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Research Article

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Research Article

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Abstract

BACKGROUND
The unusual fertility increase experienced by several Arab countries in the recent years is particularly visible in Egypt, where fertility declined very slowly after 2000 and started to increase again between 2008 and 2014.

OBJECTIVE
We first check the quality and measurement accuracy of Demographic and Health Surveys (DHS). The analysis confirms the trend since 2000. We descriptively look for possible underlying causes.

METHODS
We use quality criteria to check DHS data and control for tempo effect. We also perform a proximate determinants analysis to study the mechanisms affecting fertility, particularly marriage and contraceptive use patterns.

RESULTS
The trend in fertility, which has been at a level slightly below 3.5 children per woman since 2000, is due to an increase in parity one-to-three children and a steady decline in parity four-and-more children. While changes in contraception use had the largest and a growing suppressing effect before 2000, after the turn of the century there was no change in the impact of either marriage or contraception on fertility.

CONCLUSIONS
We find that well-educated women between 20 and 29 years lack labour market opportunities. They may have preponed their fertility. Fertility could start declining again once the labour market situation for women has improved. On the other hand, the family model of three children is still widespread in the country.

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CONTRIBUTION
The article studies the fertility increase in Egypt. It contributes to the literature on exceptions to the demographic transition, such as stalls in fertility decline, particularly in the context of Arab countries.

1. Introduction

While most developing countries have experienced declining mortality and fertility rates, two regions that seem to contradict or singularize the general theory of the demographic transition are drawing the attention of scholars. The first is sub-Saharan Africa, where fertility remained very high for a long time and only started declining appreciably in the 1990s. However, the stalled fertility decline (Goujon, Lutz, and KC 2015) observed in some African countries since the turn of the 21st century can be explained by low levels of socioeconomic development, which are only slowly rising. More puzzling is the case of Arab countries,[3] where in the 1980s women had exceptionally high numbers of children, particularly in relation to the general level of socioeconomic development. A look across the region shows that during the 1980–1985 period most women in Arab countries were having, on average, between 5.3 and 7.0 children, a clear outlier being Lebanon with 3.8 children (United Nations 2015).

Scholars have offered several hypotheses to explain the high fertility of the region, highlighting, among other aspects, the specificity of the Arab culture and the role of the prevalent Muslim religion (e.g., Caldwell 1986), hence claiming the existence of an Arab demographic transition. Other researchers (Courbage 1999) claim that low education levels and the low status of women can explain the high fertility. By 2015 the overall trend towards lower numbers of children born to women was clear, with a few notable exceptions: the least-developed Arab countries in sub-Saharan Africa,[4] Iraq and the state of Palestine in the Mashreq region, and the Gulf countries, where overall fertility rates are low but still quite high when only considering the native population. In all other countries, women bear on average less than 4 children. In 2015 a few Arab countries have fertility numbers close to replacement fertility level, e.g., Tunisia (2.2 children per woman), or even below, such as Lebanon with 1.7 children (United Nations 2015).

However, another phenomenon can be observed. A few countries have been experiencing an unusual fertility increase in recent years, more precisely during the 2005–2015 period (see Figure 1). It is slight in Tunisia and Morocco, but has been

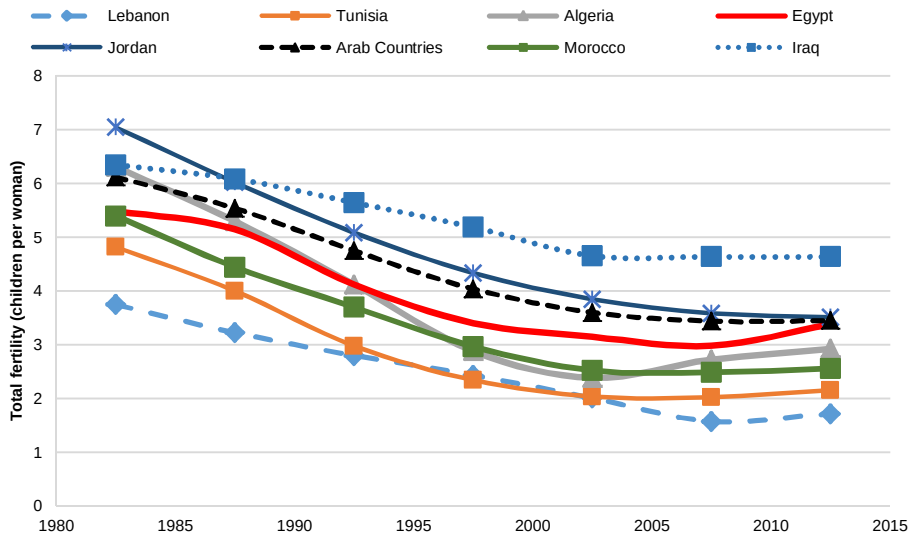
[3] Some of the 22 Arab countries are in sub-Saharan Africa and follow the fertility pattern of the region.
[4] Comoros, Djibouti, Mauritania, Somalia, Sudan, and Yemen.

persistent since 2000–2005 in Algeria, where fertility increased from 2.4 to 2.9 children between the periods 2000–2005 and 2010–2015 (+23%). The fertility decline has also stalled in Iraq and Jordan. In Egypt, the largest, most densely populated, and fast increasing Arab country, with close to 90 million inhabitants – 23% per cent of the population of all Arab countries – the total fertility rate (TFR) increased from 3.0 to 3.4 between 2005–2010 and 2010–2015 (+13%) (United Nations 2015). These estimates are based on the Egyptian Demographic and Health Surveys (EDHS) of 2008 and 2014, which show an increase from 3.0 children to 3.5 children, the latter being the same level recorded by the EDHS in 2000.[5] If confirmed, this fertility increase, which was preceded by a deceleration in the rate of fertility decline, raises environmental and economic concerns, especially since the country's economy has been faltering since the Arab Spring in 2011, with Egypt's rapid population growth already putting pressure on the country and its inhabitants in terms of well-being. Between 1994 and 2014 the population grew by 46%, from 60 million to nearly 88 million – an increase of more than the total populations of Syria and Lebanon combined (Youssef, Osman, and Roudi-Fahimi 2014).

Therefore it is important to consider this fertility increase as it could have significant consequences for the country if it continues. This article is divided into four sections. After a presentation of the actual changes in fertility in Section 1 we check the quality of the data in Section 2, i.e., if the increase is an artefact due to a measurement/sampling deficiency in one or more surveys. While birth displacement proves to be quite strong, particularly in the latest surveys, it does not affect the fertility measurement. In Section 3 we control for tempo effect. If some women had their children at earlier ages than previous cohorts, this would not be visible when looking at the TFR, which is a synthetic measure of the fertility experienced by women of several ages during a fixed period. We also analyse the proximate determinants of fertility. The result of these two sections is that the recent increase, which follows a stall since the early 2000s, is real and has not been fuelled by any drastic changes in marriage or contraceptive preferences, which have also remained the same in the last 15 years. In Section 4 we look for potential causes of the fertility increase by examining women's labour force participation and employment level.

[5] EDHS are based on large samples. CAPMAS, the statistical office of Egypt, relays similar estimates. See: www.capmas.gov.eg/Pages/StaticPages.aspx?page_id=5034 [accessed on July 26, 2016].

Figure 1: 5-year TFR, Arab region and selected countries, 1980–1985 to 2010–2015



Source: Authors' calculations based on United Nations (2015).

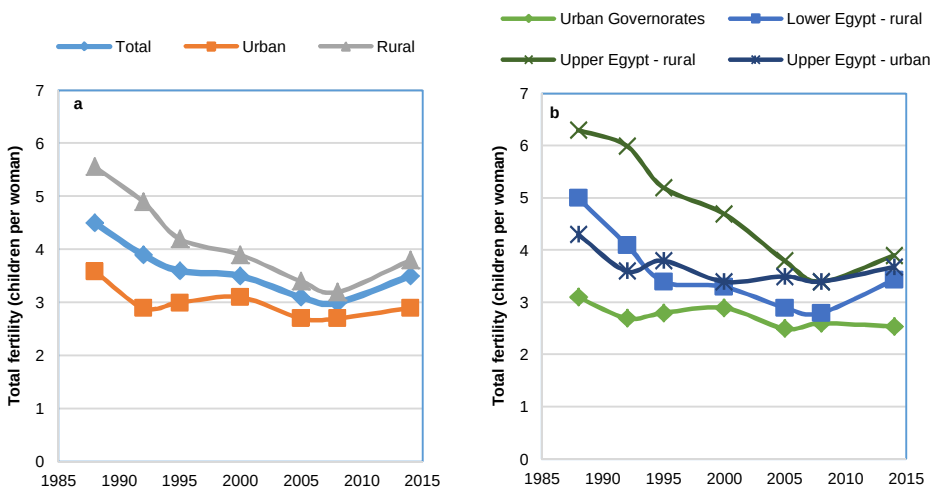
2. Fertility patterns in Egypt

Standard Demographic and Health Surveys are the main data source for analysing fertility in Egypt. They were conducted in 1988, 1992, 1995, 2000, 2005, 2008, and 2014. As shown in Figures 1 and 2a, they depict a slowing fertility decline from the late 1990s (–17% between 1995 and 2008) and end with an increase of +17% between 2008 and 2014.

Figure 2a shows the TFR by place of residence for the three years preceding the survey. There is convergence between urban and rural areas over time, at least until 2008. Fertility declined most rapidly in rural areas, from 5.6 children born to women in 1988 to 3.2 children in 2008. The latest survey in 2014 shows increasing divergence, with most of the increase happening in the rural areas of Egypt (TFR of 3.8). The fertility of urban regions has been quite stable at around 3 children per woman since 1990. Fertility by regional grouping of governorates (Figure 2b) displays a more mixed pattern. At the level of the urban governorates (mostly influenced by Cairo), fertility

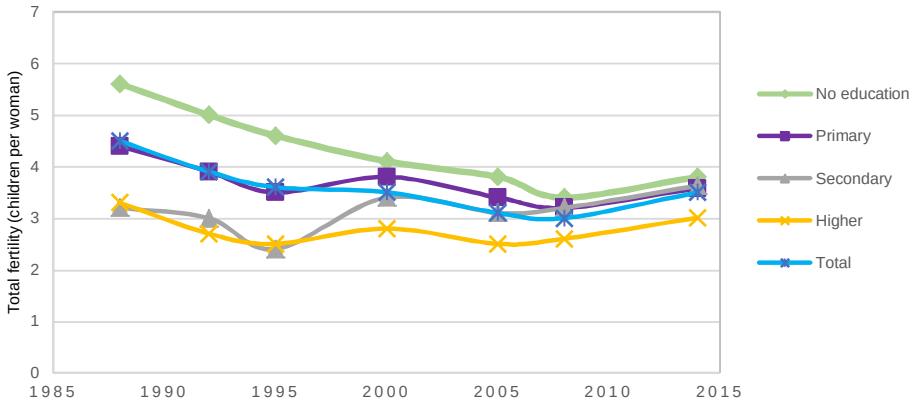
has been low since 1990, i.e., below 3.0 children, with a TFR of 2.5 in 2014. Most of the decline occurred among women residing in rural Upper Egypt, where the fertility level was 6.3 children in 1988 and had decreased to 3.4 by 2008. Fertility has been quite stable in urban Upper Egypt at around 3.5 children. The most rapid increase between 2008 and 2014 occurred in the rural areas of Lower and Upper Egypt. In the former, fertility increased from 2.8 to 3.7 children.

Figure 2: TFR for the three years preceding the survey, by place of residence, Egypt, 1988–2014



Source: All EDHS, 1988–2014.

Figure 3: TFR for the three years preceding the survey by level of education, Egypt, 1988–2014



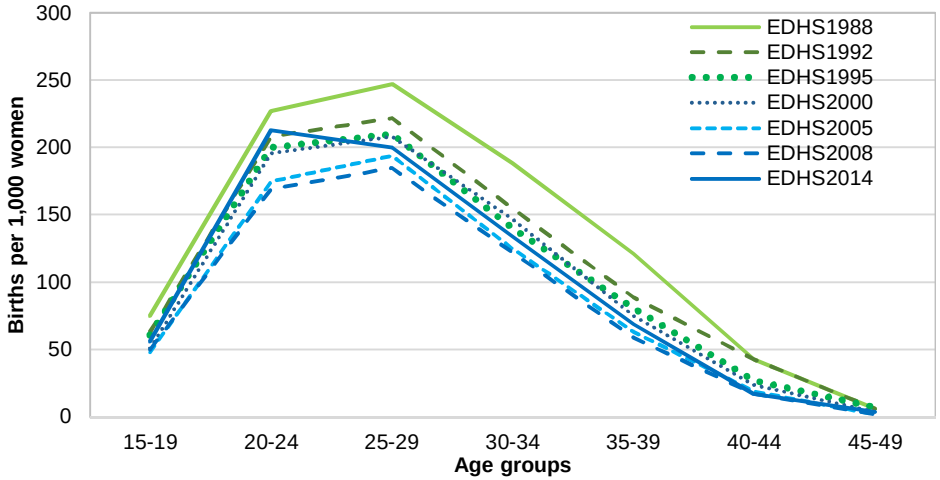
Source: All EDHS, 1988–2014.

Two main phenomena can be observed by looking at the differentials by education in Figure 3. First of all, fertility convergence has been very strong among all education categories, especially since 2008 (included), which seems to show that education is less and less a factor of heterogeneity in Egypt: the difference between the fertility of women with no education and that of women with a higher education is now less than 1 child (0.8). This is the result of a strong decline in the fertility of women with less than primary education, from 5.6 to 3.8 children in the 1988–2014 period, while in the same period the fertility of women with secondary education or higher was stable at around 3 children. The difference was very large for the 20–24 age group but had almost disappeared by the time of the 2014 survey (see Annex Figure A-2). The other phenomenon is that from 2005 the increase can be observed for women with higher education (from 2.5 to 3.0 children) and from 2008 for all education categories. This is happening in a context where the gap in educational attainment between males and females has almost disappeared among younger cohorts under the age of 25 years (EDHS 2014).

Figure 4 shows an interesting feature of the fertility pattern. In all EDHS until 2008 the fertility within age groups was lower than in the preceding survey, and the pattern was very similar, with mostly women in the 20–24 and 25–29 age groups bearing children, and very few at older ages. The 2014 EDHS shows a totally different pattern: the fertility of women in all age groups increased between 2008 and 2014, but strikingly so for the age group 20–24, the age at which fertility peaks in 2014, and the

age group 25–29. Hence, childbearing is increasingly concentrated among young women; an unusual pattern, as in countries experiencing the demographic transition the fertility curve tends to peak at older ages over time. Currently, an average Egyptian woman has 2.7 births by her 32nd birthday, more than ¾ of her lifetime births. Appendix Figures A-1 and A-2 show that between 2008 and 2014 the increase in fertility in the age group 20–24 affected women residing in both urban and rural areas and women with both low and high levels of education.

Figure 4: Age-specific fertility rates (ASFR) for the three years preceding the survey, Egypt, 1988–2014



Source: All EDHS, 1988–2014.

In Egypt, as in other Arab countries, marriage is almost universal and linked to fertility, and Rashad and Khadr (2002) have shown that postponement of age at first marriage and overall marriage decline are more important in explaining fertility decline in Arab countries than family planning. Table 1 reveals several important facts about the lives of women in Egypt. While the share of never married women increased until 2005[6] it declined very rapidly in the two subsequent surveys in 2008 and 2014. In the 2014 survey it was around 26%, lower than at any time in the previous 25 years. While, according to all EDHS, between 1988 and 2014 the median age at first marriage increased from 18.5 to 20.8 years and the median age at first birth from 20.8 to 22.6

[6] The divorce and widowhood rates remained constant at a low level (CAPMAS 2015).

years, a cohort analysis performed by Krafft (2016) reveals that both age at first marriage and age at first birth have actually been declining across cohorts, especially for those born between the mid-1970s and the mid-1980s. As observed for fertility, most of this change occurred among younger women aged 15 to 29, and particularly among those aged 20 to 24. It is important to note that teenage marriage is still very prevalent in Egypt: in 2014 more than half a million girls aged 15 to 19 were ever married (Youssef, Osman, and Roudi-Fahimi 2014).

Other key factors affecting fertility within marriage are contraceptive use and female employment. Table 1 reveals that between 1988 and 2008 overall contraceptive use increased among married women from 38% to 60%, plateaued after 2000, and then declined slightly in 2014 to 59%. The stall in the increase in contraceptive use is visible across all age groups except for those aged 45–49 years. Table 1 also shows that the share of employed women is very low – even lower in 2014 than in 1995 (16% vs. 19%). Participation rates in the labour force are higher among women above 30, which is partly due to a cohort effect, visible if we look across the diagonal in Table 1. The proportions of women born in the 1960s–1970s (aged 25 to 34 in 1995) who had worked in the last 12 months were higher throughout the ages compared with the proportions of those born later, who are much less likely to ever join the labour force (see Section 4 and Assaad and Krafft 2013).

These few elements draw the picture of a country where there is an interruption in or a slowdown of the convergence towards low patterns of childbearing. However, most of this information mixes up several cohorts of women. Before looking at the changes across cohorts, in the next section we aim to verify the quality of the data.

Table 1: Percentage of women who never married, percentage of married women currently using contraception, and percentage of married women who worked in the last 12 months and are currently working, by age, Egypt, 1988–2014

Share	EDHS	15-19	20-24	25-29	30-34	35-39	40-44	45-49	Total
Never-married women	1988	84.5	40.3	15.6	5.1	2.2	1.5	1.8	29.5
	1992	86.1	43.4	13.4	4.9	2.5	2.3	0.9	29.6
	1995	85.7	41.9	13.4	5.1	2.6	1.9	1.2	29.8
	2000	88.1	45.6	16.2	6.1	3.0	1.8	1.5	31.9
	2005	87.5	48.9	18.7	6.0	3.6	2.5	1.7	33.5
	2008	86.6	46.2	17.7	6.9	3.6	2.1	1.9	30.7
	2014	85.3	38.9	12.9	6.8	3.1	2.0	1.7	25.9
Married women using contraception	1988	5.5	24.3	37.1	46.8	52.8	47.5	23.4	37.8
	1992	13.3	29.7	46.0	58.8	59.6	55.5	34.5	47.1
	1995	16.1	33.2	47.6	58.1	60.7	58.8	33.3	47.9
	2000	23.4	42.7	57.0	67.2	68.0	63.4	42.0	56.1
	2005	26.3	44.7	57.4	69.0	73.3	70.1	47.8	59.2
	2008	23.4	44.6	59.8	67.6	74.3	72.5	51.9	60.3
	2014	20.5	42.3	55.2	64.6	72.6	71.0	54.0	58.5
Married women who worked in last 12 months	1995	3.0	8.0	16.5	25.9	24.4	23.6	17.8	18.9
	2000	2.6	5.7	15.0	19.6	24.9	21.4	16.3	16.8
	2005	6.9	9.0	16.2	23.3	26.7	31.6	28.3	21.5
	2008	2.7	5.0	13.3	16.6	20.2	24.0	24.8	16.4
	2014	3.1	5.1	12.5	17.1	20.0	20.3	22.8	15.5

Source: All EDHS, 1988–2014; weighted by sample weight.

3. Data quality and adjustment

It is important to control for the quality of the data, i.e., whether the data used for the analysis is biased and the observed trend is just an artefact of the collected data. As already mentioned, Demographic and Health Surveys[7] are the main data source for analysing fertility in Egypt. We have looked at several quality aspects that could affect fertility indicators because they change the number of women exposed to pregnancy in each age group or the number of births that they experienced during survey periods. We looked at the many aspects of quality concern developed by Schoumaker (2014) and listed below:[8]

[7] Namely, the seven Egyptian Demographic and Health Surveys: 1988, 1992, 1995, 2000, 2005, 2008, and 2014.

[8] We excluded selection bias in terms of mortality and international migration, which are more difficult to measure and less likely to affect fertility measurements in Egypt.

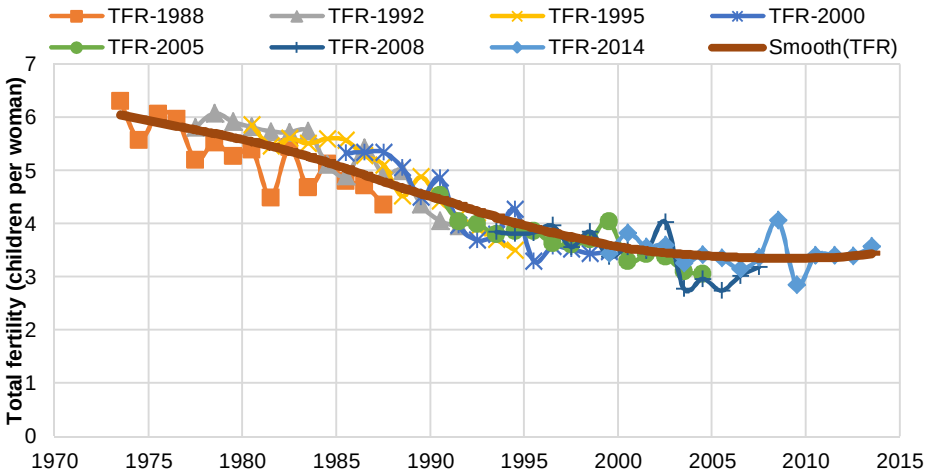
- Heaping and misreporting of women's age and children's birth year
- Omission of recent births and displacement of births to avoid additional questions
- Potter effect affecting reporting of distant (especially first) births
- Sample implementation (over- or undersampling of some groups).

Annex Table A-1 summarizes the standardized scores obtained from calculating the main indices for measuring quality that are detailed in Al Zalak and Goujon (2017). Each index is ranked on a standardized score ranging from 1 (very rough data) to 5 (highly accurate data). In summary, we found that data quality problems were present in the EDHS samples from 1988 to 2014 but that the reliability of the surveys has increased over the years, especially in the last three surveys that are of particular interest to this paper. The displacement of births has been rising since 2000, and is particularly acute for the 2008 and 2014 EDHS. Dates of births are displaced from one calendar year to another by the interviewer or the interviewee to avoid filling in the section of the questionnaire on child health, which was expanded from the early 2000s and requires additional time from both sides (Pullum and Becker 2014). It is particularly present from the fifth to the sixth year preceding the 2000, 2005, 2008, and 2014 EDHS. However, displacement does not affect the TFR, which is measured for the three years preceding the survey.

We calculated retrospective fertility rates for each survey (from 1988 to 2014) covering the previous 15 years,[9] which adds up to about 40 years of reconstructed data on fertility, fitting to them a non-parametric regression model (LOWESS) to smooth the curve. As shown in Figure 5, fertility declined from 6.5 to 4.5 children between 1973 and 1990 and to 3.5 children by 2000. Since then, however, the decline has halted at around 3.5 children per woman.

[9] We used tfr2, a Poisson regression-based Stata module for computing fertility rates from birth histories (Schoumaker 2006, 2013).

Figure 5: 15-year reconstructed fertility trends, 1973–2014



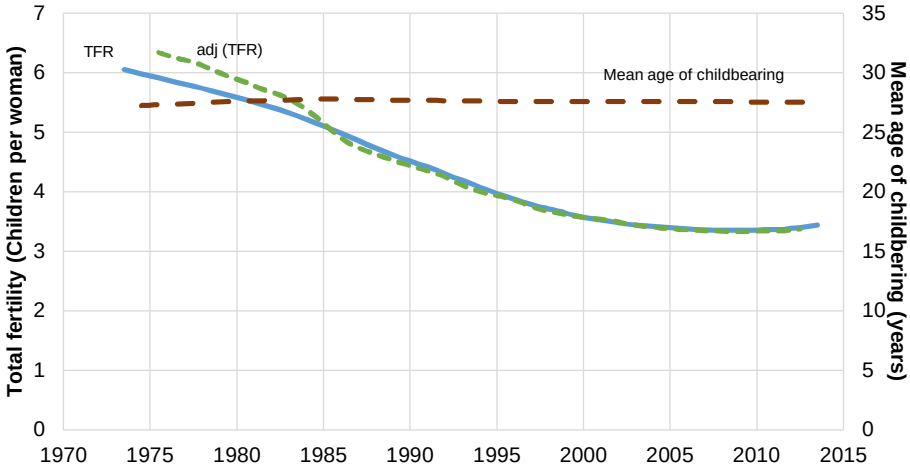
Source: Authors' calculation based on all EDHS, 1988–2014, using Stata package tfr2; smoothed with LOWESS.

4. What is happening?

In this section we try to decompose the change and see what factors best explain the stall in fertility decline followed by an increase in the last period. We first use the method developed by Bongaarts and Feeney (1998) to check for a tempo effect in fertility using data on mother's age and birth order of child. While Figure 6 – showing smoothed values based on a LOWESS regression model – indicates that there is no tempo effect across the overall fertility and that the mean age at birth is rather stable at around 28 years, Figure 7 illustrates one interesting feature, i.e., that if decomposed by parity, the stall is in fact the result of an increase in the births of parities 1, 2, and 3, compensated by a strong decline in the birth order 4-and-more children.[10] Interestingly, Krafft (2016) has shown that employment in the public sector is negatively correlated with the transition from third to fourth child, while the relationship is positive for the transition to parities one and two. However, as discussed in Section 4, the lack of employment opportunities in the public sector is a potential determinant of the increase in fertility in Egypt.

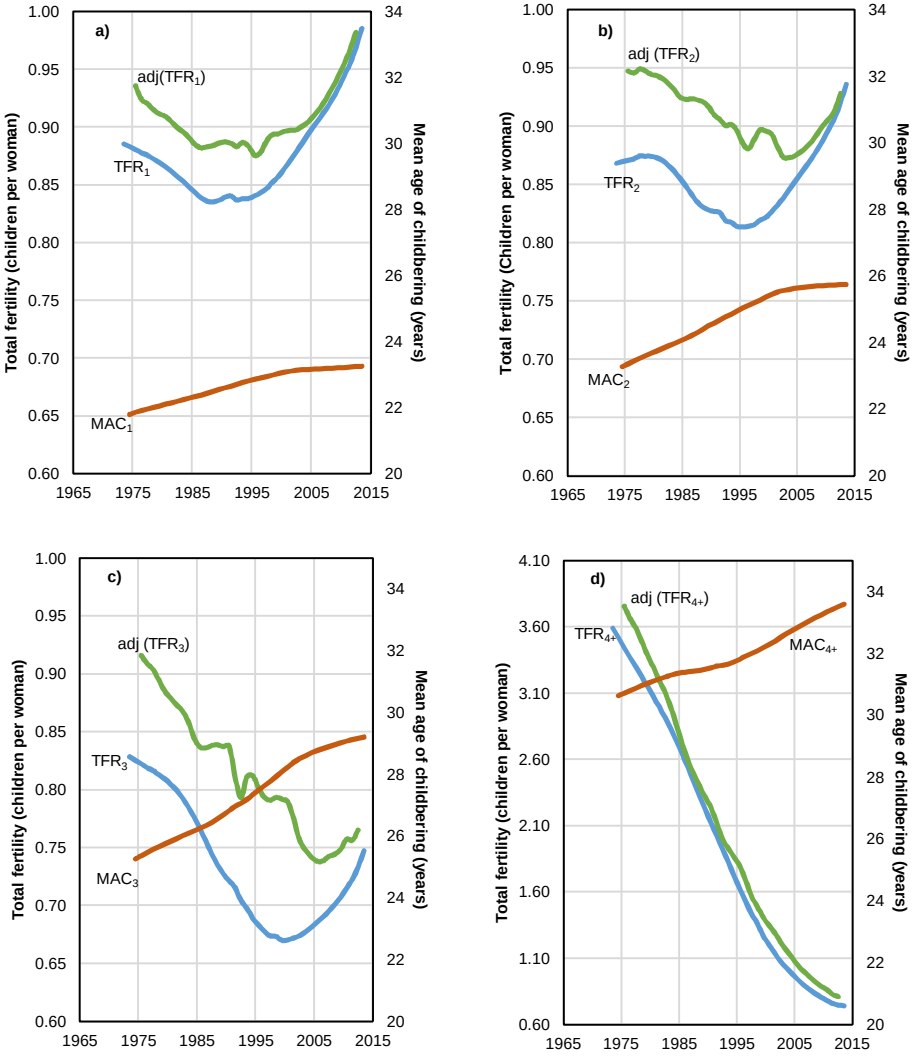
[10] Fourth and higher-order parities are grouped together because of the low number of cases. If we examine the percentage of births in the 2 years preceding each EDHS, we see that the share of birth order 4 has increased since 2005 and it is the percentage of births order 5+ which has been steadily declining since 1988.

Figure 6: Trend in TFR, tempo-adjusted TFR, and mean age at childbirth, 1974–2014, Egypt



Source: Authors' calculation based on all EDHS, 1988–2014; data weighted by sample weight, and awfactt; smoothed with LOWESS.

Figure 7: Trend in TFR, tempo-adjusted TFR and mean age at childbirth (MAC), 1974–2014, by birth order (a: birth order 1; b: birth order 2; c: birth order 3; d: birth order 4+)

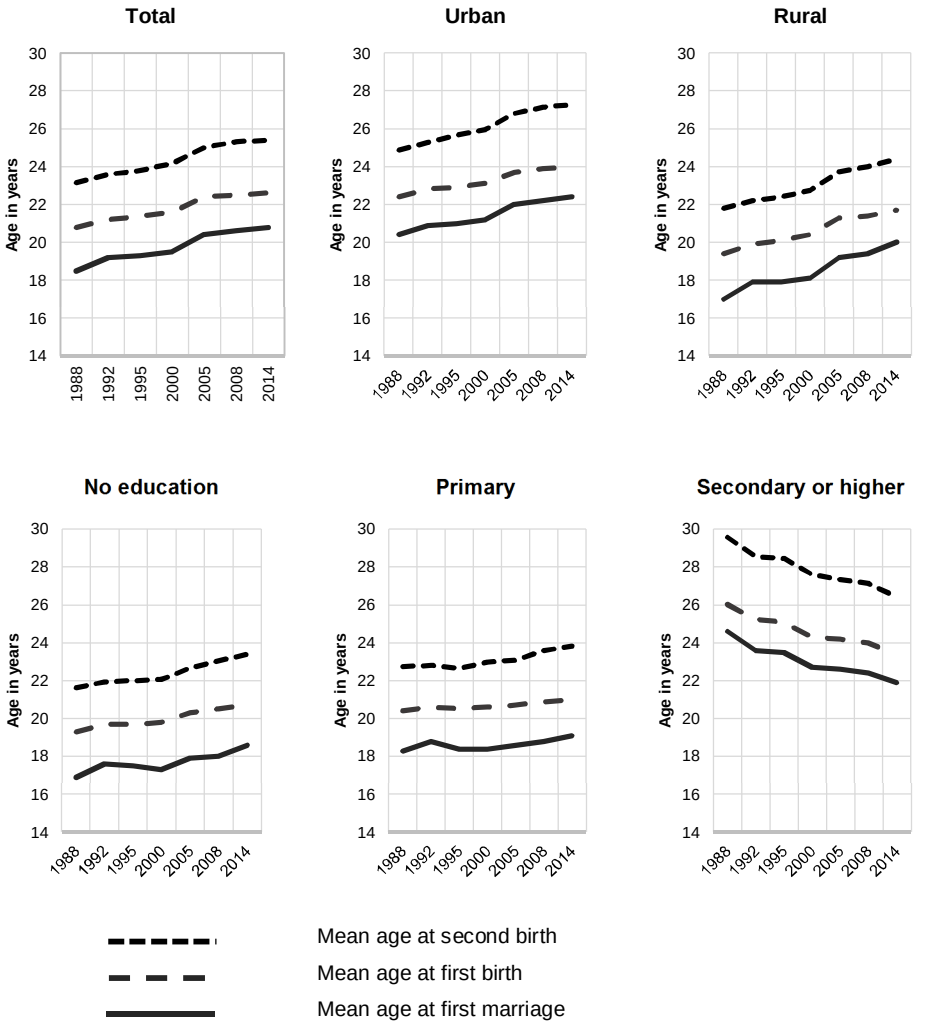


Source: Authors' calculation based on all EDHS, 1988–2014; data weighted by sample weight, and awfactt; smoothed with LOWESS.

We further perform an analysis of the proximate determinants of fertility (Bongaarts 1978). We are particularly interested in the relative impact of family planning and marriage, for several reasons. As mentioned before, marriage is almost universal in Egypt and the number of marriages increased dramatically between 2005 and 2014 (from 523,000 in 2005 to 953,000 in 2014), translating into an increase in the marriage rate from 7.4 per thousand in 2005 to 11.0 per thousand in 2014.

The median age at first marriage of the higher educated has been moving downwards since 1988, when it was close to 25 years, to around 22 years in 2014. During the same period the age at first marriage of all Egyptian women increased from 18.5 to 20.8 years. This increase is consistent across places of residence, governorates, and education groups, except for women with secondary education and more. This could be the effect of women not finding work after completing education and 'hurrying' into marriage and, with some delay (about 1.5 years), into childbearing (see Figure 8).

Figure 8: Median age at first marriage, first birth, and second birth for the three years preceding the survey, total, by place of residence and education, Egypt, women aged 25–49, 1988–2014



Source: Authors' calculation based on all EDHS, 1988–2014; data weighted by sample weight, and awfactt.

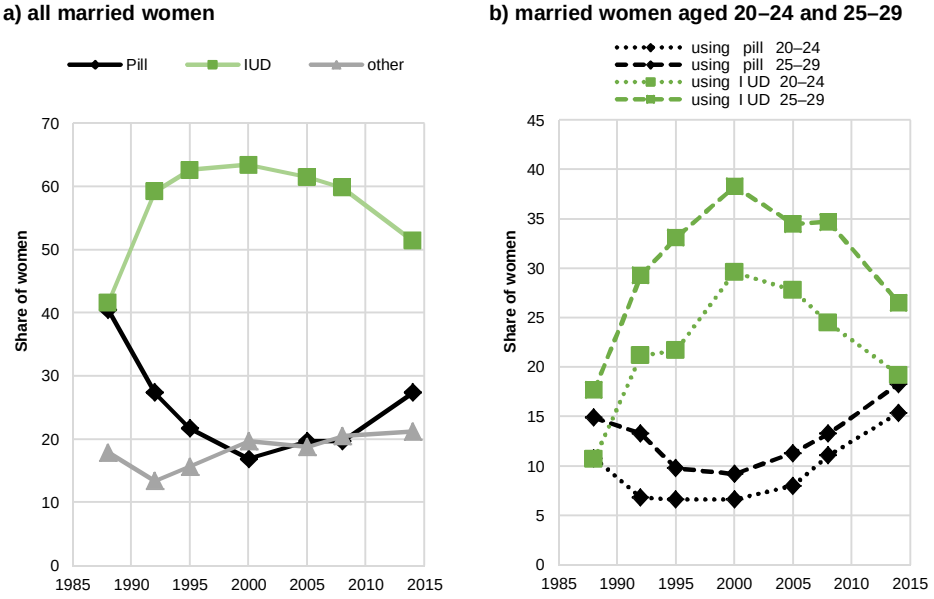
We also look at family planning, which is interesting in the context of Egypt where the mean ideal number of children for all women between 1988 and 2014 indicates that the family norm of around three children is accepted by the authorities, who do not promote smaller families,[11] and so will most likely prevail in the near to mid-term future.[12] The ideal number of children varies little by age, region, place of residence, or level of education: it is always within ±15% of that three-children value. This is in line with the fact that, when checking for family planning demand, it does not seem to be the case that women have become less knowledgeable – more than 99% of all cohorts of married women interviewed between 1988 and 2014 had some knowledge about modern contraceptive methods[13] – or have less overall access to family planning, although we did notice a small dip in the share of married women using contraception between 2008 and 2014 (see Table 1). Since 2005 there has been almost no difference between education groups, although contraceptive use in Upper Egypt is still lower than in other regions. An interesting feature of contraceptive use is the evolution of the choice of method. Most couples using family planning methods rely on the IUD (intra-uterine device) or the contraceptive pill. However, there has been a considerable shift. In 1988 the same proportion of women used either the pill or the IUD (around 40%). However, by 1995 women had shifted in favour of the IUD (above 60%), while the share of women using the pill dropped to 20%. This share did not change until 2008, when it started converging again, with a drop in the proportion of women using the IUD (to 51% in 2014) and an increase in the share of women using the pill (27% in 2014). As shown in Figure 9a–b, this trend is particularly acute among the 20–24 and 25–29 age groups, which are the ages at which women are most fertile in Egypt, and when contraceptive use is very low.

[11] However, in 2017 the parliament examined the possibility of developing a campaign aimed at encouraging smaller families. See: http://www.al-monitor.com/pulse/originals/2017/02/egypt-population-growth-national-strategy-two-child-policy.html [accessed on August 21, 2017]

[12] The total wanted fertility rate (a hypothetical measure of what the TFR would be given age-specific fertility rates for a recent past period if all women's fertility preferences in terms of wanted births were perfectly realized) shows more variation across EDHS and an increase in the recent period from 2005 to 2014 from 2.3 to 2.8 wanted births per woman.

[13] Modern methods of contraception are the following: pill, IUD, injectable, implant, vaginal methods, male condom, female sterilization, male sterilization, and emergency contraception.

Figure 9: Trend in use of family planning methods (pill, IUD, and other methods), Egypt, 1988–2014



Source: All EDHS, 1988–2014; data weighted by sample weight.

This trend could be an important determinant of the stall in fertility decline, as the probability of pregnancy is lower when using an IUD – once in place, women are 99% protected against pregnancy for 5 to 10 years – than it is with the pill, which is almost as efficient when taken properly, but practical effectiveness is lower (91%) since it is more susceptible to forgetfulness on a daily basis (CDC 2013; Baschieri and Hinde 2007). The choice of the pill over IUD is also a sign that more women are opting for a method that is easier to discontinue.

While several authors have observed that family planning appeared to be less of a priority during the last years of the Mubarak regime than it was at the beginning in the 1980s and 1990s (Khalifa, DaVanzo, and Adamson 2000; Ibrahim 1995) and even less so under president Morsi or the governments that have followed,[14] it seems that the demand for family planning has been increasingly satisfied – in 2014, only 18% of the demand was not satisfied and 20% by modern methods (EDHS 2014) – and practitioners in the field do not report any particular shortages in the availability of

[14] See, for instance, Fahim's (2013) *New York Times* article.

modern contraception (Devi 2013). The Ministry of Health and Population is the main provider of family planning in Egypt, together with the private sector and pharmacies. NGOs have become marginalized because of lack of funding (Abdel-Tawab, Oraby, and Bellows 2016).

In order to identify the mechanisms through which the factors that are discussed in Section 4 may affect fertility, we implemented a proximate determinants analysis as conceived by Bongaarts (1978) and updated recently (Bongaarts 2015) to identify particularly the role of marriage and contraception prevalence, together with the other determinants (abortion, postpartum infecundability, and sterility), in fertility dynamics.

For each EDHS, we follow Bongaarts (2015) to calculate four indices of the proximate determinants of fertility:

- Index of marriage (C_m)
- Index of contraceptive use (C_c)
- Index of abortion (C_a)
- Index of postpartum infecundability (C_i)

They are linked by the following equation:

$$TFR = C_m \times C_c \times C_i \times C_a \times TF \quad (1),$$

where *TF* is the total fecundity rate. Since the calculations according to Bongaarts (2015) lead to heaping in the total fecundity rate, we chose to fix it around the value of 15.3 as proposed by Johnson et al. (2011), and use the following equation:

$$TFR = C_m \times C_c \times C_i \times C_a \times (15.3 \times R) \quad (2),$$

where *R* is a factor adjusting the four calculated *C*s to the given TFR. As mentioned by Johnson, Noureddine, and Rutstein (2011), while we report about *R* in the table we do not interpret it, but rather use the fluctuations in its value to check for the fitting of the model. The TFR for each EDHS is calculated from births and exposure during the three years (36 months) prior to each woman's month of interview.

C_m or index of non-marriage is calculated as the ratio of the TFR to the total marital fertility rate (*TM*),

$$C_m = \frac{TFR}{TM} = \frac{\sum f(a)}{\sum \frac{f(a)}{m(a)}} \quad (3),$$

using the fertility rates *f* and marriage rates *m* at all ages *a*.

C_c represents contraceptive use and contraceptive effectiveness. It is calculated as:

$$C_c = 1 - 1.08 \times u \times e \quad (4),$$

with u being the contraceptive prevalence by age – the proportion of married women practising contraception – and e the average effectiveness using weights for the use-effectiveness of each method. 1.08 is the sterility correction factor (Bongaarts and Potter 1983; Nortman 1980).

C_i represents the reduced risk of exposure, mostly due to breastfeeding, and is calculated as:

$$C_i = \frac{20}{18.5+i} \quad (5),$$

where i is the average duration in months of postpartum infecundability. The formula is based upon empirical evidence collected by Bongaarts.

C_a represents the pregnancies that do not materialize into a birth. In the case of Egypt, where abortion is illegal (and as a result not reported in any of the EDHS), its calculation is difficult. Bongaarts (2015) proposes a solution and calculates it as follow:

$$C_a = \frac{TFR}{TFR+b.TAR} \quad (6),$$

where b is the number of births averted by an abortion and approximated by the ratio of the average reproductive time associated with an abortion (14 months according to Bongaarts and Potter 1983) to the average reproductive time associated with a live birth (18.5 according to the same source). Since *TAR*, the Total Abortion Rate, is not available for Egypt, we use the approximation developed by Westoff (2008).

Table 2 provides the values for the four *C*s and their effect on fertility; in other words the relative contribution of each of the proximate determinants to the level of fertility. A value of the index close to 1 means that the proximate determinant will have a negligible inhibiting effect on fertility, and, respectively, a value closer to 0 means a large inhibiting effect. We see that the effect of breastfeeding on infecundability has been diminishing considerably, particularly between 1995 and 2000. Since 2000, breastfeeding's reducing effect on fertility has been below the 20% mark. Contraception clearly has the strongest effect on fertility: between 1995 and 2000 its impact on fertility increased from 49% to 61%. However, since 2000 it has stalled. Also non-marriage has very little effect on fertility, and the index increased quite strongly between 2008 and 2014 (from 0.73 to 0.76). The stall in all the determinants of fertility decline since 2000 is in line with the stall in the fertility decline, particularly for the 15–

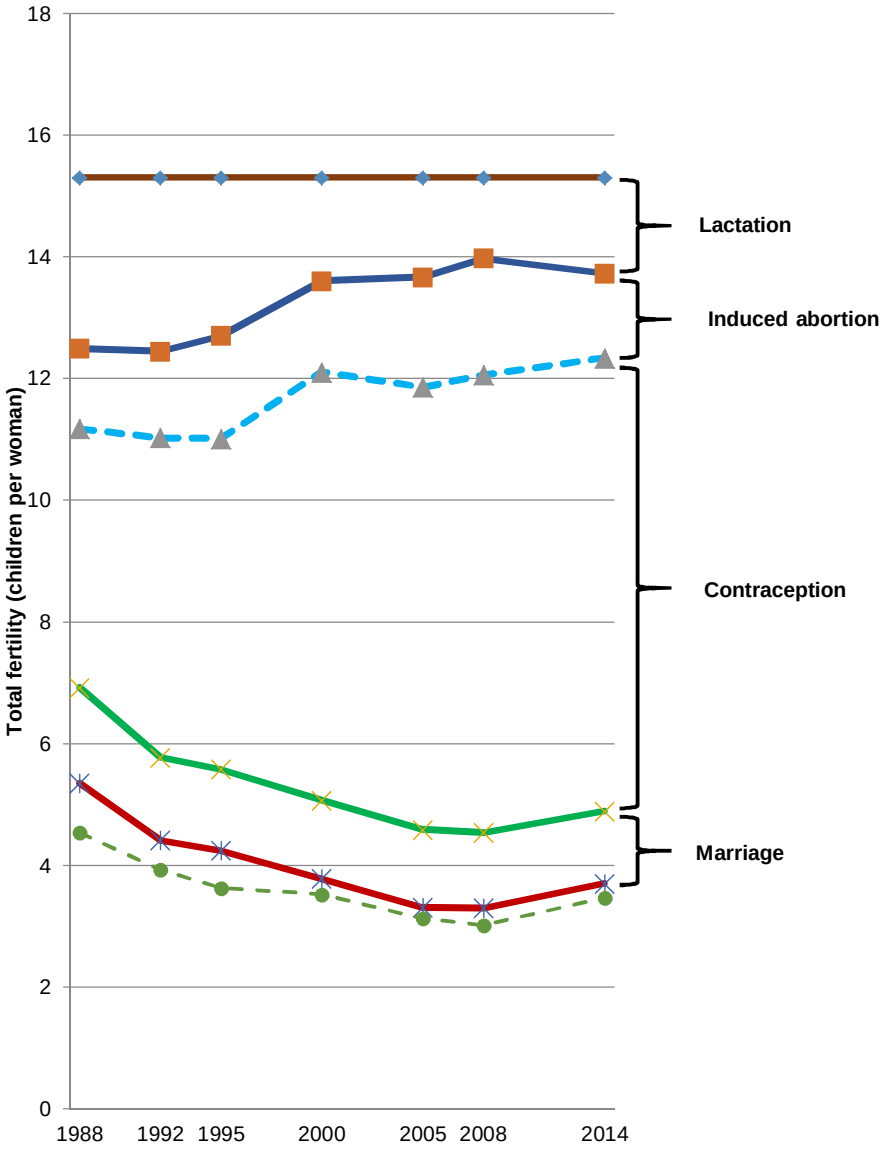
19 and 20–24 age groups (not shown), where the inhibiting effect of contraception and marriage has been diminishing since the 2000s, and particularly since 2005.

Table 2: Trends in the effect of each proximate determinant of fertility (Bongaarts indices) on the TFR

		1988	1992	1995	2000	2005	2008	2014
Lactation	Effect on fertility	28%	26%	24%	15%	14%	11%	14%
	Index (*Ci*)	0.82	0.81	0.83	0.89	0.89	0.91	0.90
Induced abortion	Effect on fertility	13%	13%	15%	13%	15%	16%	12%
	Index (*Ca*)	0.89	0.89	0.87	0.89	0.87	0.86	0.90
Contraception	Effect on fertility	43%	48%	49%	61%	61%	63%	64%
	Index (*Cc*)	0.62	0.52	0.51	0.42	0.39	0.38	0.40
Non-marriage	Effect on fertility	16%	12%	12%	11%	11%	10%	10%
	Index (*Cm*)	0.77	0.76	0.76	0.75	0.72	0.73	0.76
R		0.85	0.89	0.86	0.93	0.95	0.92	0.94
Total	Effect on fertility	100%	100%	100%	100%	100%	100%	100%
	Index (C_t)	0.35	0.29	0.28	0.25	0.22	0.22	0.24

Note: C_t is the products of all *C*s.
Source: Authors' calculation based on all EDHS, 1988–2014; data weighted by sample weight.

Figure 10: Changes in the proximate determinants in Egypt, 1988–2014



Source: Authors' calculation based on all EDHS, 1988–2014; data weighted by sample weight.

The sections above seem to imply that the stall in fertility decline and the increase since 2008 are the result of an increase in the birth of parities-one-to-three children, while there is a strong decrease in families with four and more children. The proximate determinants analysis does not provide an explanation, although we see that while family planning plays the most important role in inhibiting fertility its effect on the fertility decline is decreasing. This goes hand in hand with the fact that women are tending to opt for less effective methods (the pill vs. IUD). Therefore, we are still in need of explanations for the stalling fertility phenomenon, and must look further, into economic factors and women's employment.

5. Economic factors and women's employment

Possibly the most convincing component that can explain the stalling decline and then increase in the last period is changes in the overall economic and labour market situation in Egypt and their impact on women's lives and fertility behaviours. Although the observed demographic, economic, and educational development trends do not necessarily point in the direction of a fertility stall, some mechanisms can explain why they do in the particular context of Egypt.

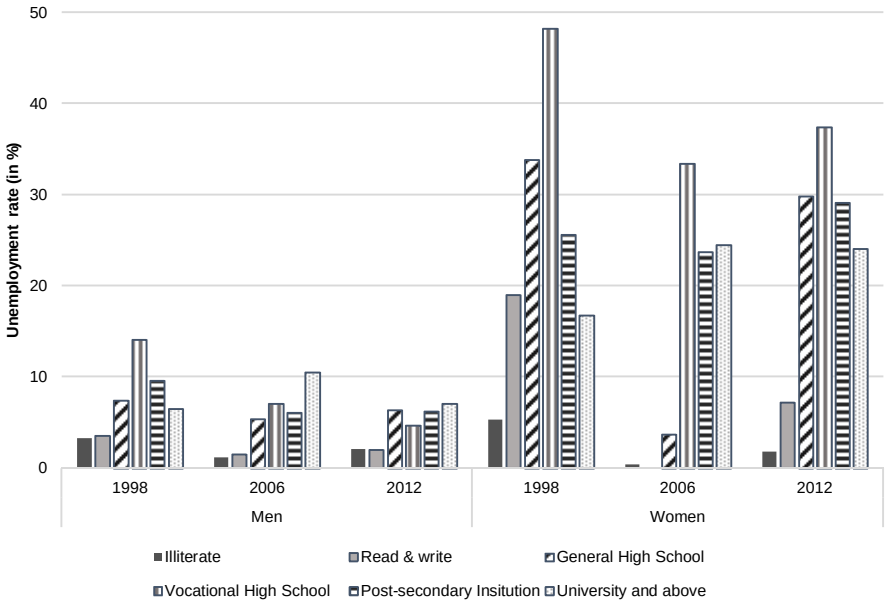
First of all, whereas the labour market participation rate of men – meaning the proportion of the male population of working age that are either working or looking for work – is close to 100%, that of women is very low, 30% in 2014, and has been plateauing at this level since 2000 (see Figure 11a). In parallel, unemployment has been substantial for some time and has even slightly increased in the last few years, to 25% for women and 9% for men in 2014 (see Figure 11b).

Figure 11: Trend in a) labour force participation rates by broad age groups and b) unemployment rates of population 15+ (ILO estimates and projections; by sex), Egypt, 1990–2014

Source: Key Indicators of the Labour Market (KILM) 2016; available at http://www.ilo.org [accessed on 1/11/2016].

What is more striking is the fact that unemployment rates are on average higher for the highly educated than for the less-educated population, and with larger deviations in that respect for women than for men. This is revealed by the data of the Egypt Labour Market Surveys (ELMS 1998, ELMPS 2006, and ELMPS 2012), shown here for selected categories of low and high levels of education that encompass most of the population (Figure 12; see also Figure 13). The unemployment rate of women with a secondary education or more was above 24% in 2012, and above 32% in urban areas (not shown in the figure), while the unemployment rate of women with less than elementary education was below 8%. The corresponding figures for men indicate much lower levels: in 2012 unemployment rates for men were between 5% and 7% for the higher-educated and around 2% for the lower-educated.

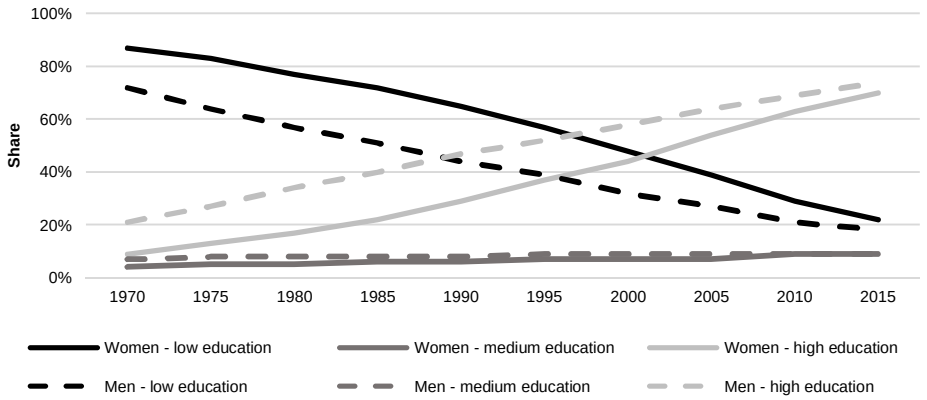
Figure 12: Unemployment rates by educational attainment, standard labour force, 15–64 age group, 1998, 2006, and 2012



Source: ELMS 1998, ELMPS 2006, ELMPS 2012.

How did this happen? Until the late 1980s the Egyptian economy was a very centralized planned economy. All Egyptians educated to high school level (graduates of vocational secondary schools and technical institutes) or higher (university) were guaranteed a job in the state sector (Assaad 1997). As a result, parents pushed their children to acquire high education levels as a way to secure them a permanent position and better working conditions in the public sector. The increase in the educational attainment of the younger generations over the years is visible in Figure 13. Figure 13 also shows Egypt to be a dichotomous society, with large segments of the population displaying low levels of education – the low-educated were the majority among men until 1990 and among women aged 20–39 until 2005 – and those with high education (having completed upper secondary education or a higher degree) accounting for more than 70% of the 20–39 working-age population in 2015 (WIC 2015). Figure 13 also shows that the gender gap in educational attainment that was large until the 2000s has been declining since then.

Figure 13: Share of the 20–39-year-old population by educational attainment, men and women, Egypt, 1970–2015



Source: WIC (2015); Note: low education = no education and incomplete primary education; medium education = completed primary (ISCED 1) or low secondary education (ISCED 2); high education = upper secondary or higher (ISCED 3+).

Under the Mubarak regime, and under the auspices of a structural adjustment programme sponsored by the IMF and the World Bank in the early 1990s, the country adopted a package of liberalization reforms which seriously constrained (among other things) employment in the public sector (World Bank 2014). This is one of the causes of the more-educated population's low labour force participation and employment, as families continued to push their children into acquiring high levels of education even though the public sector no longer had the capacity to absorb them (Assaad and El-Hamidi 2009). While this explains the high unemployment rates among highly educated men and women, as shown in Figure 12, it does not explain why educated women are less likely to be in the labour force and less likely to be employed. One of the reasons why women tend to be more affected are their chosen fields of study, which tend to make them less employable. Female students still study traditional specializations such as education, humanities and the arts, and social sciences, rather than fields of study better suited to the needs of the private sector (World Bank 2014; Gebel and Heyne 2014).

The next reason is that underemployment has increased substantially (Assaad and Krafft 2013). The increase in employment in the private sector has not matched the loss of employment in the public sector, and most economic opportunities come from the informal sector, which is dominated by low-quality work and lack of protections and benefits (Assaad and Krafft 2015; Krafft 2016). The informal sector has become the norm, especially after the economic crisis was reinforced by the Arab Spring (World Bank 2014). In this context, Assaad and Krafft (2013) show that the impact of

downturns in the growth of labour demand differs for men and women. For women, a drop in labour demand often results in overall reductions in participation rather than simply in increases in unemployment, and this is particularly the case for educated women (Assaad and Krafft 2013).

While these phenomena should increase the number of people existing in a precarious situation and could thus affect fertility negatively, as happened in Europe after the 2008 financial and economic crisis (Sobotka, Skirbekk, and Philipov 2011), the opposite has happened in Egypt. A potential explanation lies in the opportunity costs for women, who face

1) low job supply in the public sector, where women were traditionally employed (Krafft 2016)
2) inadequate skills, due to an inadequate educational profile, for participating in the private sector (World Bank 2014)
3) low salaries in the (formal and informal) private sector for women (Said 2015), together with working conditions that do not meet women's expectations in terms of working hours, leave, and exposure, whether real or perceived, to the risk of sexual harassment (Assaad 2015).

Women therefore decide to "leave (or never enter) the labor force" (Krafft 2016: 31). Although it is difficult to prove the causality between these structural conditions and the fertility increase as shown by Krafft (2016), it is nevertheless quite plausible that faced with adverse conditions in the labour market, women decide to enter marriage and have their first child earlier than older cohorts. It could also mean that in the context of low opportunities women prepone their fertility (which would not show in period indicators), which could lead to fewer births in the future, once they have achieved their planned or ideal number of children.

6. Conclusion

The analysis in this research reveals a number of interesting patterns. First, the fertility increase observed in recent years in Egypt (2008–2014) was embedded in an enduring stall in fertility decline which has lasted since 2000. It seems to be particularly affecting young women, who are marrying and bearing children earlier than previous cohorts even though they are more educated. This trend can be observed across Egypt but is less pronounced in the urban governorates. We observe that parities one, two, and three are on the increase, while parity four-and-more is strongly decreasing.

The Arab Spring and the political, economic, and religious turmoil it provoked, does not really hold as an explanation, as the stall started before the revolution (Courbage 2015) – although it has certainly been a reinforcing factor in a country already in economic crisis. Frequent explanations are that women are having more children as a result of increased religiosity in the population, or that Egyptian society has become more conservative so women are increasingly secluded in their homes (World Bank 2004). A positive link between strong religiosity and fertility has been shown (see examples in Kaufmann 2010), but while the Muslim Brotherhood movement has been gaining ground in the population, and was even in power in 2011–2012, the place of religion in people's life did not change during the 10 years surveyed. Respondents in the World Values Surveys rated family and religion as the most important elements in their lives; the importance of religion went from 97% in 2001 to 94% in 2012, while the importance of the family was 96% both times (World Values Survey 2001, 2008, and 2012). Another convincing argument against Egyptian society having become more traditional is the steady increase in young women's educational level throughout the various political and economic crises experienced by the country (Assaad 2015).

Access to contraceptives might have been a temporary issue, as contraceptive use has declined and the government has been decreasing funds for the provision of contraceptives to the population in the context of a persistent ideal number of around three children per family. We saw that women have changed their mode of contraception, increasingly using the pill rather than the IUD, which could voluntarily or involuntarily – on the women's side – be a factor in the fertility increase. However, this is more likely to be instrumental in fertility decrease, as shown by the proximate determinant analysis, as contraception is consciously chosen by women in accordance with their fertility desires (Awadalla 2012).

Another plausible explanatory factor is women's labour force participation and employment levels, which have been very low and have declined in recent years, particularly for the increasing number of highly educated women residing in urban areas. This is due to different phenomena, mostly cuts in the public sector as Egypt

adopted a more market-oriented economy, and to the economic crisis – itself the result of an unbalanced economy with increasing social inequality. This was reinforced when the Arab Spring caused some of the main sources of revenue, such as tourism, to plummet. The lack of jobs for women in the public sector and the inadequacy of the private (formal and informal) employment sector appear to have induced young married couples to have children earlier, as the family has a strong foundation in Egyptian society. The sudden change in the age structure of the fertility curve could mean that young (and mostly well-educated) women are having their children earlier in life, during the period when they are available and mostly out of work. This could result in a decline in the near future, especially if women enter the labour force and become actively employed. This will depend on several factors, such as adjusting women's education specializations to make them more suited to the private market and implementing policies to lower the barriers faced by women in the labour market.

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Appendix

Table A-1: Summary of the extent of the main data quality problems affecting fertility estimates (women's and children's) in all EDHSs (1988–2014), standardized scores[1]

EDHS	Women				Children			
	Incompleteness of dates of birth[2]	Age heaping measured by Whipple's index for women aged 18–47[3]	Age heaping measured by Myers' Blended index for women aged 15–44[4]	Sample implementation[5]	Incompleteness of dates of births[6]	Age heaping measured by Myers' Blended index for children aged 0–29[7]	*Displacement*[8]	*Potter effect*[9]
1988	1	2	1	2	2	5	*5*	*5*
1992	2	2	1	5	4	5	*5*	*5*
1995	2	2	1	5	3	5	*5*	*5*
2000	2	2	2	5	4	5	*3*	*4*
2005	3	2	3	4	4	5	*4*	*4*
2008	4	3	4	4	5	5	*1*	*4*
2014	5	4	4	4	5	5	*2*	*5*

[1] 1= very rough data; 2 = rough data; 3 = approximate data; 4 = fairly accurate data; and 5= highly accurate data.
[2] Standardized scores based on the percentage of women who did not provide information about their dates of birth.
[3] Standardized scores based on the Whipple's index which shows the excess or deficit of people in age ending in any of the 10 digits (0 to 9) (Hobbs 2004).
[4] Standardized scores based on the Myers' blended index which shows the excess or deficit of people in age ending in any of the 10 digits (0 to 9) assuming equal distribution of the population among the different ages (Myers 1940).
[5] Standardized scores based on the comparison of the percentage of ever-married women at all ages for weighted and unweighted samples in all EDHS.
[6] Standardized index based on the percentage of women who did not provide information about the dates of birth of their children.
[7] Standardized scores based on the Whipple's index which shows the excess or deficit of people in age ending in any of the 10 digits (0 to 9).
[8] Standardized scores based on a comparison of retrospective fertility trends for 15 years before the survey for all individual EDHS.
[9] Standardized scores based on the reconstruction of fertility rates over a time period of 30 years (Potter 1977; Schoumaker 2014).

Figure A-1: Age-specific fertility rates for three years preceding the survey, Egypt, by place of residence

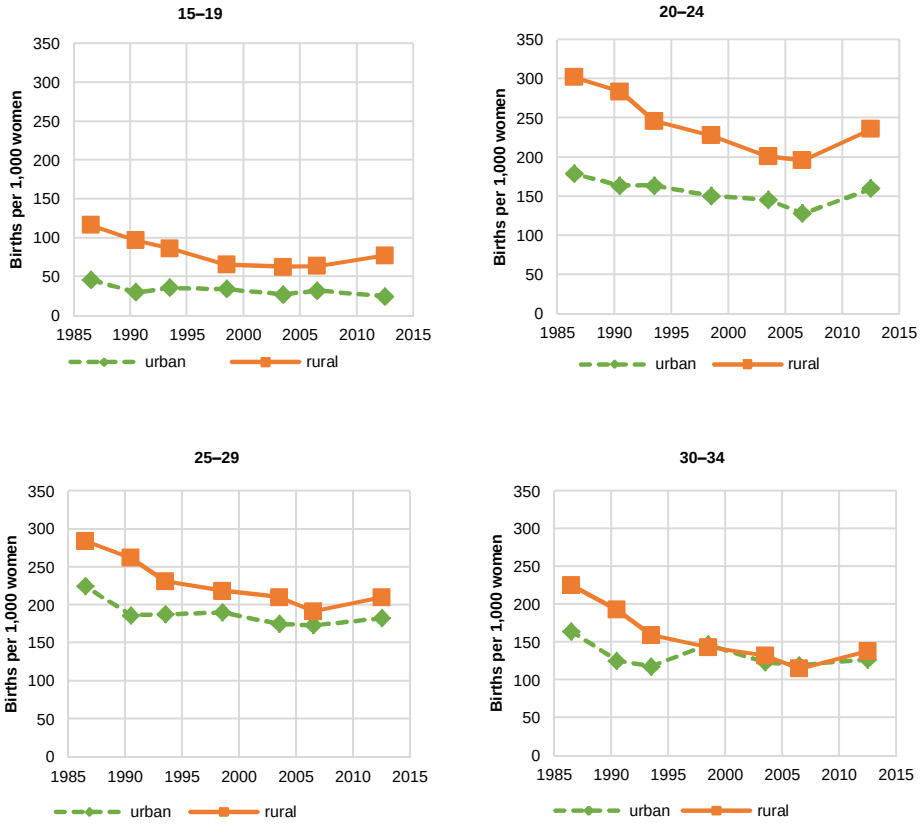


Figure A-1: (Continued)

Source: All EDHS, 1988–2014; weighted by sample weight, and awfactu.

Figure A-2: Age-specific fertility rates for three years preceding the survey, Egypt, by broad levels of education

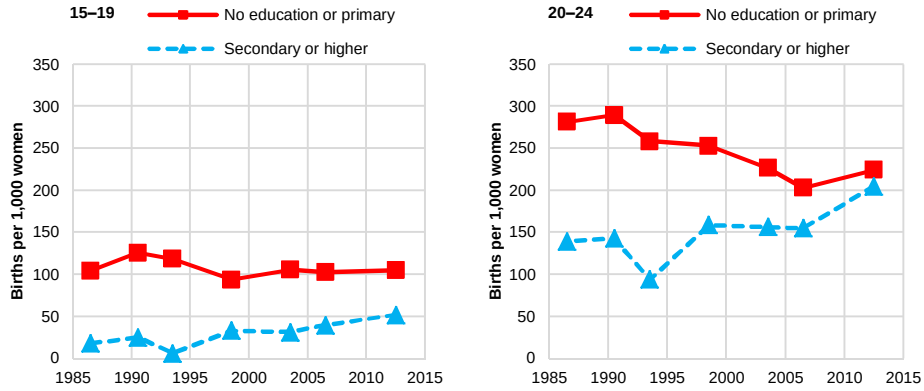
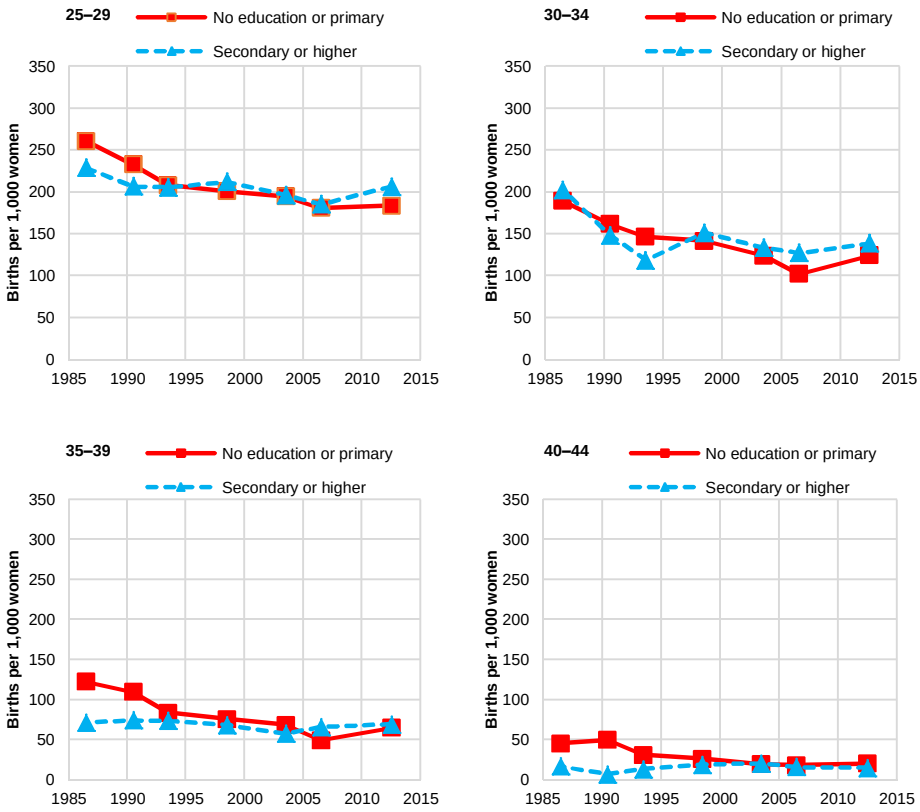


Figure A-2: (Continued)



Source: All EDHS, 1988–2014; weighted by sample weight, and awfacte.