ECONOMIC ANALYSIS AND POLICY IMPLICATIONS OF FERTILITY IN MIDDLE EAST AND NORTH AFRICAN COUNTRIES

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ABSTRACT

This paper attempts to provide an economic analysis of fertility interrelationships using pooled cross-country data from the Middle East and North African region, 1982-2000. Regression results provide strong confirmation that family planning, urbanisation and female labour force participation rates are inversely related to fertility rates. Income, infant mortality rates and female education are found to have a strong positive correlation with fertility. The results of several variables are also consistent with the results obtained in earlier studies involving countries and regions other than the Middle East and North Africa. Some policy implications are drawn.

INTRODUCTION

The twenty countries in the Middle East and the North Africa (MENA) region had a combined population of approximately 283 million in 1997 (The World Bank, 1999, Table 1), contributing to approximately 4.9 percent of world total population. The majority of the countries are in the middle-income and medium human development categories (Table 1). The overall level of economic development of MENA is comparatively much better than many regions elsewhere (UNDP, 1999, Table 1). The level of achievement in per capita incomes and human development is largely attributable to several of the MENA countries rich natural resource base. Theoretically, as countries become rich, they tend to go through a demographic transition in which fast-improving medical conditions and high birth rates combine to give rapid population growth, a phenomenon that characterised

most of Asia almost thirty years ago (*The Economist*, September 13, 1997). Demographic indicators provide evidence of similar demographic transitions taking place in several of the MENA countries (Table 2).

Table 1: Development Indicators - Middle East and North African Countries

Country	GNP per capita - $US 1997	HDI value – 1997	Population (Millions – 1997)	Population growth rate (1990-97)
Algeria	1490	0.665	29	2.3
Egypt	1180	0.616	60	2.0
Jordan	1570	0.715	4	4.8
Morocco	1250	0.582	28	1.9
Oman	4950	0.725	2	5.0
Saudi Arabia	6790	0.740	20	3.4
Syria	1150	0.663	15	2.9
Qatar	11570	0.814	0.675	…
Tunisia	2090	0.695	9	1.8
Kuwait	22110	0.833	1.6	…
United Arab Emirates	17360	0.812	3	4.9
Bahrain	4514	0.832	0.619	…
Yemen	270	0.449	16	4.5
Iran	1780	0.715	60	…
Middle East and North Africa	3880	0.626*	283	2.5
Lower Middle Income	1230	0.637**	2285	1.2
Upper Middle Income	4520	…	571	1.5

Note: * - refers to Arab states; ** - refers to all developing countries; and … indicates that data is not available.
Source: The World Bank (1999) and United Nations Development Program (UNDP, 1999).

Although the indicators of per capita income and human development look satisfactory for MENA, the population and population growth rate give cause for concern. Although MENA ranks the lowest in terms of the share of total world population, such is not the case in terms of the growth rate (World Bank, 1999, Table 1). MENA annual average population growth rate of 3.0 percent during 1990-2000 period was the highest when compared with East Asia and the Pacific, Europe and Central Asia, Latin America and Caribbean, South Asia and Sub-Saharan

Africa. Although annual average population growth rate declined to 2.5 percent in the 1990-97 period, it was second to that of Sub-Saharan Africa which recorded a growth rate of 2.7 percent (The World Bank, 1999, Table 3) during the same period. Almost all MENA countries experienced higher population growth rates than 1.5 percent, the world average (Table 1).

Table 2: Fertility Rate - Births Per Woman

Country	Total Fertility Rate				
	1975	1980	1985	1996	% Change 1975-96
Algeria	7.3	6.7	5.8	3.4	53.4
Egypt	5.4	5.1	4.6	3.3	38.9
Jordan	7.8	6.8	6.5	4.4	43.6
Morocco	6.3	5.4	5.1	3.3	47.6
Oman	7.2	7.2	7.2	7.0	02.8
Saudi	7.3	7.3	7.2	6.2	15.1
Arabia	7.5	7.4	7.0	4.0	46.7
Syria	…	…	…	…	…
Qatar	5.9	5.2	4.4	2.8	52.5
Tunisia	6.3	5.3	4.3	…	31.7*
Kuwait	5.9	5.4	5.0	3.5	40.7
UAE	5.7	5.3	5.0	…	12.2*
Bahrain	7.1	7.9	7.6	7.2	1.4
Yemen	6.2	6.1	6.3	…	1.6*
Iran					
MENA	…	6.1	…	4.0	34.4**
LMI	…	3.1	…	2.2	29.0**
UMI	…	3.8	…	2.6	31.6**

Note: … indicates that data is not available; MENA = Middle East and North Africa; LMI = Lower Middle Income; UMI = Upper Middle Income; * refers to 1975-85; ** refers to 1980-1996.
Source: The World Bank (1992 and 1999).

While it is noted that the transition from a less developed economy to one which is more developed is not only feasible and can be attained in a relatively short period of time (Stiglitz, 1996), the MENA high rate of population growth can have a retarding effect on the pace of the development process. Of main importance is the

high fertility rates in MENA. High rates of fertility can have several direct effects on a country's long-term development: contribute to lower standard of living; reduces per capita land and resource availability; greater under-employment and open unemployment; demand pressures on social capital like education, health and housing; increases dependency; environmental destruction and contributes to inequalities in income distribution (Ghatak, 1995, pp. 231-233).

Table 3: Descriptive Statistics

Variable	N	Mean	Standard Deviation	Minimum	Maximum
Fertility Rate	90	6	1.1	3.6 (Tunisia)	7.4 (Syria)
Income	90	4001	3841.0	600.0 (Egypt &	14500.0 (UAE)
Infant mortality rate	90	62	23.4	Iran)	119.0 (Egypt)
Female education	90	88	18.5	23.0 (UAE)	117.0 (Tunisia)
Urbanisation	90	54	20.1	53.0 (Oman)	83.0 (Bahrain)
Female labour force participation	90	13	5.8	7.9 (Oman) 5.4 (UAE)	24.4 (Tunisia)

Data in Table 2 shows MENA fertility rate trends. For the high-income countries, the fertility rates in 1980 were above 1.9, the average for all of the high-income countries (The World Bank, 1999, Table 7). In 1996, after a span of fifteen years, the average fertility rate for high-income countries was 1.7 (The World Bank, 1999, Table 7). In the same year, for United Arab Emirates, the fertility rate was 3.5, many times higher than 1.7. While the fertility statistic for 1996 is not available for Qatar and Kuwait, it is quite likely that they followed similar patterns as noted for the United Arab Emirates.

For the three upper-middle-income countries (Oman, Saudi Arabia and Bahrain), fertility rates in 1980 and 1996 have been many times higher than 3.8 and 2.6, respectively, the average for upper-middle-income countries (The World Bank, 1999, Table 7).

For the seven lower-middle-income economies in Table 2, the fertility rates have again been many times higher in 1980 compared to 3.1, the average for all the lower-middle-income economies (The World Bank, 1999, Table 7). In 1996, the trend remained the same with fertility rates higher than 2.2, the average for all lower-middle-income economies (The World Bank, 1999, Table 7).

While the fertility rates are high for all countries in Table 2, compared with the average for all countries in similar income categories, one common feature has

been a declining pattern in fertility rates as shown in the percent change 1975-96 column of Table 2. Algeria and Tunisia have made tremendous progress in reducing their fertility rates while Iran, Oman and Yemen have made least progress.

Attention needs to be focussed towards controlling high levels of population growth. Of vital importance is a close check on fertility rates because they can be a strong factor contributing to a speedy rate of decline in population growth. Such forms of checks on population growth can improve the quality of human capital, in particular through improving maternal productivity. It is noted by Shultz (1997), that any investments able to increase individual lifetime productivity can contribute to economic growth and socio-demographic development.

In this spirit, this paper aims to provide an economic analysis of fertility inter-relationships on the basis of pooled cross-sectional data for the MENA region. The next section presents a theoretical discussion of the channels through which fertility is affected. Sample size and data are discussed in section three followed by empirical regression results in section four. A conclusion is presented in section five.

CHANNELS THROUGH WHICH FERTILITY IS AFFECTED

This section presents a discussion of several economic and non-economic factors that are likely to influence MENA high fertility rates.

Income

The level of income can influence fertility rates. Economic choice models (Becker and Lewis, 1973; Schultz, 1976) argue that if babies are regarded as consumption goods than their demand will compete against the demand for other consumption goods. Therefore, the benefits of having babies must be outweighed against the cost: the allocation of parental time for raising the babies and the possible associated loss of income. In particular, a rise in real income would tend to reduce the fertility rate as rising income means children are needed less as producer and investment goods. In a similar vain, Temple (1999) notes that if people perceive that incomes are likely to rise, and possibly the returns to human capital, they may decide to have a fewer children. Thus, theoretically, the demand for babies and eventually fertility should be inversely correlated with income.

Infant Mortality Rates

The relationship between fertility and infant mortality rates is likely to be bi-directional, that is, infant mortality may affect fertility and fertility may affect infant mortality (Rosenzweig and Schultz, 1983 and Schultz, 1993). In this study, high infant mortality rates are hypothesised to influence fertility rates, that is, if large numbers of children die, parents must have large numbers of children to ensure at least some survive.

Female Education

Educating females is one of the best investments for future socio-economic welfare (The World Bank, 1980) and is found to be associated with lower fertility (Barro, 1991 and Schultz, 1993). Greater female literacy could reduce fertility rate in several ways: (1). Literate women are more likely to know how to plan family size; (2). Literacy confers status on women, and women can use this higher status in the family to advance the interests of the family, including size; (3). The acquisition of education delays the age of marriage; and (4). Education also complements the effectiveness of family planning programs and the opportunities for work. Hence, higher education is expected to reduce fertility as educated women are likely to comprehend more clearly the logic of fertility control including a re-think of age-old customs resulting in a change of attitudes and motivations (Ghatak, 1995). It is also noted that educated mothers would be expected to value more highly education for their children, and would more likely make a conscious trade-off between quality of life and the number of children (Dasgupta, 1993). Thus, female education is hypothesised to promote decline in fertility and to act as a force behind the demographic change.

Urbanisation

Urbanised populations have lower fertility rates than rural populations in developed nations (Eberstadt, 1980 and Schultz, 1993). Urbanisation is expected to depress aggregate fertility rates as the level of awareness of the consequences of higher fertility rates is expected to be greater. Urban areas provide better access to education, wider employment opportunities, higher incomes, more comprehensive information flows, and offers family planning services. Therefore, these factors

contribute positively towards parental decision making with an expected smaller family. Thus, fertility should be inversely correlated with urbanisation.

Female labour force participation rate

A factor that is likely to influence the rate of fertility is the status of women. A change in status of women can be brought about through education and their levels of participation in the labour market. With greater participation in the labour market, it is likely that young, married couples are in a better position to bargain over family size, where *smaller* is better, eventually influencing the fertility rates.

Family Planning

Schultz (1997) notes that the capacity to avoid unwanted fertility is a form of human capital which enhances female market productivity by allowing women to continue their education, to migrate to where their skills are most valued, or to allocate time to their most rewarding work. An active family planning service is expected to influence fertility as it brings about greater awareness of birth control and is effective in helping eliminate inefficiency with the introduction of modern contraceptive methods. This should result in a drop in fertility rates. Effective family planning programs are known to result in longer birth spacing and a reduction in infant mortality (Dasgupta, 1993).

DESCRIPTION OF DATA

The countries chosen in this study for the empirical work comprises a sample of ten MENA countries: Algeria, Bahrain, Egypt, Iran, Morocco, Oman, Saudi Arabia, Syria, Tunisia and United Arab Emirates. While there are twenty countries in the MENA region (The World Bank, 2003), the choice of these ten countries was solely dictated by the availability of published data on variables of interest as discussed in section two. Unfortunately, not all MENA countries have a consistent set of data, and where data is available the time span is limited. Since the sample time frame for the dependent variable has to be consistent with the explanatory variables, all variable measures were restricted to 1990-2000, with all data taken from the World Bank World Development Indicators CD-ROM (2003).

In terms of variable measures, fertility rate is the average number of children that would be born alive to a woman in her lifetime. Income is measured by real per

capita GNP. Infant mortality rate is the number of infants per thousand live births, in a given year, who die before reaching one year of age. Female education is measured by gross enrolment of females of all ages at primary level as a percentage of children in the country's primary school age group. Urban population as a percentage of total population measures urbanisation. Female labour force participation is female labour force as a percentage of total labour force. Because measures of family planning are deficient across MENA countries, a dummy was used. A value of *one* was allocated to Algeria, Egypt, Syria and Tunisia, supported by the fact that these countries revealed contraceptive prevalence rate. For example, the contraceptive prevalence rate during 1990-96 was 51 percent in Algeria, 48 percent in Egypt, 40 percent in Syria and 60 percent in Tunisia (The World Bank, 1999). It was assumed that contraceptive prevalence rates existed in these countries even prior to 1990 but perhaps at a lower rate. *Zeros* were allocated to countries other than Algeria, Egypt, Syria and Tunisia. This means absence of effective family planning programs.

EMPIRICAL REGRESSION ANALYSIS AND RESULTS

The model is estimated using SHAZAM 7.0 Econometrics Computer Program (White *et al.,* 1993) following the model outlined by Kmenta (1986). Descriptive statistics are provided in Table 3 while the regression results are reported in Table 4.

Table 4: Results

Variable	Coefficient	Standard Errors	T- Value
Constant	3.750	0.301	12.440
Income	0.00118	0.000167	7.065
Infant mortality rate	0.0284	0.00207	13.700
Female education	0.0233	0.00286	8.141
Urbanisation	-0.0389	0.00266	-14.630
Female labour force participation	-0.0271	0.0131	-2.066
Family Planning	-0.307	0.0923	-3.325
Buse R-square = 0.86., F – Statistics = 71.4., Durbin Watson = 1.57, Jarque Bera = 0.48.			

The model performs highly satisfactorily. Its robustness and adequacy based on diagnostic statistics is considered to be satisfactory for models utilising cross-sectional data. In terms of coefficient of determination (Buse R-square), the six explanatory variables

explain over 86 percent of the variation in MENA fertility rates. Given the use of pooled data, such an outcome is considered to be highly satisfactory. The F-Statistics is established as significant. This led to a conclusion that there exists a strong statistical relationship between the six-predictor variables and the criterion variable at alpha 0.05 level. Of critical importance is the issue of heteroscedasticity. The Engle's conditional test on residuals did not reveal any serious heteroscedasticity problems. The coefficients are statistically significant at the 1- percent level. The signs of the regression coefficients have several implications as discussed below.

An issue crucial to the findings obtained for the MENA countries is an attempt to shed some light on the discussion of results from previous studies addressing similar issues thus providing some comparisons. However, comparisons are difficult, for a whole host of reasons: differences in countries economic structures, variable selection, measurements, the sample size, the choice of countries and the methods of estimations. Thus, only those aspect that are most comparable and appropriate in this context are discussed.

The coefficient of *income* is surprising and does not meet priori expectations. It is positive and statistically significant, providing strong evidence that MENA fertility rate positively correlated with income: increases in incomes are associated with increases in fertility rates. This result contradicts the arguments of the economic choice models (section 2), including Becker and Lewis (1973) and Shultz (1978). Studies involving other countries and regions have shown an inverse relationship between fertility and income (Gani, 1999). However, in an earlier study, Eberstadt (1980) noted that nations like Mexico, Brazil and Philippines, with relatively high-income levels and growth rates, showed little sign of fertility decline. Today, of course, it is obvious that fertility has declined rapidly in these three countries. It seems that individual decisions on family size in MENA countries have much to do with the level of income. The results of the income variable leading to the conclusion higher average incomes mean more resources available to support large families, thus, a higher demand for children.

The coefficient *infant mortality rate* is, as expected, positive and most significantly related to fertility. The results provide confirmation that high fertility rates are associated with high infant mortality rates. The results indicate that in the MENA region the chances of child survival are less in comparison to developed countries. For example, the current, average infant mortality rate in high-income countries is 6 per 1,000 live births, while in low-income countries it is 59 per 1,000 live births (The World Bank, 1999, Table 7). MENA countries have high infant mortality rates. In 1980 the average infant mortality rate in the MENA region was 96 per 1,000 live births and in 1996 it had declined to 50 per 1,000 live births, still higher than the average for low and middle-income countries in 1980 and 1996, respectively (The World Bank, 1999, Table 7). The result obtained for infant mortality rate is consistent with earlier studies involving different countries and regions. Blau (1986), Rosenzweig and Schultz (1985 & 1993) and Gani (1999) show infant mortality rate and fertility rate in developing countries is significantly positively correlated.

The coefficient, *female education*, is positive and statistically significant and inconsistent with our a priori expectations. Barro (1991), using data for 100 countries, shows that high school enrolment rates contributed to lower fertility rates. Similarly, Shultz (1993) found that female education is also associated with lower fertility. High levels of female education is also found to be negatively correlated with fertility in a cross-section of Pacific Island countries (Gani, 1999). The results obtained here for the variable female education is not surprising given low female literacy rates. For example, current average female literacy rate for Arab states is 46.4 percent, much lower than 62.9 percent, the average for all developing countries (UNDP, 1999, Table 2).

Evidence of a fairly strong impact of *urbanisation* on fertility was found. The coefficient urbanisation is consistent with theoretical expectations. At the standard 1 percent level of significance, the coefficient of urbanisation is negative and statistically significant; giving strong evidence that urbanisation is inversely associated with fertility. Urban areas provide better accessibility to health, education and gainful employment.

The coefficient for *female labour force participation* rate is consistent with *a priori* expectations, negative and statistically significant, providing strong evidence that increases in female labour force participation rate is associated with lower levels of fertility. The trend in the developing world is for women to become better educated. While MENA female literacy and employment rates are still lower than their male counterpart, the gap is gradually narrowing. As MENA women gain skills and abilities, this is likely to shift their position in the labour force. The increase in female participation in the MENA labour force is revealed in the participation rates. For example, the average MENA female percent of the labour force in 1997 was 26 compared to 24 in 1980 (The World Bank, 1999, Table 3). Although this number is lower than the average for the low and middle-income economies, the existing level of female involvement in the labour force is a positive development in terms of improving the status of women.

Family planning as measured by dummy variable is consistent with *a priori* expectations; the negative and statistically significant coefficient providing confirmation that family planning services are associated with lower fertility rates. The results are consistent with that of Shultz (1993) and Gani (1999) where the association between family planning and fertility is found to be negative.

SUMMARY AND CONCLUSION

This study provided economic analysis of fertility interrelationships in MENA, and has helped to identify the relative contributions of the different influences reasonably well. Our results provide strong evidence that family planning, urbanisation and female labour force participation are confirmed as inversely related to fertility rates. Surprisingly, a strong positive association is found between fertility rate, incomes, infant mortality rate and female education. Several outcomes of the empirical analysis are similar to results obtained by earlier studies involving non-MENA countries and regions. The analysis presented has some

policy implications. One reservation is that while cross-sectional regression analysis as adopted in this study is a popular method, the appropriate policies will depend on a country's particular demographic situation.

The important policy outcome is to allow improvements in the status of woman, which could contribute to improvements in human capital and thus economic development and demographic improvements. Expanding the opportunities for women in the educational system, participation in the out-of-house labour market, infant and general health care services, and access to family planning programs should be a matter of priority among the MENA policy makers. This may also bring about beneficial externalities as a healthy population with higher levels of education and income-earning opportunities can also lead to increases in the marriage age. To reduce infant mortality, public expenditure on infant health care is an obvious area for improvement: more resources should be devoted to primary health care facilities, increasing the number of health care personnel and establishing maternal education programs directed toward health, nutrition and basic hygiene, coupled with effective, population responsive, family planning programs. Family planning is an important health policy instrument and awareness of its benefits should be increased enabling parents to make the right decisions in terms of achieving their fertility targets and family size. Public resources effectively directed towards family planning programmes can provide vital information about birth control, enabling a woman to avoid unwanted pregnancy and enhancing their market productivity. Generally, this will lead to lower desired fertility. It is not surprising that family planning is viewed as a means to *empower* women because it is likely to increase their economic opportunities.

While several studies on fertility concerning the developing world have made important contributions in the past, the conclusions of earlier studies may not be applicable in current times to the developing world given the economic and demographic transitions several developing countries have experienced or are going through. For example, in an earlier study on fertility in less developed countries, Eberstadt (1980) concluded that there is "no economic evidence to show that rapid population growth stifles economic growth, or even per capita economic growth, that models generate meaningless numbers and if there is any international correlation between population growth and per capita economic growth in LDC's, and many are not convinced there is, it would be positive, not negative".

While such conclusions may have had their place some two decades ago, it should be noted that tremendous advancements have taken place in both theoretical and applied economics over time and several nations have a good statistical records on economic and demographic variables. As a result of such advancements, studies of recent times provide convincing outcomes of the correlation's between population and economic growth that makes conclusions of earlier studies like Eberstadt (1980) redundant. With much certainty, high fertility rates may have negative consequences on overall level of growth and development. In recent times researchers have noted negative (although weak) correlation between population growth and growth of per capita income (Mankiw, Romer and Weil, 1992). Other effects of high population growth are also noted. There is some evidence of

students in countries with higher population growth recording lower achievement (Hanushek, 1992), and a weak negative relationship between population growth and changes in total factor productivity (Temple, 1999), who further notes that some researchers have looked at the link from fertility rates to subsequent growth, sometimes finding a negative correlation.

In general, achieving an improved fertility rate depends to a great extent on achieving economic development, which in turn depends upon sound and effective economic and social policies and fiscal expenditure. As such, fiscal expenditure directed toward the welfare of women should be increased and insulated from cuts within the development budget.

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