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CHAPTER 20

FE → DETERMINANTS OF FERTILITY IN EGYPT
A SUPPLY-DEMAND APPROACH.

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BY

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I. INTRODUCTION:

1.1. Economic Theory of Fertility:

Fertility determinants has been an important topic in demographic literature. This is due to fertility being the major underlying cause for rapid population growth which hinders development efforts.

In the recent years, economists and noneconomists alike have been asking: How relevant to human fertility behavior is economic theory? Until recently, most theoretical work on the economics of fertility derived from some studies in which the economic theory of consumer behavior was applied to childbearing decisions. The conventional theory of consumer behavior was applied to childbearing decisions. The conventional theory of consumer behavior views the individual as trying to maximize satisfaction, given a range of goods, their prices, and his own tastes and income. In application of the theory to fertility analysis, children are viewed as a special kind of goods, and fertility is seen as a response to the consumer's demand for children relative to other goods (Easterlin, 1975).

The standard formulation of the economic theory of fertility emphasizes the demand of children as the key to understanding fertility behaviour. It also treats the cost of controlling fertility. The principal innovation in the present approach, which builds substantially on prior work by some scholars, is more explicit treatment of the production of child, the

possibility of shifts in output independent of demand conditions. attention to the reproductive side leads to greater recognition of such sociological concepts as natural and real world conditions to which the usual demand may be inapplicable (Easterlin, 1975).

Easterlin presented detailed descriptions and applications of the supply-demand framework in a series of studies (Easterlin 1975; 1980; 1985; and 1988). The framework includes three variables, demand for children, supply of children, and cost of fertility regulation. The dependent variable of Easterlin model is children ever born. Children ever born refer to the past experience over the reproductive life cycle of a cohort of women.

Bongaarts (1992) proposed an alternative approach to the implementation of the Easterlin model depending on the period fertility rather than cohort fertility measures. This model gives a recent view of fertility determinants, rather than Easterlin's model. According to this approach fertility is determined by three proximate variables; (a) Wanted fertility (Demand); (b) Natural fertility (Supply); and (c) Preference implementation, which measures the cost of fertility regulation and the cost of unwanted childbearing.

1.2 Objectives of the Study:

The study is organized to accomplish the following objectives:

- (1) Estimating and examining the trend in fertility determinants in the five main regions of Egypt, namely, Urban Governorates, Urban Lower Egypt, Rural Lower Egypt, Urban Upper Egypt, and Rural Upper Egypt; and
- (2) Examining the factors underlying the fertility change between 1980 and 1991 and their relative contribution in the regions of Egypt.

1.3 Data Sources and Limitations:

1.3.1 Data Sources:

The analysis to be carried out in this paper will be based on data from the 1980 Egyptian Fertility Survey (1980 EFS) conducted by CAPMAS as part of the World Fertility Survey, and 1991 Egyptian Maternal and Child Health Survey (1991 EMCHS) which was conducted by CAPMAS and the League of Arab States as part of Pan-Arab Project for Child Development (PAPCHILD).

(1) 1980 EFS

Within a 10079 households successfully interviewed in the 1980 EFS for the household survey, a total of 8788 ever married women under 50 years of age were identified as eligible for the individual reproductive health interviewed. The response rate was 97.9 percent.

(2) 1991 EMCHS

Within a 11074 households successfully interviewed in the 1991 EMCHS for the household survey, a total of 10041 ever married women under 55 years of age were identified as eligible for the individual reproductive health interviewed. The response rate was 98.2 percent.

1.3.2 Data Limitations:

Women aged 50 years and more will be excluded from the analysis in the 1991 EMCHS. Births that occurred in the three years preceding the survey will be used in the calculation of all fertility measures in both 1980 and 1991 surveys. Cairo and Alexandria represent Urban Governorates in 1980 EFS.

1.4 Review of Literature:

Many studies have documented fertility determinants in Egypt (El-Badry, 1965; Nawar, 1984; Easterlin et al, 1986; Nawar and Hobcraft, 1988; Osheba, 1988; Osheba, 1992). Only a few studies have examined fertility determinants using Supply-Demand Approach. Nawar (1984) examined the determinants of fertility in Egypt and Sudan. She found that the desired family size is much higher in Sudan than Egypt. Mostafa (1988) examined motivation for contraceptive use in Egypt using Easterlin's model. She found that number of living children is the most important factor affecting contraceptive use. Ismael (1992) examined fertility preference in Egypt. She found that the majority of women prefer small families. The proportion wanting no more children increased with age and duration of marriage. Such studies have focused mainly on examining contraceptive motivation.

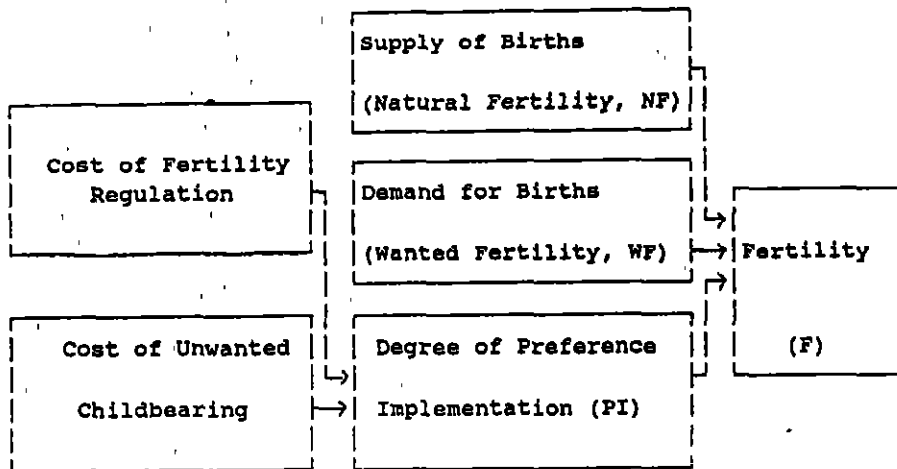
1.5 Organization of the Study:

Following this introductory section, this paper is organized in four sections. Section II describes the methodology used in the study. Section III focuses on estimating and examining the trend in fertility determinants by region of residence. Section IV examines the factors underlying the fertility change between 1980 and 1991 by region of residence. The conclusion and policy implications of the study are given in Section V.

II. METHODOLOGY:

Bongaarts (1992) developed a framework for the study of fertility determinants that depends on births rather than children ever born as a fertility measure. In addition to the supply and demand components, the model introduced a new variable, degree of preference implementation, to measure the role of costs and benefits of fertility regulation (See Figure 1). The main equation

FIGURE (1): KEY VARIABLES AND INTERRELATIONS IN THE SUPPLY-DEMAND MODEL.



Source: Bongaarts, J. (1992)

that summarizes the overall relationship between fertility and the three mediating variables can be written as follows:

$$F = WF \times PI + NF (1 - PI) \quad (1)$$

Where:

- F = Total Fertility Rate.
- WF = Wanted Total Fertility Rate.
- NF = Natural Fertility Rate.
- PI = Index of Preference Implementation.

For the derivation of equation number (1) see Appendix (A).

2.1 Estimating Fertility Determinants:

a) Natural Fertility:

The relationship between NF and observed fertility can be summarized as follows:

$$NF = F / C \quad (2)$$

where C is an index between 0 and 1 that measures the proportional reduction in natural fertility attributable to deliberate birth control, it is estimated using the following equation:

$$C = 1 - 1.02 \times U \quad (3)$$

where U represents the proportion practicing contraception among married women.

b) Wanted Fertility:

The preferred approach for estimating the wanted fertility rate (WF) is the one proposed by Bongaarts (1990). It relies on the following equation:

$$WF = WMTFR + 1.09 - WM(40-44) \quad (4)$$

Where:

WMTFR = "Want more" TFR, which equals the TFR that results after deleting all births to women who want no more children at the time of the survey.

WM(40-44) = Proportion of married women aged 40-44 who want more births.

A short reference period for which the wanted fertility is calculated is preferred (Bongaarts, 1990 and 1992).

c) Index of Preference Implementation:

Preference Implementation is measured by an index with values ranging between 0 and 1. The level of implementation is the net result of a decision-making process in which couples weigh the cost of fertility regulation and the cost of unwanted childbearing. With full preference implementation (PI=1) no unwanted births occur and actual fertility equals wanted fertility ($F=WF$). At the other extreme, with no preference implementation (PI=0) observed fertility equals natural fertility.

Index of Preference Implementation can be estimated using the following equation:

$$PI = (NF - F) / (NF - WF) \quad (5)$$

2.2 Decomposition of Fertility Change:

The decomposition equation used in this study can be written as follows:

$$\Delta F = \Delta WF \bar{PI} + \Delta PI (\bar{WF} - \bar{NF}) + \Delta NF (1 - \bar{PI}) \quad (6)$$

Where ΔF , ΔWF , ΔNF , and ΔPI represents the absolute changes in F , WF , NF , and PI respectively. \bar{WF} , \bar{NF} , and \bar{PI} represent the average values of WF , NF , and PI respectively.

III. TREND IN FERTILITY AND ITS DETERMINANTS:

This section focuses on examining the change in the levels of total fertility rates, natural fertility, wanted fertility, and the index of preference implementation between 1980 and 1991 by region of residence.

3.1 Trend in Total Fertility Rates:

The total fertility rate is a useful summary measure of recent fertility levels. It is interpreted as the number of children woman would have on average at the end of her childbearing years if she were to bear children during those years at the currently observed age-specific fertility rates.

TABLE (1)

TOTAL FERTILITY RATES BY REGION OF RESIDENCE,
1980 EFS AND 1991 EMCHS

Region	1980 EFS	1991 EMCHS	% Change
Urban Governorates	3.74	2.69	-28.1
Urban Lower Egypt	4.17	3.19	-23.5
Rural Lower Egypt	5.76	4.41	-23.4
Urban Upper Egypt	5.70	3.62	-36.5
Rural Upper Egypt	5.89	6.29	6.8
Total Egypt	5.04	4.23	-16.1

Source: Computed from the clean tapes of 1980 EFS and 1991 EMCHS for three years before the surveys.

The TFR by region of residence in 1980 and 1991 is given in Table (1). It is noticed from this table that fertility declined in all regions of Egypt, except in Rural Upper Egypt. The increase in fertility in Rural Upper Egypt may be attributed, in part, to Rural Upper Egypt being the least developed region in Egypt, with traditional values and norms favoring high fertility holding very strongly (Osheba, 1992).

It is noticed also from the table, column 3, that the magnitude of the decline in fertility is largest in Urban Upper Egypt (36.5%). The percent change in Rural Lower Egypt and Urban Lower Egypt is almost the same.

The current fertility levels in all regions of Egypt, except Urban Governorates, are still high specially in rural regions.

3.2 Trend in Natural Fertility:

Natural fertility is defined by Henry (1961) as fertility in the absence of deliberate birth control. In practice, fertility may be considered natural if no contraception or induced abortion is used (Henry, 1979).

Table (2) shows the trend in natural fertility by region of residence in 1980 and 1991. Natural fertility increased in all regions of Egypt. The magnitude of the change in natural fertility was high in rural regions than urban regions.

Natural fertility is affected by age at marriage, breastfeeding, and fecundability. Age at marriage tends to raise with socio-economic development while breastfeeding and abstinence decline. The increase in natural fertility in all regions, specially, in rural regions, may be attributed to the decline in breastfeeding and postpartum abstinence counteracted the effect of the raise of age at marriage.

TABLE (2)

NATURAL FERTILITY RATES BY REGION OF RESIDENCE,
1980 EFS AND 1991 EMCHS

Region	1980 EFS	1991 EMCHS	% Change
Urban Governorates	6.76	7.73	14.3
Urban Lower Egypt	7.42	8.56	15.4
Rural Lower Egypt	7.06	9.02	27.8
Urban Upper Egypt	7.66	8.50	11.0
Rural Upper Egypt	6.14	8.17	33.1
Total Egypt	6.69	8.22	22.9

Source: Computed from the clean tapes of 1980 EFS and 1991 EMCHS depending on equation number (2), Section II.

3.3 Trend in Wanted Fertility:

Wanted fertility is the rate of childbearing that would be achieved if all women were able to eliminate unwanted births. Births are considered unwanted if they occur after a woman has reached the point at which she does not want more children because she has achieved her childbearing objectives (Bongaarts, 1992).

Table (3) shows the wanted fertility rates by region of residence in 1980 and 1991. It is noticed from the table that wanted fertility rates declined in all regions of Egypt. The highest percentage decline was observed in Urban Upper Egypt (39.3%) followed by Rural Upper Egypt (32.7%). All wanted fertility rates observed in 1991 were lower than the replacement level of fertility (2.1) except Rural Upper Egypt. Wanted fertility is highly affected by media and information programs about ideal family size and population education programs.

TABLE (3)
WANTED FERTILITY RATES BY REGION OF RESIDENCE,
1980 EFS AND 1991 EMCHS

Region	1980 EFS	1991 EMCHS	% Change
Urban Governorates	2.09	1.56	-25.4
Urban Lower Egypt	2.29	1.79	-21.8
Rural Lower Egypt	2.80	1.96	-30.0
Urban Upper Egypt	3.21	1.95	-39.3
Rural Upper Egypt	4.41	2.97	-32.7
Total Egypt	2.91	2.09	-28.2

Source: Computed from the clean tapes of 1980 EFS and 1991 EMCHS depending on equation number (4), Section II.

3.4 Trend in Preference Implementation:

The value of PI chosen by couples determines where actual fertility falls within the range set by wanted and natural fertility. The implementation index rises as fertility regulation costs decline and its benefits (i.e. the elimination of unwanted births) rise.

The values of PI in 1980 and 1991 are given in Table (4) by region of residence. It is noticed from the table that the value of the index raised for all regions of Egypt. The percent change of the value of the index was higher in rural areas than urban

TABLE (4)

PREFERENCE IMPLEMENTATION BY REGION OF RESIDENCE,
1980 EFS AND 1991 EMCHS

Region	1980 EFS	1991 EMCHS	% Change
Urban Governorates	0.65	0.82	26.2
Urban Lower Egypt	0.63	0.79	25.4
Rural Lower Egypt	0.30	0.65	116.7
Urban Upper Egypt	0.44	0.75	70.5
Rural Upper Egypt	0.15	0.36	140.0
Total Egypt	0.44	0.65	47.7

Source: Computed from the clean tapes of 1980 EFS and 1991 EMCHS depending on equation number (5), Section II.

areas. It was (140.0%) in Rural Upper Egypt , and (116.7%) in Rural Lower Egypt. The percent change in urban areas was lower than rural areas because it was initially high in 1980.

The increase of the value of PI in all regions , specially rural areas, may be attributed, in part, to the family planning practice and the availability of medical services as well as the impact of media.

3.5 Relation Between Fertility Levels:

The relationship between fertility levels, namely, natural fertility, total fertility rate, and wanted fertility is summarized in Figure (2). It is noticed from the figure that the gap between natural fertility and total fertility becomes wider with the time in all regions. The difference between natural fertility and total fertility is the amount of fertility averted by birth control.

The difference between observed total fertility and wanted fertility which refers to the unwanted fertility becomes narrow with time in all regions of Egypt, except Rural Upper Egypt.

3.6 Comparison Between Egypt and Other Countries:

Table (5) presents estimates of observed, wanted, natural, and preference implementation for Egypt 1980 and 1991 in addition to some other developing countries.

There is a substantial variation among countries in the level of fertility and its determinants. The highest total fertility rate was observed in Mali (7.6), while the lowest was observed in Colombia (3.1). Egypt 1980 and 1991 lies in the middle.

FIG.(2):WANTED FERTILITY (WF), TOTAL FERTILITY (F), AND NATURAL FERTILITY (NF) BY REGION OF RESIDENCE, EGYPT, 1980-1991.

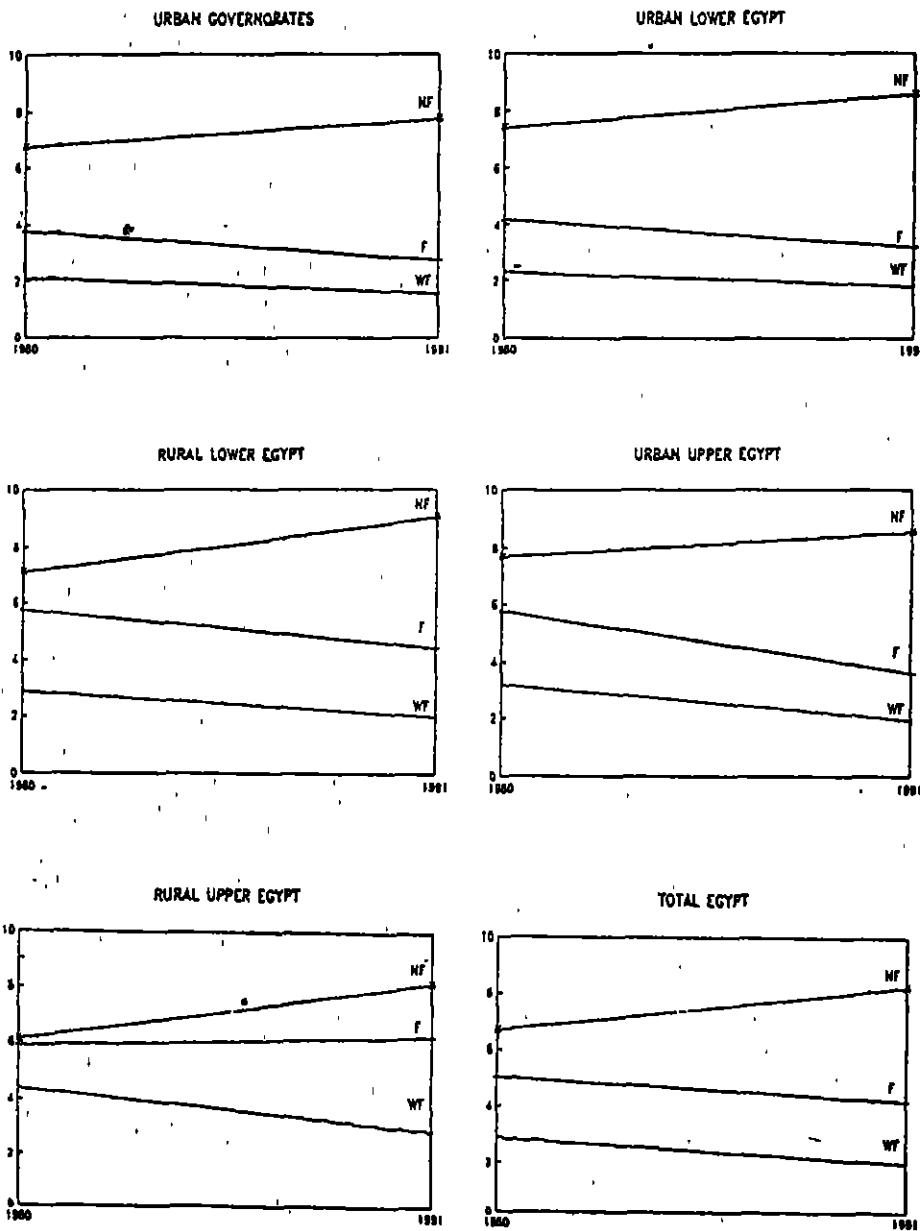


TABLE (5)

ESTIMATES OF OBSERVED, WANTED, NATURAL FERTILITY, AND
PREFERENCE IMPLEMENTATION FOR SELECTED COUNTRIES.

	Observed Fertility	Wanted Fertility	Natural Fertility	Preference Implementation Index
Mali	7.6	7.0	7.8	0.25
Senegal	6.5	5.7	6.8	0.30
Kenya	6.4	4.3	8.2	0.45
Zimbabwe	5.2	4.3	7.5	0.71
Egypt (1980)*	5.0	2.9	6.7	0.44
Morocco	4.6	3.2	7.2	0.66
Egypt (1991)*	4.2	2.1	8.2	0.65
Tunisia	4.1	2.9	8.8	0.79
Peru	4.0	2.1	7.0	0.60
Colombia	3.1	2.0	8.5	0.82

Source: Bongaarts, J. (1992).

* Computed from the Clean Tapes of 1980 EFS and 1991
EMCHS.

Wanted fertility ranged between 7 and 2. Egypt 1980 and 1991 has low levels of wanted fertility compared with other countries.

The variations in natural fertility were lower than observed and wanted fertility. Natural fertility in Egypt 1980 was the lowest, while in 1991, it was one from the highest natural fertility levels.

The value of the preference implementation for Egypt 1980 and 1991 lies in the middle between the developing countries.

IV. FACTORS UNDERLYING FERTILITY CHANGE:

This section focuses on quantifying and assessing the relative contribution of fertility determinants to the change in fertility between 1980 and 1991 using the decomposition equation described in Section II.

The contribution of the change in each of the natural fertility, wanted fertility and preference implementation to the change in the total fertility rate between 1980 and 1991 by region of residence is given in Table (6). This table shows that the change in the preference implementation has the largest contribution to the decline of fertility in all regions

In Rural Upper Egypt, the fertility-promoting effect of the increase of natural fertility exceeds, in magnitude, the fertility inhibiting effect of the decrease in wanted fertility and the increase of preference implementation, therefore the observed fertility in 1991 is higher than that in 1980. It is noticed from the table also that the total fertility rate in Rural upper Egypt would have declined by about .75 child between 1980 and 1991 in response to the change in preference implementation if all other determinants had been held constant.

TABLE 1.6.1
CONTRIBUTION OF SUPPLY, DEMAND, AND PREFERENCE
IMPLEMENTATION TO CHANGE IN TFR BETWEEN 1980 AND 1991
BY REGION OF RESIDENCE

Region	Wanted Fertility (Demand)	Natural Fertility (Supply)	Preference Implemen- tation	Total Change in TFR
Urban Governorates	0.38 (36.5)	-0.26 (-24.7)	0.93 (88.2)	1.05 (100.0)
Urban Lower Egypt	0.35 (36.1)	-0.33 (-33.4)	0.95 (97.3)	0.98 (100.0)
Rural Lower Egypt	0.40 (29.8)	-1.02 (-75.3)	1.97 (145.5)	1.35 (100.0)
Urban Upper Egypt	0.74 (35.8)	-0.34 (-16.5)	1.68 (80.7)	2.08 (100.0)
Rural Upper Egypt	0.37 (-91.9)	-1.51 (-376.5)	0.74 (-184.6)	-0.40 (100.0)
Total Egypt	0.45 (55.0)	-0.70 (-86.1)	1.07 (131.1)	0.81 (100.0)

Note: Numbers between parentheses refer to the percentage contribution of the variables.

Source: Computed depending on equation No. 6, Section II.

In Urban Lower Egypt, the fertility inhibiting effect caused by the decline in wanted fertility is close, in magnitude, to the fertility inhibiting effect of the increase in natural fertility (.35 and .33 live births respectively) and, therefore, the observed decline in total fertility rate (.98 live birth) can be attributed to the increase of the preference implementation.

In Rural Lower Egypt, unlike the situation in Rural Upper Egypt, the fertility promoting effect of the increase in natural fertility was accounted for by the decline in wanted fertility and the increase of preference implementation with a difference of 1.35 live birth. The fertility inhibiting effect of the increase in the preference implementation was twice of the fertility promoting effect the increase in natural fertility .

The fertility promoting effect of the increase in natural fertility in Urban Upper Egypt was the least between all regions (only .34 live birth). The fertility inhibiting effect of the change in wanted fertility and preference implementation was about seven times the increase caused by natural fertility. The fertility inhibiting effect of preference implementation was 81% of the decline in fertility between 1980 and 1991.

In Urban Governorates, the fertility promoting effect of the increase in natural fertility (.26 live birth) was two-thirds the fertility inhibiting effect of the decline in wanted fertility, while it was about one fourth the fertility inhibiting effect of the increase of preference implementation.

Table (6) also shows that, in all regions, the change in each of wanted fertility and the preference implementation makes for reducing the total fertility rates, while the change in natural fertility makes for increasing the total fertility rates.

V. CONCLUSIONS AND RECOMMENDATIONS:**5.1 Conclusions:**

This study examined the trend in fertility determinants and factors underlying the fertility change between 1980 and 1991 in the regions of Egypt. The analysis carried out in this study leads to the following conclusions:

First, fertility declined in all regions of Egypt between 1980 and 1991 except Rural Upper Egypt, where fertility has shown a slight increase. Despite the marked fertility decline, the lowest TFR observed in 1991 (2.69 live births) is still higher than the replacement fertility level (2.1 live births) by about six-tenth of a child.

Second, natural fertility increased in all regions of Egypt. The magnitude of the increase was higher in rural regions than urban regions.

Third, wanted fertility rates in 1991 were lower than the replacement fertility level in all regions, except Rural Upper Egypt.

Fourth, the preference implementation index rose for all regions of Egypt, specially in Rural Lower and Rural Upper Egypt.

Fifth, the change in wanted fertility and preference implementation makes for reducing fertility, while the change in natural fertility makes for increasing fertility.

Sixth, the fertility promoting effect of natural fertility was counteracted by the fertility reducing effect of wanted fertility and preference implementation in all regions, except Rural Upper Egypt.

5.2 Recommendations:

In view of the findings of the study, the following recommendations seem to emerge:

- (1) Given the marked differences between fertility levels and determinants in the regions of Egypt, region-specific fertility control policies must be adopted.
- (2) Given the increasing fertility trend in Rural Upper Egypt, more efforts are needed to control fertility in this region.
- (3) Given the importance of preference implementation in the decline of fertility between 1980 and 1991, more efforts are needed to decrease the unwanted fertility through mass media and the availability of family planning services.
- (4) Given the importance of wanted fertility in the decline of fertility between 1980 and 1991, further research should be directed toward the study of the determinants of wanted fertility.

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APPENDIX (A)DERIVATION OF EQUATION (1)

Observed fertility (F) is the sum of its wanted and unwanted components:

$$F = WF + UF \quad (A1)$$

where:

- F = Total Fertility Rate
- WF = Wanted Total Fertility Rate
- UF = Unwanted Total Fertility Rate.

Unwanted fertility is in turn a function of the difference between supply and demand, $NF-WF$, and the degree of preference implementation:

$$UF = (NF-WF) * (1-PI) \quad (A2)$$

where:

- NF = Natural Total Fertility Rate
- PI = Index of preference implementation.

Substitution of (A2) in (A1) yields the central equation summarized the relationship between fertility and its mediating variables.

$$F = WF * PI + NF * (1 - PI) \quad (1)$$

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