morocco		Egypt		Turkey	
	Exp.	Events	Exp.	Events	Exp.	Event
Calendar Period						
Before 1990	659,276	2,084	919,426	3,338	458,094	1,639
1990-1992	180,187	413	269,956	833	126,057	418
1993-1995	150,262	297	254,306	609	105,591	304
1996-1998	164,811	309	279,543	767	114,182	269
1999-2000	117,965	198	139,985	501	79,790	175
2001-2003/04	147,866	261	127,958	731	110,504	130
Educational Attainment of Woman						
No education (0 year)	709,754	2,677	591,988	3,549	191,236	883
Primary incomplete or more (at least 1 year)	710,614	885	1,397,842	3,230	802,903	2,051
Missing			1,344	0	80	1

Table A3. Descriptive statistics of the Model 2: Person months (exposures) and first births (events) by variables

	Morocco		Egypt		Turkey	
	Occ.	**Events**	**Occ.**	**Events**	**Occ.**	**Events**
Age at Marriage						
Less than 18	65,055	503	142,782	809	50,256	430
18 or higher	43,501	107	141,057	406	42,838	108
Educational Attainment of Woman						
0-4 years	78,054	480	110,880	546	16,310	106
5-7 years	15,545	71	36,814	175	53,956	330
8 or more years	14,957	59	136,145	494	22,827	102
Educational Attainment of Husband						
0-4 years	65,740	385	68,839	326	6,133	46
5-7 years	14,418	76	44,991	194	45,475	281
8 or more years	26,930	139	169,151	688	41,111	210
Missing/DK	1,468	10	857	6	375	1
Wealth Status of Household						
Below middle	55,904	329	133,926	642	41,434	260
Middle and over	52,652	281	149,914	573	51,660	278
Consanguinity						
Not related	73,133	407	170,357	720	69,519	400
Related	35,423	204	113,012	493	23,451	138
Missing			471	2	123	0
Spousal Age Difference						
0 to 4 years	21,766	107	67,748	256	31,570	155
5 years or more	86,790	503	216,091	959	61,524	383
Women's Attitudes Toward Wife Beating						
Not accepting	25,938	138	120,032	476	43,743	256
Accepted at least one of the reasons	82,181	470	160,732	723	47,702	270
Missing	436	2	3,075	16	1,649	12

Table A4. Relative risks of first birth by age 20 among women age 15-49, by interaction between calendar period and educational attainment of woman. Risk relative to calendar period '-1990' and 'Primary incomplete or more' categories, in Morocco (2003/04), Egypt (2005), and Turkey (2003/04)

	Morocco		Egypt		Turkey	
Calendar period	**No education**	**Primary incomplete or more**	**No education**	**Primary incomplete or more**	**No educ./Primary incomplete**	**Primary complete or more**
Before 1990	3.02***		2.76***		1.98***	
	(2.66-3.43)	***1.00***	(2.57-2.96)	***1.00***	(1.77-2.23)	***1.00***
1990-1992	2.03***	0.96	2.77***	0.86**	1.98***	0.86*
	(1.72-2.40)	(0.77-1.19)	(2.49-3.09)	(0.77-0.99)	(1.58-2.47)	(0.75-1.00)
1993-1995	1.88***	0.77**	2.32***	0.70***	1.60***	0.79**
	(1.56-2.26)	(0.61-0.98)	(2.04-2.63)	(0.62-0.80)	(1.24-2.06)	(0.67-0.93)
1996-1998	1.85***	0.70***	2.06***	0.85***	1.04	0.64***
	(1.55-2.22)	(0.55-0.89)	(1.81-2.34)	(0.77-0.95)	(0.78-1.38)	(0.54-0.76)
1999-2000	1.57***	0.74**	2.15***	0.73***	0.69*	0.61***
	(1.26-1.96)	(0.57-0.97)	(1.85-2.49)	(0.64-0.82)	(0.47-1.01)	(0.50-0.74)
2001-2003/04	1.62***	0.51***	1.87***	0.84***	0.21***	0.30***
	(1.33-1.97)	(0.41-0.65)	(1.63-2.15)	(0.75-0.93)	(0.13-0.36)	(0.23-0.38)

*** p < 0.01, ** p < 0.05, * p < 0.1