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FERTILITY LEVELS AND DETERMINANTS IN EGYPT

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1. INTRODUCTION

Like many other developing countries, Egypt is in the middle of a transition to lower fertility. This study is intended to improve understanding of this transition by using data from the 1992 Egypt Demographic and Health Survey (EDHS), to look in some depth at the nature and pace of fertility change in Egypt and its determinants. Based on a model plan for the analysis of DHS fertility data (Hammerslough, 1993), the study first addresses the following issues:

- What has been the long-term trend in fertility?
- How has the pace of the family building process changed over time?
- How did fertility rates change over the period immediately prior to survey both for Egypt as a whole and for key subgroups?

Using Bongaarts' proximate determinants model, the study then looks at factors, which are influencing fertility change in Egypt. According to the model, the four principal proximate determinants of fertility are: a) the prevalence of marriage; b) the use of contraception; c) the use of induced abortion; and d) the level amount of postpartum infecundibility caused by breastfeeding and postpartum abstinence (Bongaarts, 1978). In this study, the relative importance of each of these determinants in influencing fertility levels in Egypt is assessed first. Then the trend in fertility in the late 1980s and early 1990s is decomposed into parts that reveal the effects of the principal proximate variables.

2. DATA QUALITY

The validity of fertility analysis is determined to a large extent by the accuracy of age and date reporting for both women and their children. Therefore, before looking at patterns of fertility change in Egypt, it is important to examine the quality of the age and date information collected in the 1992 EDHS. The

following sections review the quality of the data on respondent's age and of the birth and/or age data obtained through the birth history in the EDHS. Since one of the key concerns in the design of the survey was to provide reliable estimates of fertility levels for Egypt as a whole and for key residential subgroups, the exploration of data quality takes into account variations by urban-rural residence and region (Urban Governorates, Lower Egypt and Upper Egypt) as well as the educational level of the respondent.

2.1 Respondent Data

In obtaining age data, respondents in the 1992 EDHS were asked to report both their birth dates (month and year) and their ages in completed years. If the respondent failed to give either her birth date or her age, the interviewer was instructed to probe and to try to estimate the respondent's age in relation to national events, other members of the household, the date of the respondent's first marriage or first birth, or in any other way that was plausible. The latter procedures may lead to measurement error, particularly when the interviewer estimates the respondent's age on the basis of physical appearance, as this assessment may be influenced by both the respondent's as well as interviewer's background.

Table 1 shows the extent to which the women interviewed in the 1992 EDHS gave complete information about their birth dates. A majority of respondents (61 percent) provided both the month and year of birth. Nearly 40 percent provided the year and age, whereas a negligible percentage (0.1 percent) knew only their age. For these groups, the month of birth was imputed and/or the year of birth was calculated (Croft 1991). Table 1 also compares the proportion of women providing complete age and/or birth date information in the 1992 EDHS with that in the 1988 EDHS[1]. This comparison indicates that the percentage reporting a complete date of birth in 1992 EDHS is higher than in 1988 EDHS for all subgroups. Despite the overall improvement, this percentage remains low in rural areas, especially in Upper Egypt and among women with no education.

[1] For more information on the 1992 DHS, see El-Zanaty et al., 1993; for information on the 1988 DHS, see Sayed et al., 1989.

Table 1 Percent distribution of ever-married women 15-49 by the completeness of reporting of age information, 1992 Egypt Demographic and Health Survey, and the percentage of ever-married women 15-49 reporting a complete date of birth (month and year) in the 1988 Egypt Demographic and Health Survey, according to urban-rural residence, place of residence and level of education

Background Characteristic	Completeness of reporting in the 1992 EDHS				Number of Women	1988 EDHS
	Month and year	Age and year (month imputed)	Age only (moth and year imputed)	Total		Month and year
Urban – rural residence						
Urban	79.8	20.2	0.0	100.0	4,596	67.3
Rural	44.1	55.8	0.1	100.0	5,268	17.7
Place of residence						
Urban Governorates	86.8	13.2	0.1	100.0	2,357	78.7
Lower Egypt	60.2	39.6	0.2	100.0	4,067	34.8
Urban	78.5	21.5	0.0	100.0	1,210	60.8
Rural	52.5	47.2	0.3	100.0	2,857	24.2
Upper Egypt	43.4	56.6	0.0	100.0	3,440	24.7
Urban	65.2	34.8	0.0	100.0	1,029	51.8
Rural	34.1	65.9	0.0	100.0	2,411	10.0
Education level						
No education	39.2	60.6	0.2	100.0	4,771	16.8
Some primary	62.2	37.7	0.1	100.0	2,078	41.2
Primary through secondary	84.7	15.3	0.0	100.0	1,093	77.0
Completed secondary/higher	98.8	1.2	0.0	100.0	1,922	98.1
Total	60.7	39.2	0.1	100.0	9,864	41.6

One frequently observed problem with age data is heaping, i.e., the tendency for women who are not certain how old they are to show a preference for certain ages, usually those ending in zero or five. Figure 1, which presents the distribution of respondents in the 1992 EDHS by single year of age, confirms that there is some heaping on selected ages. This tendency toward digit preference is confirmed in Table 2, which shows the distribution of respondents according to the terminal digit of their ages. Table 2 also compares a version of the Myers index[2] (an overall measure of digit preference) for the 1992 survey with that observed in the 1988 EDHS. The comparison indicates that, although there is obvious digit preference in the 1992 results, particularly among rural respondents, the extent of digit preference is less in the 1992 survey than in the 1988 EDHS.

In summary, there is some evidence of age heaping for respondents in the 1992 EDHS. However, age heaping is less evident than in earlier surveys and affects only a minority of respondents. Moreover, the grouping of respondents into five-year age categories will further minimize the impact of any age heaping on the analysis of the fertility data from the 1992 EDHS

[2] Calculated as the sum of the absoulte values of the deviation of the percentage in each terminal digit category from 10 (Rutstein and Bicego, 1990).

Figure 1
Distribution of Ever-married Women by Single Year of Age

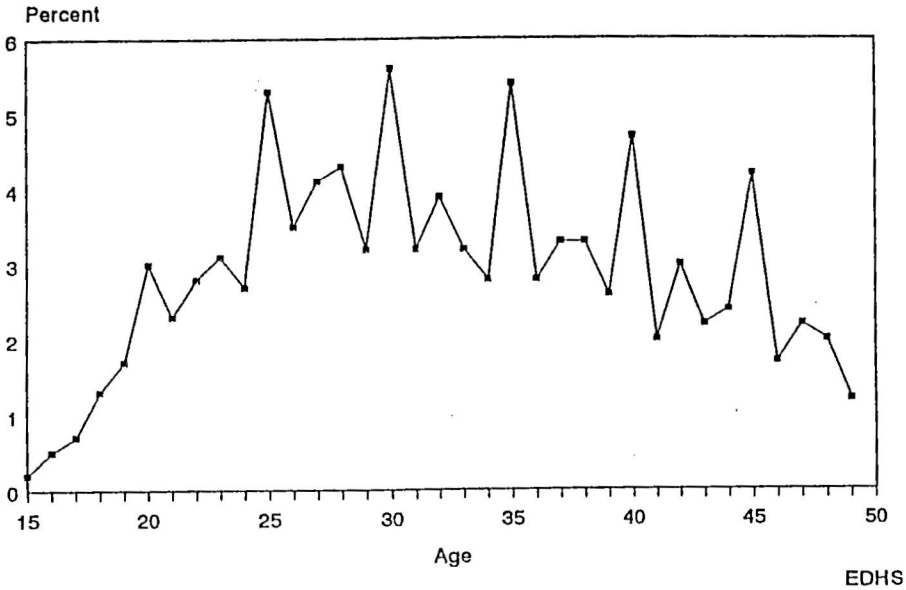


Table 2 Percent distribution of ever-married women 15-49 by terminal digit of age for the 1992 EDHS, and comparison of the Myers index for the 1988 and 1992 EDHS surveys, according to urban-rural residence, place of residence and level of education

Background Characteristic	Terminal Digit										Myers index	
	0	1	2	3	4	5	6	7	8	9	1988	1992
Urban – rural residence												
Urban	8.1	8.1	10.0	8.7	8.5	12.9	9.6	10.4	10.9	9.3	15.5	11.6
Rural	6.9	6.9	9.4	8.2	7.3	16.8	7.7	10.0	10.8	8.1	34.4	24.8
Place of residence												
Urban Governorates	7.8	7.8	9.3	8.9	8.7	13.0	9.3	9.8	11.4	10.5	10.1	12.5
Lower Egypt	7.5	7.5	10.2	8.4	7.7	13.8	8.1	10.8	11.5	8.5	26.7	19.6
Urban	8.2	8.2	12.4	8.8	8.2	10.7	10.2	11.3	11.1	8.3	20.7	13.0
Rural	7.2	7.2	9.2	8.3	7.5	15.1	7.2	10.5	11.7	8.6	29.3	23.9
Upper Egypt	7.2	7.2	9.4	8.0	7.4	17.7	8.7	9.7	9.8	7.7	33.7	24.2
Urban	8.6	8.6	8.7	8.0	8.5	15.3	9.9	10.7	9.6	7.9	20.7	17.0
Rural	6.7	6.7	9.7	8.0	7.0	18.7	8.2	9.3	9.8	7.6	40.8	27.4
Education level												
No education	6.2	6.2	9.3	7.9	6.8	18.2	7.3	9.7	11.1	7.7	18.3	30.2
Some primary	7.5	7.5	10.4	8.0	9.1	14.0	9.5	10.1	11.2	8.7	21.0	14.3
Primary through secondary	9.4	9.4	8.3	8.7	6.9	12.1	8.8	11.3	12.0	11.5	16.1	15.5
Completed secondary/higher	9.5	9.5	10.6	10.0	9.8	9.7	10.5	10.8	9.2	9.5	10.7	4.6
Total	7.5	7.5	9.7	8.4	7.9	15.0	8.6	7.9	10.9	8.7	25.5	18.6

2.2 Birth History Data

To obtain information on the timing of fertility events, respondents were asked to give the birth dates (i.e., month and year) and age for each surviving child and a birth date and age at death for each child who had died. Again the accuracy of the reporting of this information varies. Greater error is usually associated with the reporting of more distant events or of dates for children who have died.

Table 3 examines the completeness of reporting of dates of birth for all live births during the period January 1983 to December 1992. The completeness of reporting varies according to the survival status of the child. For nearly 90 percent of all living children, mothers reported both the month and year of birth, while a complete birth date was reported for only around 60 percent of children who had died. The reporting of birth dates was better for recent births, i.e., those occurring during the period January 1983 to December 1992, than for other births, whatever the survival status. The completeness of birth date information varies significantly by residence (see Table 4), with reporting of date information being better for urban than rural births. Birth date reporting increases with the educational level of the mother. Overall, the percentage of live births for which information on date of birth was complete is higher in the 1992 EDHS than 1988 EDHS, indicating that date reporting is improving in Egypt.

Table 3 Percent distribution of all live births and all births during the period January 1983 through December 1992 by completeness of reporting of birth date information, according to survival status of the birth

Completeness of data reporting	All births			All births January 1983 through December 1992		
	Alive	Dead	Total	Alive	Dead	Total
Month and year given	88.7	59.3	84.3	95.1	77.0	93.3
Month and age given, year imputed	0.0	0.0	0.0	0.0	0.0	0.0
Year and age given, month imputed	11.2	0.0	9.5	4.9	0.0	4.4
Year only given, age and month imputed	0.0	40.2	6.1	0.0	22.8	2.2
Month only given, age and year imputed	0.0	0.0	0.0	0.0	0.1	0.0
Month, year and age imputed	0.0	0.5	0.1	0.0	0.1	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0
Number of births	32,410	5,801	38,211	16,307	1,778	18,085

Table 4 Percentage of all live births in the 1992 EDHS for which information on the birth date was complete, by survival status of the child, and the percentage of births for which information was complete in the 1988 EDHS, according to urban-rural residence, place of residence and level of education

Background Characteristic	1992 EDHS			1988 EDHS
	Living	Dead	Total	
Urban – rural residence				
Urban	94.0	59.8	90.2	78.2
Rural	84.9	59.0	80.3	50.5
Place of residence				
Urban Governorates	96.0	61.1	92.2	89.4
Lower Egypt	90.3	69.7	87.6	64.3
Urban	95.4	71.6	93.4	75.5
Rural	88.4	69.3	85.7	60.6
Upper Egypt	82.8	51.8	76.6	46.7
Urban	88.3	51.2	82.8	62.3
Rural	80.8	51.9	74.5	39.2
Education level				
No education	84.9	57.3	79.9	52.8
Some primary	89.9	58.9	85.5	66.7
Primary through secondary	94.9	67.6	91.9	82.7
Completed secondary/higher	99.7	90.1	99.3	97.8
Total	88.7	59.3	84.3	62.5

One area of specific concern in estimating fertility levels in all DHS surveys is the extent to which fertility rate estimation may be influenced by the displacement of children's birth dates, usually by interviewers seeking to avoid asking the extensive set of child health questions (Arnold 1990). Since such displacement typically results in a deficit of births in the fifth calendar year before the survey (the boundary for the DHS health section), significant displacement may result in underestimation of the fertility rate for the five-year period before the survey and an overestimation of the rate for the preceding five-year period. In assessing the extent of birth displacement in DHS surveys, Curtis (1995) concludes that, in Egypt, there was a marked decrease in the extent of birth displacement between the 1988 and 1992 DHS surveys.

In summary, the birth history data from the 1992 EDHS is more complete and subject to fewer errors than data from the 1988 EDHS. Although some displacement of births occurred, this will not substantially affect the interpretation of fertility trends derived from these data.

3. FERTILITY LEVELS AND TRENDS

The assessment of fertility trends is one of the most important objectives of the study. In this part of the paper, fertility patterns are examined from two perspectives. First, evidence of long-term changes in fertility is examined, using both period and cohort measures. Then parity progression ratios are presented to provide an understanding of how the family building process has changed over time. Finally, the issue of how recent changes in fertility vary by residence and education is addressed.

3.1 Long-term Trends in Fertility

3.1.1 Changes in Period Rates

Long-term trends in fertility can be explored for up to 15 years preceding the 1992 EDHS by using the birth history information to estimate total fertility rates for successive periods before the survey.

Table 5 Trends in fertility rates during the 15-year period preceding the survey, 1992 EDHS

Background Characteristic	1992 EDHS		
	0-4	5-9	10-14
Total			
15-19	69	112	124
20-24	224	258	287
25-29	231	271	292
30-34	170	208	245
35-39	102	134	[164]
40-44	45	[49]	-
45-49	[5]	-	-
TFR 15-34	3.5	4.2	4.7
Urban			
15-19	31	72	80
20-24	163	195	239
25-29	194	239	260
30-34	139	182	202
35-39	79	95	[124]
40-44	30	[32]	-
45-49	[2]	-	-
TFR 15-34	2.6	3.4	3.9
Rural			
15-19	100	150	167
20-24	282	321	336
25-29	268	305	327
30-34	202	237	290
35-39	126	176	[212]
40-44	61	[69]	-
45-49	[9]	-	-
TFR 15-34	4.3	5.1	5.6

Note : Age-specific rates are per 1,000 women. Estimates enclosed in brackets are truncated.

Table 5 shows fertility rates for three five-year periods before the survey. The fertility rates are cumulated only up to age 34 because of the progressive truncation of data for older women as the time before the survey increases.

The analysis indicates that fertility rates for women age 15-34 fell by 1.3 births during the 15-year period for which information is presented in Table 5. The pace of the decline has accelerated over time. As a result, fertility changes are heavily concentrated in the most recent periods. Fertility in rural areas has remained consistently high, relative to fertility in urban areas, although both urban and rural rates declined during the period. Overall, fertility among women 15-43

in urban areas fell by one-third, from 3.9 births during the period 10-14 years before the survey, to 2.6 births in the five-year period immediately before the survey. Among rural women 15-34, fertility declined by 24 percent, from 5.6 births to 4.3 births during the same period.

3.1.2 Changes in Cohort Rates

Changes in fertility rates over time are examined in Table 6 for cohorts of women born during the period 1948-1977. Unlike period fertility rates, which measure the level of childbearing at a given time period for all age groups in a population, cohort fertility measures allow an examination Of changes over time in the fertility behavior of a given birth cohort.

Table 6 Trends in fertility rates by birth cohort, 1948-1977, 1992 EDHS

Mother's age at birth	1973-1977	1968-1972	1963-1967	1958-1962	1953-1957	1948-1952
15-19	53	100	121	141	119	147
20-24	-	215	251	285	280	285
25-29	-	-	236	260	287	301
30-34	-	-	-	178	191	247
35-39	-	-	-	-	102	134
40-44	-	-	-	-	-	52
45-49	-	-	-	-	-	-

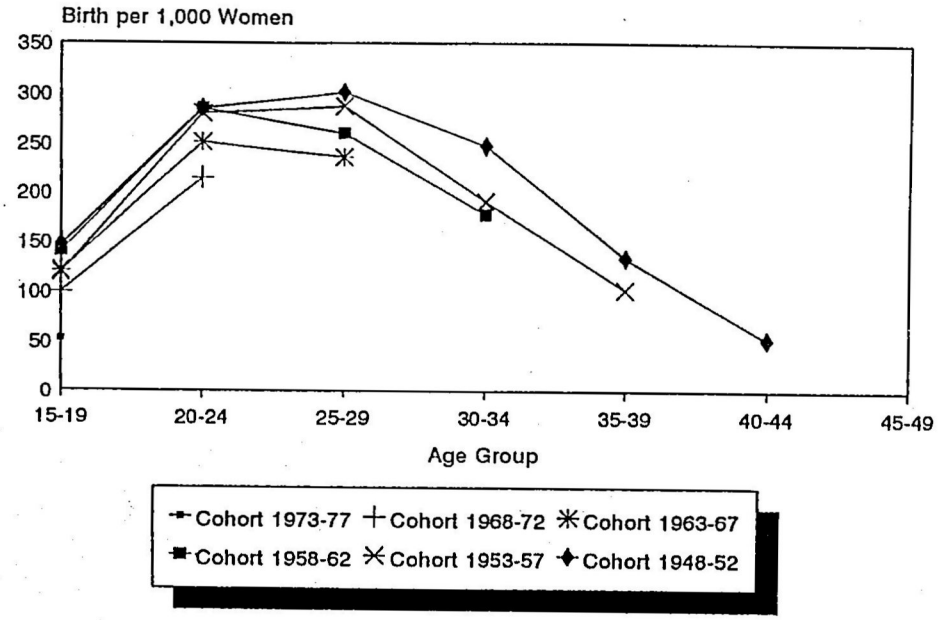
A general trend toward lower fertility is the principal finding that can be drawn from the examination of changes in cohort fertility. For each successive cohort, fertility is generally lower at any given age (see Figure 2). The substantial reduction in fertility at ages 15-19 observed for the youngest cohorts (those born between 1968 and 1972 and between 1963 and 1967) is a result of an increasing trend toward later marriage which delayed the start of childbearing and, hence, reduced fertility levels for these women.

The overlap of the three oldest cohorts at ages 20-24 suggests that there was little change in fertility among women in this age group until the cohort born between 1963 and 1967 reached their twenties. The declines observed at ages 20-24 for the latter cohort, as well as the cohort born between 1968 and 1972, are likely a result of an increased tendency for many women to delay marriage into their twenties.

Figure 2 also shows steady decreases in fertility in the late twenties and early thirties for all cohorts. This suggests that successive cohorts are practicing

fertility control earlier. The changes are particularly notable for the cohort born between 1953 and 1957. The women in this cohort would have reached their peak childbearing ages in the 1980s when rates of family planning use were increasing rapidly in Egypt.

Figure 2
Age Specific Fertility Rates by Cohort



EDHS 1992

3.2 Parity Progression

An analysis of parity progression contributes to the understanding of fertility change over time by looking at how many women move successively from one stage to the next in the family building process, i.e., from marriage to first birth, from first birth to the second birth, and so on. Calculated using life table methods, the proportion of women achieving the next higher birth order within five years (60 months) of the previous one (i.e., the quintum)[3] provides a reasonable measure of the extent to which women at one parity will go on to have another birth.

[3] For purpose of this study, quintums are calculated for the periods 0-5, 6-10, 11-15 and 16-20 years before the survey.

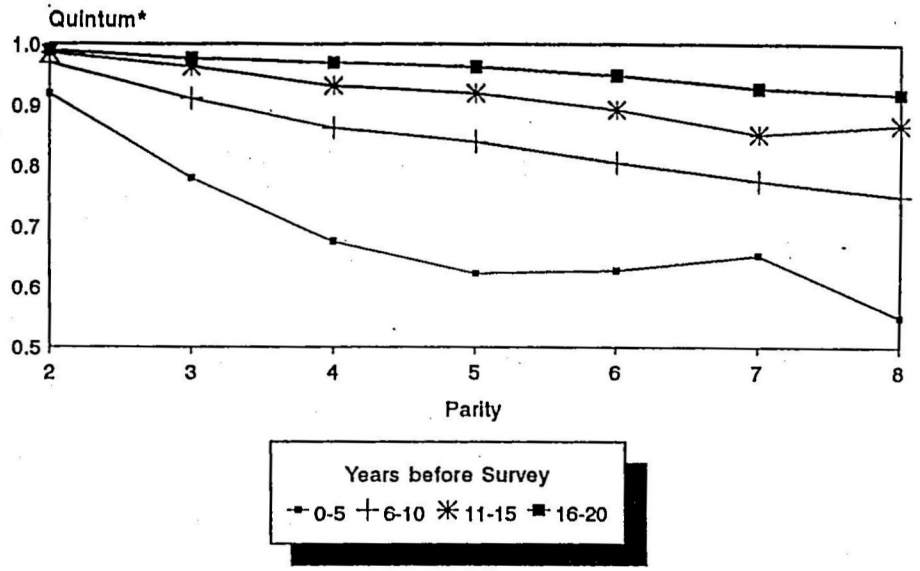
Table 7 presents the values of the quintum or the proportion having a birth within five years of the previous event, which are also shown graphically in Figure 3. An examination of trends in quintums for successive periods before the survey indicates that there has been a steady decline over time in the proportion having the next birth, with the decline becoming evident as long as 20 years before the survey. However, the slowing in the transition to the next birth is most noticeable in the period 0-5 years preceding the survey.

The decrease in the quintums in the period 0-5 years before the survey are quite large, especially in the proportion of women having a third birth within five years of the second (.92 to .78). The dramatic fall in the quintums at third and higher birth orders in the period 0-5 years before the survey is evidence of more conservative childbearing behavior as family size increases. The presentation of these quintums by birth order in Figure 3 clearly illustrates the relationship between parity and the timing of the adoption of fertility control, with high parity women being the first to change. For example, the transition to parity 5 has been falling steadily in the last 20 years; however, the change has been more rapid in the period 0-5 years before the survey. Among high parity women, the recent fall in quintums has been especially notable

Table 7 Proportion of women at parity *i* who have given birth within five years of a previous birth (quintum), by successive 5-year periods before the survey, 1992 EDHS

Parity	Number of years before survey			
	0-5	6-10	11-15	16-20
2	.92	.97	.99	.99
3	.78	.91	.96	.98
4	.67	.86	.93	.97
5	.62	.84	.92	.96
6	.63	.80	.89	.95
7	.65	.77	.85	.93
8	.55	.75	.87	.92

Figure 3
Parity Progression Ratios for Specific Periods Prior to the Survey



*Proportion moving from one parity to the next within five years

EDHS 1992

Table 8 shows the values of the quintum in the period 0-5 years before the survey for both urban and rural areas. The extremely low levels of fertility in urban areas are being achieved through the adoption of fertility control by women at fairly low parities. Overall, fairly high proportions of urban women ultimately have the second or third birth, but then only about 50 percent go on to each higher order. Reflecting the historically high levels of fertility in rural Egypt, the changes in the rural quintums are more gradual, with the greatest declines in transitions at parity 6 or higher.

Table 8 Proportion of women at parity *i* who have given birth within five years of a previous birth (quintum), by urban-rural residence, 1992 EDHS

Parity	Urban	Rural	Total
2	.90	.93	.92
3	.64	.89	.78
4	.47	.82	.67
5	.40	.77	.62
6	.51	.69	.63
7	.54	.70	.65
8	.48	.57	.55

3.3 Recent Trends in Fertility by Residence and Education

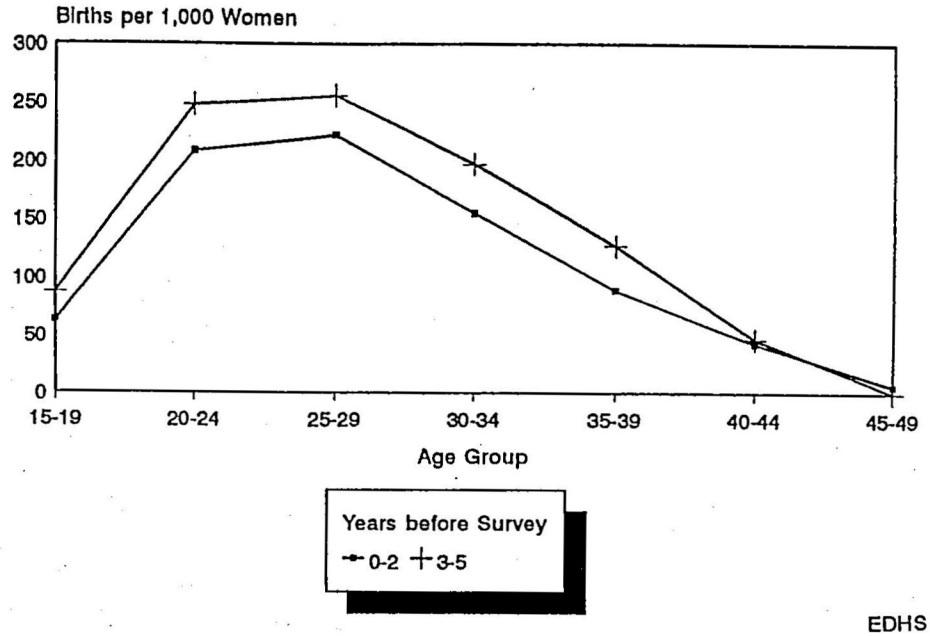
In this section, the levels and trends of fertility are examined in relation to the socioeconomic characteristics of the population. The common pattern of fertility differences is for fertility levels to be high when socioeconomic levels are low. Thus, developing countries have high birth rates compared with developed countries and, within countries, less-privileged groups (poor or uneducated) have higher birth rates than more-privileged groups that are affluent and well-educated. Although this is the general pattern, fertility patterns vary depending on the characteristics of the society.

An analysis of period changes in fertility documents the substantial decline in fertility that has been occurring in Egypt (see Table 9). The total fertility rate has fallen from 4.8 births in the period 3-5 years before the survey to 3.9 births in the period 0-2 years before the survey. The decline took place in all but the oldest age group, where fertility remained low and stable (see Figure 4). As discussed later in this paper, decreases in fertility rates in the youngest cohorts are largely due to trends in the age at marriage, which has been rising rapidly in Egypt, while changes in the older cohorts largely reflect greater use of contraception.

Table 9 Age-specific fertility rates and total fertility rates for two 3-year periods preceding the survey, by urban-rural residence, 1992 EDHS

Mother's age	Urban		Rural		Total	
	0-2 years	3-5 years	0-2 years	3-5 years	0-2 years	3-5 years
15-19	28	43	89	129	63	87
20-24	145	188	269	305	208	248
25-29	188	220	256	292	222	256
30-34	130	162	180	235	155	197
35-39	64	101	117	155	89	127
40-44	27	32	61	65	43	47
45-49	2	0	10	0	6	0
TFR 15-49	2.9	3.7	4.9	5.9	3.9	4.8
TFR 15-44	2.8	3.5	4.5	5.3	3.6	4.4

Figure 4
Trends in Age –specific Fertility in Egypt



Although a trend toward gradual concentration of childbearing in the 25-34 age group is continuing in Egypt, fertility rates among teenagers and women age 35 and over remain comparatively high. Fertility levels at these ages are of particular concern because pregnancy -related morbidity and mortality have been shown to be greater for mothers and children when the mother gives birth in her early teens or when she is age 35 and over (Haaga, 1989; Zimicki, 1989). Additionally, a woman who marries and begins childbearing in her teens often cannot take advantage of opportunities for education that would improve her life and the lives of her children. Overall, at current levels of fertility, one-quarter of lifetime births occur to women while they are in their teens or after age 35.

3.3.1 Trends by Urban-Rural Residence

Fertility has been declining in both rural and urban areas in Egypt (see Table 9). Because the pace of decline in recent years has been somewhat faster in rural areas than in urban areas, the differential in the fertility levels between women living in urban and rural areas in Egypt is gradually narrowing. Nevertheless, rural residence continues to be associated with substantially higher fertility. During the period 4-7 years before the survey, there was a difference of

2.2 births between the total fertility rates for urban and rural areas. By the period 0-3 years before the survey, the gap had narrowed slightly to 2.0 births, with rural women having 4.9 births compared with 2.9 births for urban women.

Considering differences in age-specific fertility, rural rates are higher than urban rates in all age groups, with especially large differences in rates observed for teens and women age 35 and over. The likelihood of giving birth when a woman is in a "high-risk" age group is greater in rural than urban areas. Overall, at current fertility levels, 28 percent of the lifetime births to rural women will take place when the mother is in the high-risk age groups, compared with only 20 percent of urban births.

3.3.2 Trends by Region

With regard to regional differentials, the recent declines in fertility were particularly noticeable in the Urban Governorates-where rates fell from 3.5 births during the period 4-7 years before the survey to 2.7 births in the period 0-3 years before the survey-and in urban Lower Egypt, where fertility dropped from 3.7 births to 2.8 during this period (see Table 10). In urban Upper Egypt, the decline was slower although still substantial, with the rate falling from 4.3 births in the period 4-7 years before the survey to 3.6 births in the period 0-3 years before the survey.

In all three urban areas, the age-specific fertility rates peak in the 25-29 age group, an indicator of the effect of the rising age at marriage. As a result of somewhat higher fertility rates in the 15-19 and 35-44 age groups, the likelihood that a woman will give birth when she is in a high-risk age group is slightly greater in the urban Upper Egypt than in the Urban Governorates and urban Lower Egypt. At current fertility levels, almost one in four births to women in urban Upper Egypt will take place when a women is in the high-risk age groups, while fewer than one in five births in the Urban Governorates or urban Lower Egypt will be to women in these age groups.

Recent trends in rural fertility show variation by region. In both Lower Egypt and Upper Egypt, rural fertility declined, but the pace of change has been slower among rural women in Upper Egypt than in Lower Egypt. As a result, the gap in fertility between rural areas in Lower Egypt and Upper Egypt has widened slightly. Overall, the total fertility rate for the period 0-3 years before the survey was 6 births in rural Upper Egypt, nearly 2 births more than the rate for rural Lower Egypt (4.1 births).

Comparing trends in age-specific rates for rural women in the two regions, fertility continues to peak in the 20-24 age group in both regions. The rates for this age group are converging with those of the 25-29 age group, indicating that rural women, like their urban counterparts, are delaying marriage.

Table 10 Age-specific and total fertility rates for two 3-year periods preceding the survey, by place of residence, 1992 EDHS

Mother's age	Urban Governorates		Total		Urban		Rural		Total		Urban		Rural	
	0-2 years	3-5 years	0-2 years	3-5 years	0-2 years	3-5 years	0-2 years	3-5 years	0-2 years	3-5 years	0-2 years	3-5 years	0-2 years	3-5 years
15-19	24	36	54	82	23	36	64	103	98	132	42	66	122	165
20-24	121	178	222	254	164	190	247	281	258	295	179	207	295	339
25-29	188	204	215	257	171	236	235	268	259	297	205	241	287	322
30-34	121	146	133	182	123	156	137	195	208	260	160	207	231	287
35-39	56	102	77	124	60	101	85	135	135	154	89	99	161	183
40-44	26	34	37	40	19	23	45	48	66	69	37	38	82	86
45-49	2	0	5	0	0	0	7	0	11	0	3	0	15	0
TFR 15-49	2.7	3.5	3.7	4.7	2.8	3.7	4.1	5.2	5.2	6.0	3.6	4.3	5.9	6.9
TFR 15-44	2.6	3.3	3.4	4.3	2.7	3.5	3.8	4.6	4.7	5.5	3.4	4.0	6.0	6.9

Despite the significant declines in fertility, the proportion of lifetime births occurring among rural women in "high-risk" age groups remains high. For women in rural Lower Egypt, at current fertility levels, 25 percent of lifetime births will take place when a woman is in her teens or age 35 and over. In rural Upper Egypt, this figure exceeds 30 percent.

3.3.3 Trends by Education

There are substantial differences in fertility by level of education. During the period 0-3 years before the survey, the total fertility rate varied from a low of 2.9 births among women who had completed secondary school or higher to 5.0 births among women with no education (see Table 11). The pace of change in fertility between the periods 4-7 years and 0-3 years before the survey also differed by educational group, with the relative rate of change least for women with no education and those with secondary or higher education. In all education groups, fertility rates peak among women age 20-24, except for women with secondary or higher education, whose fertility is highest in the 25-29 age group. The likelihood of a women giving birth when she is in a "high-risk" age group decreases directly with increasing education. At current fertility levels, the proportion of lifetime births that will take place when a woman is "too young" or

"too old" ranges from only 15 percent among women with a secondary education to 30 percent among women with no education.

Table 11 Age-specific and total fertility rates for two 4-year periods preceding the survey, by educational level, 1992 EDHS

Mother's age	No education		Some Primary		Primary through secondary		Secondary complete/higher	
	0-3 years	4-7 years	0-3 years	4-7 years	0-3 years	4-7 years	0-3 years	4-7 years
15-19	135	172	78	150	33	73	17	7
20-24	281	317	238	280	212	246	128	143
25-29	245	286	217	245	164	211	210	229
30-34	173	220	142	180	104	168	154	181
35-39	109	138	82	137	49	101	70	87
40-44	54	59	36	48	41	20	5	13
45-49	8	0	3	0	3	0	0	0
TFR 15-49	5.0	6.0	4.0	5.2	3.0	4.1	2.9	3.3
TFR 15-44	4.4	5.1	3.6	4.4	2.9	3.7	2.8	3.3

4. PROXIMATE DETERMINANTS OF FERTILITY

As the previous sections of this paper document, fertility in Egypt has been declining steadily. This section contributes to an understanding of those trends by looking at changes over time in the contribution of various proximate determinants to fertility change. As noted earlier, the analysis will rely on the model developed by John Bongaarts (Bongaarts, 1978 and 1980; and Bongaarts and Potter 1983). In the Bongaarts model, differences in four principal proximate determinants are considered to account for most variation in fertility: marriage, contraception, postpartum infecundibility, and induced abortion.

This analysis considers the effects of the proximate determinants for the national population and for each of the major regions in Egypt. The extent to which each of the principal determinants was responsible for changes over time in fertility is also explored by decomposing the trend in the total fertility rate between 1988 and 1992, according to the effects of the main proximate determinants. This permits the quantification of the contribution made by each proximate determinate to the given change in fertility.

4.1 Analytic Details

The Bongaarts model assumes that fertility is lower than its maximum value in any population as a result of delayed marriage, the use of contraception, postpartum infecundibility due to breastfeeding or abstinence, and abortion. The fertility-inhibiting effects of the these factors are represented in the model by four

indexes C_m, C_c, C_i, C_a, which take values between 0 and 1. The lower the value of an index, the greater the fertility-inhibiting effect of the component to which that index refers.

The following equation, which summarizes the basic structure of the Bongaarts model relates the total fertility rate (TFR) to the proximate determinants:

$$TFR = C_m \times C_c \times C_a \times C_i \times TF$$

Where:

- C_m is the index of marriage,
- C_c is the index of contraception[4]
- C_i is the index of postpartum infecundibility,
- C_a is the index of abortion, and
- TF is the total fecundity rate, which is assumed to be 15.3, in the absence of the fertility-inhibiting effects of contraception, induced abortion, breastfeeding and postpartum abstinence.

The EDHS provides the measures needed for directly examining the effects of three of the four principal determinants. Only abortion, which is generally assumed to be less important in determining fertility levels in Egypt and -other Islamic countries, cannot be estimated using EDHS results.

The contribution of each of the principal proximate determinants to fertility change in a society is further estimated by the following equations in which a change between two points in time in the total fertility rate for a population is related to the changes in the various proximate determinants. In the first equation, the ratio of the total fertility rate at Year 2 to the total fertility rate at Year 1 is expressed as:

$$\frac{TFR2}{TFR1} = \frac{C_{m2}}{C_{m1}} \times \frac{C_{c2}}{C_{c2}} \times \frac{C_{a2}}{C_{a1}} \times \frac{C_{i2}}{C_{i1}} \times \frac{TF2}{TF1}$$

The above equation is then rearranged as:

$$P_f = P_m + P_c + P_a + P_i + P_r + I$$

[4] The average use-effectiveness of contraception that was used in estimating the index of contraceptive was derived from data collected in the 1992 EDHS.

where:

P_f = $TFR2/TFR1 - 1$
= proportional change in TFR between Year 1 and Year 2

P_m = $C_m 2/C_m 1 - 1$
= proportional change in TFR due to a change in the index of marriage

P_c = $C_c 2/C_c 1 - 1$
= proportional change in TFR due to a change in the index of contraception

P_a = $C_a 2/C_a 1 - 1$
= proportional change in TFR due to a change in the index of induced abortion

P_i = $C_i 2/C_i 1 - 1$
= proportional change in TFR due to a change in the index of postpartum infecundibility

P_r = $TF2/TF1 - 1$
= proportional change in TFR due to a change in the remaining proximate variables – natural fecundibility, spontaneous intrauteine mortality, and permanent sterility

I = An interaction factor.

Thus, a proportional change in the TFR between any two points in time is equal to the sum of the proportional fertility changes due to the different proximate determinants plus an interaction term. Again, data are available from the 1988 and 1992 EDHS surveys to estimate the effects of changes in all of the principal proximate determinants except abortion.

4.2 Differentials in Proximate Determinants

Table 12 looks at trends in the principal proximate determinants of fertility for which information was obtained in the 1988 and 1992 DHS surveys in Egypt, i.e., in marriage, contraceptive use and postpartum infecundibility. The table

shows that there were only slight changes in the proportion married for most residential subgroups between 1988 and 1992. However, there were large increases in the median age at first marriage are evident in Table 11, particularly in Upper Egypt. The greatest increase in age at first marriage was among urban women in Upper Egypt, from 18.8 years in 1988 to 20.5 years in 1992.

Table 12 Marriage, contraceptive use, and postpartum insuceptibility, by place of residence, Egypt 1988 and 1992

Place of residence	Marriage				Contraceptive use		Postpartum insusceptibility	
	Proportion married women 15-49		Median age at first marriage, women 25-49		Percentage currently using any method, married women 15-49		Mean duration in months[1]	
	1988	1992	1988	1992	1988	1992	1988	1992
Urban Governorates	58.8	63.7	21.1	21.1	56.0	59.1	6.0	6.3
Lower Egypt	65.9	63.8	18.4	19.1	41.2	53.3	8.7	7.3
Urban	64.8	62.7	20.5	20.8	54.5	60.3	6.2	5.9
Rural	66.3	64.2	17.6	18.5	36.6	50.5	9.6	7.8
Upper Egypt	69.0	69.6	17.1	17.9	22.1	31.4	10.4	9.0
Urban	63.8	62.0	18.8	20.5	41.5	48.1	8.1	7.1
Rural	72.2	73.4	16.4	17.2	11.5	24.3	11.4	9.6
Total	65.1	65.3	18.5	19.2	37.8	47.1	8.9	7.9

[1]Calcualted using the prevalence-incidence method in which the prevalence of postpartum insuscepitibility (the total number of women who were insusceptible) is divided by the incidence (the average number of births per month over the 36 month period).

For all residential subgroups, a larger proportion of currently married women were using a contraceptive method in 1992 than in 1988. Striking changes in current use are observed in both urban and rural Lower Egypt. Significant change also occurred in Upper Egypt between 1988 and 1992, with the use rate rising from 12 percent to 24 percent in rural areas, while it increased from 42 to 48 percent in urban areas.

The differences in the mean duration of insusceptibility (resulting from women being either amenorrheic or abstaining) reflect the differences in the length of breastfeeding and postpartum abstinence. At both points in time, rural women were insusceptible to the risk of pregnancy for much longer periods than urban women. With respect to trends, rural Upper Egypt exhibited the most change between 1988 and 1992. The median duration of insusceptibility in rural Upper Egypt declined from 11.4 months in 1988 to 9.6 months in 1992, a decrease of almost two months.

4.3 Effects of the Proximate Determinants on Fertility

Table 13 presents the indices of marriage, contraceptive use, and postpartum infecundibility and the TFR and TF implied by the Bongaarts model for 1988 and 1992. In interpreting the findings, it should be remembered that the higher the value of an index, the lower the percentage reduction in the TFR due to that index. In general, the reduction in fertility is principally due to use of contraception and to postponement of marriage, with the reduction due to postpartum infecundibility being less important. In both 1988 and 1992, the effect of contraceptive use was somewhat greater than the effect of delays in marrying[5]. Regarding regional patterns, the effects of delay in marriage and of contraceptive use are relatively small in rural Upper Egypt compared with other regions. Postpartum infecundibility as a factor in fertility decline is of much less importance than contraceptive use or delay of marriage in most areas. Its effect is greatest in rural upper Egypt.

Table 13 Proximate determinants and fertility rates, by place of residence, Egypt 1988 and 1992

Proximate determinants / fertility rates	Urban Governorates	Lower Egypt		Upper Egypt		Total
		Urban	Rural	Urban	Rural	
Proximate determinants						
Cm: index of marriage delay						
1992	.500	.508	.627	.595	.759	.612
1988	.477	.593	.681	.608	.748	.629
Cc: index of contraceptive use						
1992	.382	.367	.469	.499	.748	.507
1988	.416	.432	.628	.569	.881	.606
Ci: index of postpartum insusceptibility						
1992	.806	.820	.760	.781	.712	.758
1988	.816	.810	.712	.752	.669	.730
Fertility rates						
Actual TFR						
1992	2.69	2.80	4.10	3.58	5.97	3.93
1988	3.12	3.93	5.96	4.29	6.34	4.54
Implied TFR						
1992	2.34	2.34	3.42	3.55	6.18	3.60
1988	2.48	3.17	4.66	4.98	6.75	4.26
Implied TF						
1992	17.6	18.3	18.3	15.4	14.4	16.7
1988	19.3	18.9	16.3	16.5	14.8	16.3

[5] In another study (Adlakha et al., 1991) that compares the 1988 EDHS data with data from the 1980 Egypt Fertility Survey, the inhibiting effect of contraception on fertility was generally found to be less important than the 'inhibiting effect of marriage.

The decomposition of the change in the fertility rate between 1988 and 1992 is presented in Table 14 by place of residence. In the first column, fertility change for all of Egypt is decomposed into the component due to each of the determinants. In the second column, the decomposition results are standardized to add to 100 percent and, in the final column, the absolute change in the TFR (.48 births per women between 1988 and 1992) is decomposed into the contributions made by various Proximate variables. In effect, the last column of Table 13 provides an estimate of the extent to which the TFR would have changed between 1988 and 1992 if the relevant proximate determinant had changed, and all other factors had remained the same. The results indicate that the decline in the total fertility rate would have been greater by almost one child, in response to changes in contraceptive use and marriage, if all other proximate determinants had remained constant.

The decomposition analysis presented in Table 14 suggests that changes in contraceptive use was generally the principal factor in fertility change[6]. The regions vary somewhat in the extent to which changes in contraceptive use inhibited fertility, with the largest effect observed for rural areas in Lower Egypt. Although generally less significant than changes in contraceptive use, changes toward late marriage contribute to the fertility decline in all regions, except the Urban Governorates, where the age at marriage was already quite high at the time of the 1988 survey. In most regions, changes in the duration of postpartum insusceptibility, which are largely due to a decline in breastfeeding, have had the effect of promoting rather than inhibiting fertility, and have partially offset the fertility inhibiting effects of contraceptive use.

[6] A previous study carried out by Osheba (1992) concluded that, in rural and urban Lower Egypt, the increase in contraceptive use was the dominated driving force for the decline in the total fertility rate between 1980 and 1988, whereas, in the Urban Governorates and urban Upper Egypt, changes in the marriage pattern dominated. In rural Upper Egypt, the largest contribution to the fertility change during that period was due to the decline in lactational infecundibility.

Table 14 Decomposition of the change in total fertility in Egypt from 1988 to 1992, by place of residence and factors responsible for fertility change.

Place of residence / Factors responsible for fertility change	Percentage change in TFR	Distribution of percentage change	Absolute change in TFR
Egypt			
Proportion married	-2.7	-20.1	-.12
Contraceptive use	-16.3	-121.6	-.74
Postpartum insusceptibility	+3.8	+28.5	+.17
Other determinants	+2.4	+18.0	+.11
Interaction	-0.6	-4.8	-.03
Total	-13.4	100.0	-.61
Urban Governorates			
Proportion married	+4.8	+35.0	+.15
Contraceptive use	-8.7	-62.8	-.27
Postpartum insusceptibility	-1.2	-8.9	-.04
Other determinants	-8.8	-64.1	-.28
Interaction	+0.1	+0.8	+.00
Total	-13.8	100.0	-.43
Lower Egypt : Urban			
Proportion married	-14.3	-49.9	-.56
Contraceptive use	-15.0	-52.3	-.59
Postpartum insusceptibility	+1.2	+4.3	+.05
Other determinants	-3.3	-11.5	-.13
Interaction	+2.7	+9.3	-.11
Total	-28.8	100.0	-1.13
Lower Egypt : Rural			
Proportion married	-7.9	-51.8	-.32
Contraceptive use	-25.3	-165.2	-1.01
Postpartum insusceptibility	+6.7	+44.0	+.27
Other determinants	+12.6	+100.3	+.61
Interaction	-3.5	-27.3	-.17
Total	-15.3	100.0	-.76
Upper Egypt : Urban			
Proportion married	-2.1	-12.9	-.06
Contraceptive use	-12.3	-74.3	-.32
Postpartum insusceptibility	+3.9	+23.3	+.10
Other determinants	-6.4	-38.5	-.17
Interaction	+4.1	+2.5	+.01
Total	-16.6	100.0	-.71
Upper Egypt : Rural			
Proportion married	+1.5	+25.2	+.28
Contraceptive use	-15.1	-258.7	-2.92
Postpartum insusceptibility	+6.4	+110.1	+1.24
Other determinants	+2.7	+46.2	+.52
Interaction	-1.3	-22.9	-.26
Total	-16.6	100.0	-.37

5. CONCLUSIONS

Fertility has achieved noticeable decline in Egypt over the past 20 years. As is the case in most high fertility societies, older, higher parity women appear to have led the way in the transition to lower fertility. The decline in fertility is evident in all regions as well as all educational levels, with the lowest fertility observed in urban areas and among women with higher education. The marked success of the Egyptian family planning program is reflected in the role contraceptive use has played in recent fertility decline. Contraception use was the most important determinant of the fertility reduction that occurred between 1988 and 1992.

The existence of large regional differentials in fertility points to the continuing need for region-specific policies to promote future fertility change. In view of the strength of the relationship between fertility and education, greater efforts are warranted to ensure the success of governmental policy in education development. The fertility promoting effect of recent decreases in the duration of postpartum insusceptibility is clear, suggesting that greater attention needs to be paid to encouraging breastfeeding, particularly in urban areas.

Finally, it is important to continue to stress the importance of reducing fertility levels among teenage women and women age 35 and over. Births to women in both these age groups pose significant health risks for mothers and children. Moreover, births to women under age 20 limit their opportunities for education, which is a cost to society as well as a loss to the women and their families.

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