

Working Paper

Fertility and Mortality in North Africa: Levels, Trends and Future Prospects

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July 1995



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ABSTRACT

The focus of this paper is on substantive aspects of fertility and mortality, and their implications for future population trends in North Africa. There is convincing evidence that high fertility has been maintained for a considerable time and that a decline has begun in these countries. This decline is not uniformly the same in each country. Most of it is in urban areas, while fertility in rural areas is still high. Also, because of differences in desired fertility, use of contraceptive methods, and women's education, the potential for further decline in fertility varies considerably by place of residence. Results from the World Fertility Surveys and the Demographic and Health Surveys show enormous fertility differences by level of women's education. Also, they show large fertility declines in response to a few years increase in women's education. On the other hand, mortality decline is progressing rapidly. Life expectancy at birth has increased for males and females. There are substantial mortality differences between countries. Mortality data by place of residence in North Africa is not available except for Egypt, where life expectancy at birth has increased for rural males and females more than for their urban counterparts. These patterns of fertility and mortality will shape the future population trends for several years. In the first place, a young age structure resulting primarily from past high fertility levels will lead to high population growth momentum such that a decline in fertility will not have its full impact for quite a long period. The greatest demographic challenge for governments in North Africa is in rural areas, where fertility is the highest and women's education is the lowest. On the other hand, there are considerable uncertainties about future demographic trends in these countries primarily because of social development and political instability. With differences in development and varying political support to national population programs and activities, future population trends in these countries are likely to take a divergent course.

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FERTILITY AND MORTALITY IN NORTH AFRICA: LEVELS, TRENDS AND FUTURE PROSPECTS

Hassan Musa Yousif

INTRODUCTION

North Africa is characterized by high population growth as a result of high fertility and declining mortality. This generalization conceals substantial demographic heterogeneity between countries and within countries by place of residence (urban-rural) and level of education (primary, secondary, and tertiary). These countries are in various stages of development, modernization, and social change. Each country provides its own demographic laboratory. Government activities and the official stand on population policies are crucial in modulating demographic behavior and shaping the future pattern of fertility and mortality. Population policies and social programs influence reproductive decisions of couples in various ways. For example, the use of modern contraceptive methods is determined to a large extent by the government's stand on population issues. Government social policies and programs in many countries have successfully helped couples to achieve their fertility and health aspirations, primarily because these programs have gained social acceptance and direct government support. In other countries, couples failed to achieve some of these aspirations not because they are helpless victims of their own behavior, but because of lack of government and public support and of social obstacles. This paper provides basic understanding of the substantive aspects of fertility and mortality, and studies their implications for future population trends in countries in North Africa. The paper highlights demographic differentials by place of residence and education, and briefly reviews the stand of governments on population issues. It concludes with future demographic prospects.

Before exploring these issues, it is important to ask ourselves: What is the problem? The population in North Africa¹ is the third fastest growing in the world. The overall annual population growth rate is 2.5, exceeded by a rate of 2.6 for Western and Central Asia and 3.0 for Sub-Saharan Africa. This high growth rate is due to sustained high fertility for about two decades (1960s and 1970s) and declining mortality. High fertility produces a young age structure and strengthens the momentum of population growth. There is a large potential for future growth in the age structure of the population in North Africa. On the other hand, the potential for structural changes in these countries is great as a result of forces of modernization, internal social change, political instability, peace in the Middle East, and the rise of religious fundamentalism. Therefore, there is considerable uncertainty about future demographic trends.

¹ The largest population is in Egypt. Over a ten-year period (1976-1986), the population of Egypt increased by about 11.6 million persons (from 36.6 million in 1976 to 48.2 million in 1986). The population in Egypt is estimated at around 52 million in 1995. Sudan ranks second, with a population estimated at about 29 million in 1995. In the Maghreb countries, Algeria and Morocco have the largest populations. The population of Algeria increased from 16.3 million in 1977 to 22.6 million in 1987, and is estimated around 28.7 million in 1995. The population of Morocco was 15.2 million in 1971. It increased to 20.5 million in 1982 and is expected to be about 28 million in 1995. By contrast, Libya and Tunisia have small populations. The population of Libya increased from 2.2 million in 1973 to 3.2 million in 1984, and is expected to be 5.5 million in 1995. The population of Tunisia, the most slowly-growing in the region, increased from 4.5 million in 1966 to 6.9 million in 1984, and is expected to be about 9 million in 1995.

SOURCES OF DATA

Registration of vital events, regular periodic censuses, and national sample surveys are the most well-known sources of data for demographic analysis. The system of vital registration is deficient and the quality of vital statistics is generally poor in most countries of Northern Africa. Censuses and national surveys are, therefore, the best available sources of demographic data. Censuses usually provide very limited information on deaths and on children ever born (CEB). Table 1 provides dates of censuses and national sample surveys conducted in the countries of Northern Africa. The earliest censuses were conducted in the 19th century in Egypt. Egypt's first official count of its population was in 1882; the second was in 1897. The most recent censuses were taken in roughly ten-year intervals. Egypt, Morocco, Sudan, and Tunisia participated in the international rounds of World Fertility Surveys (WFS) and the Demographic and Health Surveys (DHS). Algeria conducted its first national fertility survey in 1987.

Table 1. Censuses and national sample surveys. Source: UNECA 1992, Table 29.

Country	Censuses	National Surveys
Algeria	1966,1977,1987	National Fertility Survey 1987
Egypt	1800, 1882, 1887, 1907, 1917, 1927, 1937, 1960, 1966, 1976, 1986	Egypt Fertility Survey 1979-1980. Demographic & Health Surveys 1986-88, 1990-92 Use Effectiveness of Contraceptives 1993 Maternal and Child Health Survey 1991
Libya	1931, 1936, 1954, 1964, 1973, 1984	No surveys
Morocco	1960,1971,1982,1992	Morocco Fertility Surveys 1979-1980 Morocco Demographic and Health Survey 1987 National Survey on Population and Health (ENPS-II) 1992
Sudan	1955/56, 1973, 1983, 1993	Sudan Fertility Survey 1979 Sudan Demographic and Health Survey 1989-1990
Tunisia	1921, 1926, 1931, 1936, 1946, 1956, 1966, 1975, 1984, 1994	Tunisia National Fertility Survey 1979 Tunisia Demographic and Health Survey 1988

In this paper we use official data provided by the statistical offices to the United Nations Population Division. These usually are published in the United Nations *Demographic Yearbooks*. Data for these yearbooks were compiled by a set of questionnaires sent annually to the statistical offices, supplemented by data from official censuses, civil registration, and national sample surveys. One problem we encountered with the UN *Demographic Yearbooks* is that mortality measures, particularly life expectancy at birth and infant mortality rates, are surprisingly the same for Libya and Morocco for the period 1950-1990.² A general data problem is that because of the proximity of rural areas to urban centers, high population mobility, and growing urbanization in North Africa, death statistics are likely

² The author of this paper contacted the UN Population Division on this issue. The error is attributed to lack of data. The Population Division agreed to correct this error in its forthcoming *Demographic Yearbooks*.

to be sensitive to errors relating to the place of residence. For example, women living in rural areas near major cities may travel to hospitals and maternity centers for delivery. Therefore, infant and maternal mortality differentials by place of residence are likely to be distorted somewhat if the death events are classified by place of occurrence rather than by place of usual residence.

FERTILITY

Fertility from 1960-1979

During 1960s and 1970s, all countries in North Africa, except Egypt and Tunisia, were characterized by high fertility. Total fertility rates (TFR) were high, usually 6 to 7 or more live births per woman in each country (Table 2 and Figure 1). The TFR in Egypt and Tunisia were 7.1 and 7.2, respectively, during the 1960s, and 5.6 and 5.7, respectively, during the 1970s. In Algeria, TFR was 7.5 in 1966 and 7.2 in 1977. For Morocco, TFR was 7.1 in 1960 and 6.9 in 1971. One possible explanation for the high total fertility rates is early marriage. The mean age of entry into marriage was low. Early marriage provided the social and cultural environment for sustained high fertility (Coale 1993). Also, because of cultural factors, such as predominance of the patriarchal family and extended family norms, women were traditionally very subordinate; a daughter went from parental (family) domination to domination by her husband's family. During the 1960s and 1970s there was a strong anti-family-planning stand in all countries in North Africa, therefore, family planning activities were very limited.

Table 2. Total fertility rates. Sources: UN 1993; Khalifa 1994; Department of Statistics 1991.

Country	1960-69	1970-79	1980-92	Change in years 1970-79 to 1980-92
Algeria	7.5 (1966)	7.2 (1977)	4.4 (1992)	2.8 (38%)
Egypt	7.1 (1960)	5.6 (1976)	3.9 (1992)	1.7 (30%)
Libya	7.2 (1964)	7.7 (1973)	7.2 (1984)	0.5 (6%)
Morocco	7.1 (1960)	6.9 (1971)	4.0 (1992)	2.9 (42%)
Sudan	6.7 (1960)	6.9 (1979)	4.9 (1990)	2.0 (29%)
Tunisia	7.2 (1966)	5.7 (1975)	3.4 (1988)	2.3 (40%)

Another possible explanation for sustained high fertility is improving standards of living and income levels. Income affects fertility in a number of indirect ways. It is more likely that a woman does not work outside the house if her husband's income is rising. Income would, therefore, increase the likelihood of the wife staying at home, and possibly increase the motivation to have more children. Also, rising incomes often lead to improvement in nutrition and health, thus contributing to lower infant and child mortality, which in turn affects fertility. Rising incomes are also associated with bottle feeding, eventually leading to a decrease in breast feeding, with possible substantial positive effects on fertility. When the need for dowry, cost of marriage, and setting up a new household are obstacles that tend to delay marriage, rising incomes may permit earlier marriage and earlier childbearing.

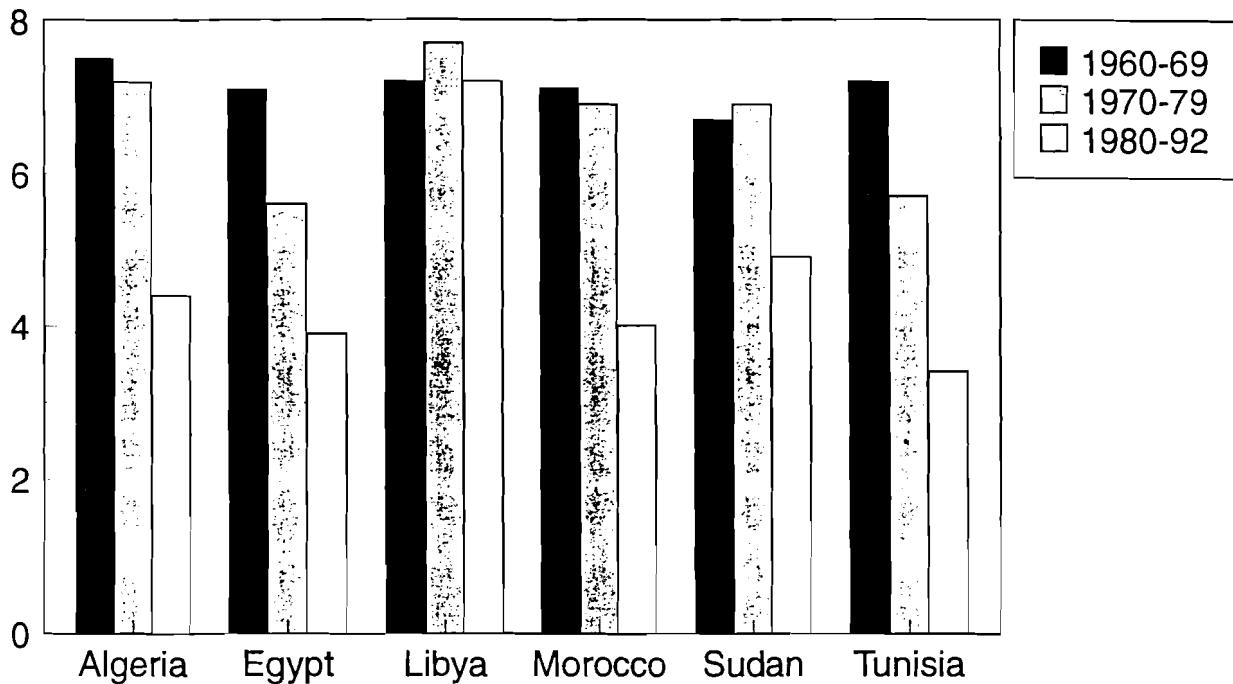


Figure 1. Trends in total fertility rates. Sources: UN 1993; Khalifa 1994; Department of Statistics 1991.

Fertility Decline

There is convincing evidence that a decline in fertility is underway in North Africa. The level of fertility during the late 1980s and early 1990s is different from what it was during the 1960s and 1970s (Table 2 and Figure 1). The largest drop is in the Maghreb countries. The total fertility rate declined by about 38% (2.8 children) in Algeria (1977-1992), 42% (2.9 children) in Morocco (1971-1992), and 40% (2.9 children) in Tunisia (1975-1989). In Egypt, the total fertility rate, which was 5.6 in 1976, declined to 4.1 in 1991 and 3.9 in 1992--a drop of about 30% in 17 years. High fertility levels during the 1960s and 1970s in Sudan slowly declined in recent years. Results from the Sudan WFS and DHS show that fertility has declined by about 29%, from 6.9 in 1979 to 4.9 in 1990 (Department of Statistics 1991).

Age-specific fertility rates show a declining trend. There is a downward shift in the age-specific fertility curves for all countries (Table 3 and Figure 2). The largest shift is in the peak childbearing period 25-34. Factors, such as increasing use of contraceptives, women's education, rising age at marriage, and social change, operate together to bring down fertility even though traditional and religious factors may impede this process. Also, government support of population policies and programs is gaining momentum. It is not a coincidence that the rapid decline of fertility in Egypt and Tunisia took place at a time when government intervention to resolve population issues was on the rise. In these two countries, the use of family planning methods has increased significantly during the last 15 years. More important is the substantial increase in women's education. High illiteracy rates in the 1960s and 1970s have sharply declined in the last decade. For example, illiteracy rates that were above 85% for women in Tunisia, Algeria, and Morocco during the 1960s have declined to less than 50% during the 1980s. Women's education in Egypt, Sudan, and Libya has increased too. However, because of differential

access to education services by place of residence, urban women are likely to be more educated than rural women. Also, high urbanization in countries in North Africa have contributed to lower fertility.

Table 3. Age-specific fertility rates per 1000 women. Sources: UN 1987, 1993; National Board of Statistics 1991.

Country/Year	15-19	20-24	25-29	30-34	35-39	40-44	45-49	TFR
Algeria								
1984	47	239	322	293	227	104	20	6.3
1986	35	212	263	273	212	86	17	5.5
1988	33	175	260	250	202	104	18	5.2
1995*	30	155	233	172	120	52	8	3.9
Egypt								
1980 (WFS)	99	256	286	217	130	48	16	5.3
1988 (DHS)	72	220	243	182	118	41	6	4.4
1991 (EMCHS)	69	215	216	192	93	40	6	4.2
1992 (DHS)	63	208	222	155	89	43	6	3.9
1995*	73	205	222	151	86	31	9	3.9
Libya								
1973 (UN)	249	407	360	285	151	66	29	7.7
1995*	110	279	313	272	190	95	20	6.4
Morocco								
1981 (WFS)	93	265	296	222	178	98	29	5.9
1992 (ENPS-II)	40	139	183	182	138	86	39	4.0
1995*	37	138	211	167	114	59	24	3.8
Sudan								
1979 (WFS)	114	264	283	251	149	108	35	6.0
1983 (Census)	115	294	348	268	196	79	74	6.9
1990 (DHS)	69	183	240	236	157	82	25	4.9
1995*	88	234	290	259	167	84	25	5.7
Tunisia								
1978 (WFS)	34	225	304	260	199	112	36	5.9
1984 (UN)	35	173	248	238	140	54	18	4.5
1988 (DHS)	17	131	195	176	113	41	9	3.4
1995*	23	128	209	152	82	31	6	3.2

* UN Population Division estimates for 1990-95 (The 1994 Revision) median variant projections.

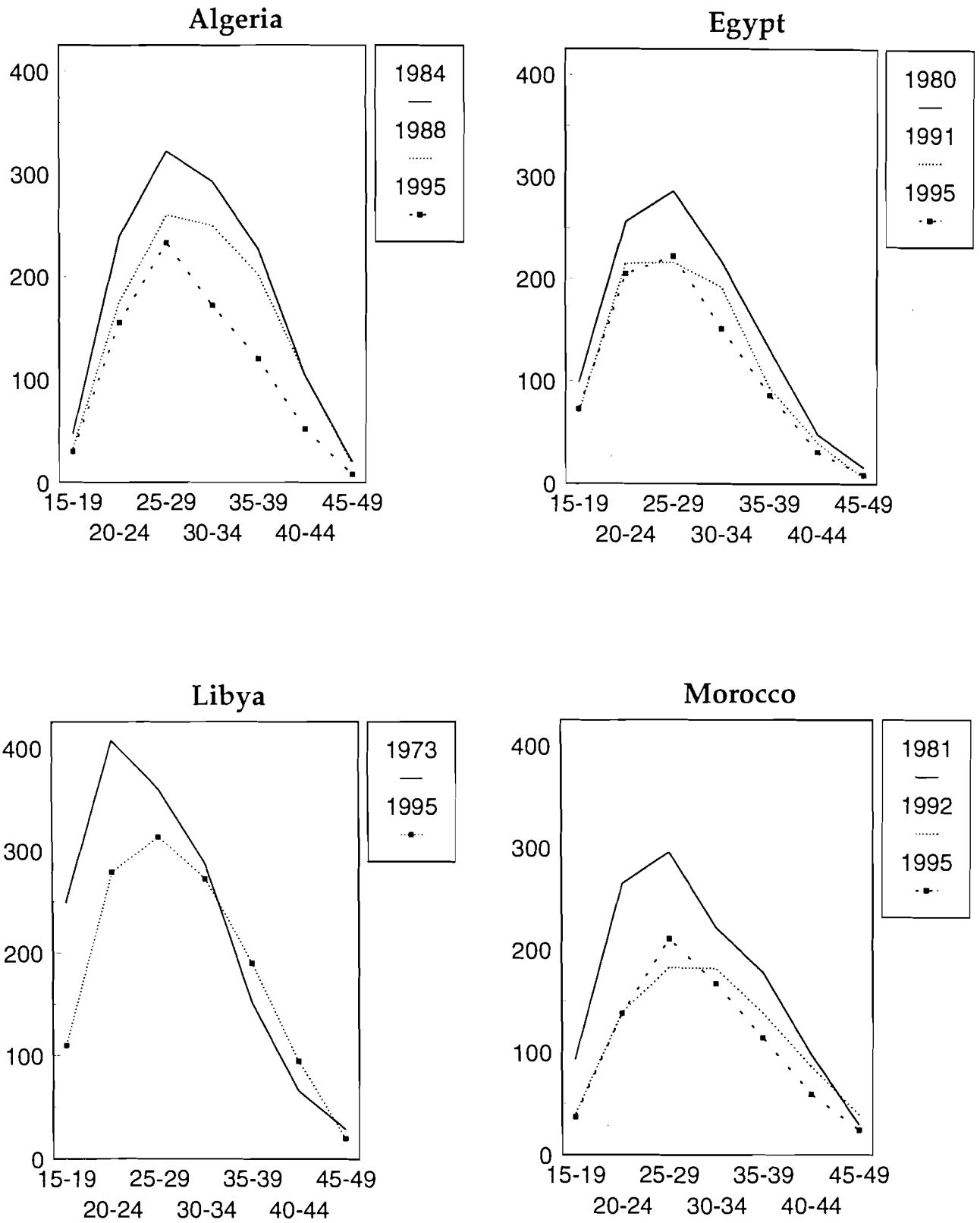


Figure 2. Age-specific fertility rates.

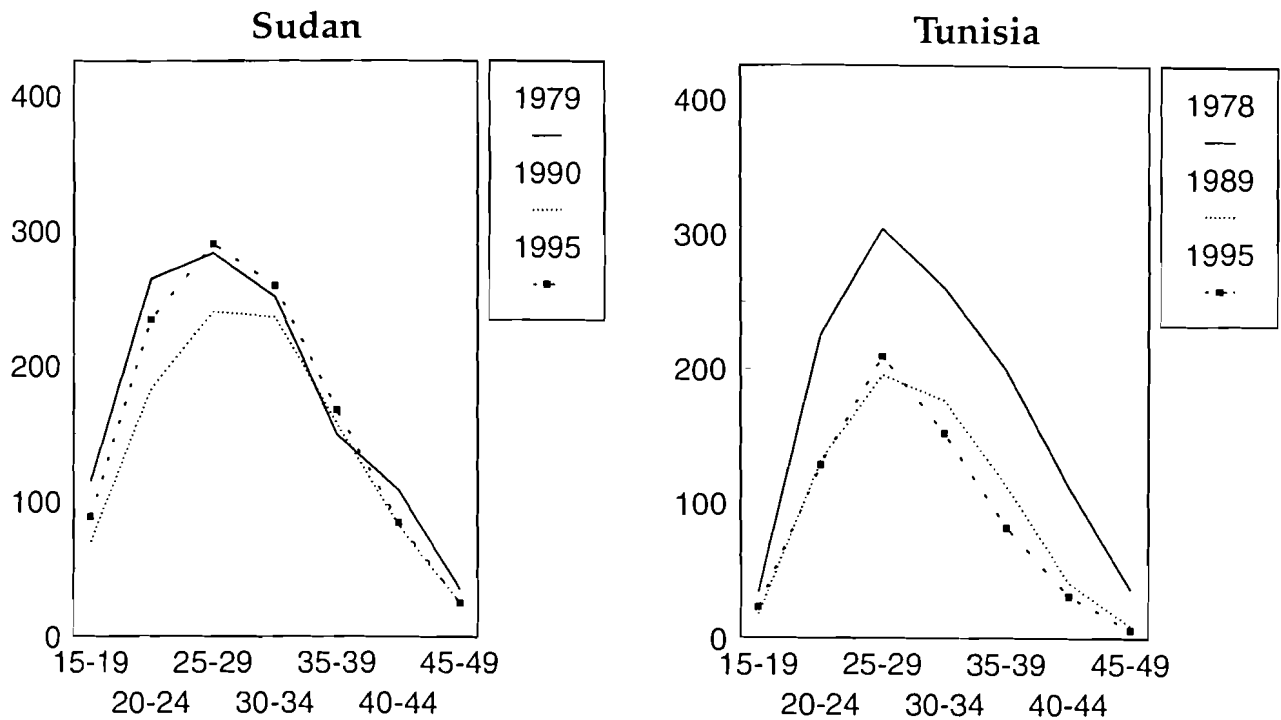


Figure 2 (continued). Age-specific fertility rates.

Fertility by Place of Residence

Place of residence (rural/urban) has a pervasive influence on fertility. It summarizes many differences in opportunities available to households. Urban households have better access to social services, particularly education and health services, and modern employment opportunities. Moreover, households in urban areas are more likely to possess modern types of consumer goods. These may alter reproductive behavior and ease the diffusion of contraceptive technology. Urban fertility is likely to be lower than rural fertility.

Research shows that rural women have higher fertility than urban women in North Africa. According to the WFS, rural women in four countries in North Africa bear, on average, 2.5 children more than urban women. The fertility difference between rural and major urban areas³ (Table 4 and Figure 3) is 2.3 children for Egypt, 3.1 children for Morocco, 1.6 children for Sudan, and 2.2 children for Tunisia (UN 1987). Recent findings from DHS surveys reveal similar differences. For example, the Sudan Demographic and Health Survey shows lower fertility in urban (TFR = 4.1) than rural (TFR = 5.6) areas, and lower fertility in Khartoum (TFR = 3.7) than in other regions of the country. Results from the 1991 Egypt Maternal and Child Health Survey give a TFR of 2.7 for the urban governorate,⁴ 3.2

³ In the WFS surveys, the place of current residence was coded in three categories: rural, other urban and major urban. The basic definition of rural versus urban was left to the discretion of the individual countries. Countries use various criteria based on population size, sewerage, electricity, water, etc., to differentiate between rural and urban areas. Further division of urban areas into "other urban" and "major urban" was based on a set of rules, such as (1) cities exceeding 1 million were classified as major urban, and (2) national capitals, regardless of population size, were classified as major urban (UN 1987, p. 190).

⁴ In Egypt, the governorates of Cairo, Alexandria, Port Said, Ismailia, Suez, frontier governorates and capitals of other governorates, as well as district capitals (Markaz), are considered urban.

for urban lower Egypt, and 3.6 for urban upper Egypt, in contrast to 4.4 for rural lower Egypt and 6.3 for rural upper Egypt. Rural-urban fertility difference in upper Egypt is considerable (Zohry 1994).

Table 4. Fertility and family planning measures by place of residence (WFS). Source: UN 1987, Tables 96, 99, 104.

Fertility/ Place of residence	Egypt	Morocco	Sudan	Tunisia
Total Fertility Rates				
Major Urban	3.8	3.9	4.8	
Other Urban	4.9	4.8	5.7	4.8**
Rural	6.1	7.0	6.4	7.0
Desired Family Size*				
Major Urban	3.0	3.9	5.5	3.4
Other Urban	3.5	4.2	6.1	3.9
Rural	4.8	5.5	6.5	4.6
Contraceptives Use				
Major Urban	42.0	40.0	16.0	
Other Urban	36.0	35.0	9.0	43.0**
Rural	13.0	10.0	2.0	21.0

* Mean desired family size for ever-married women, 15-49 years old, adjusted for the effects of age difference between residence groups.

** These numbers for Tunisia are for major urban and other urban together.

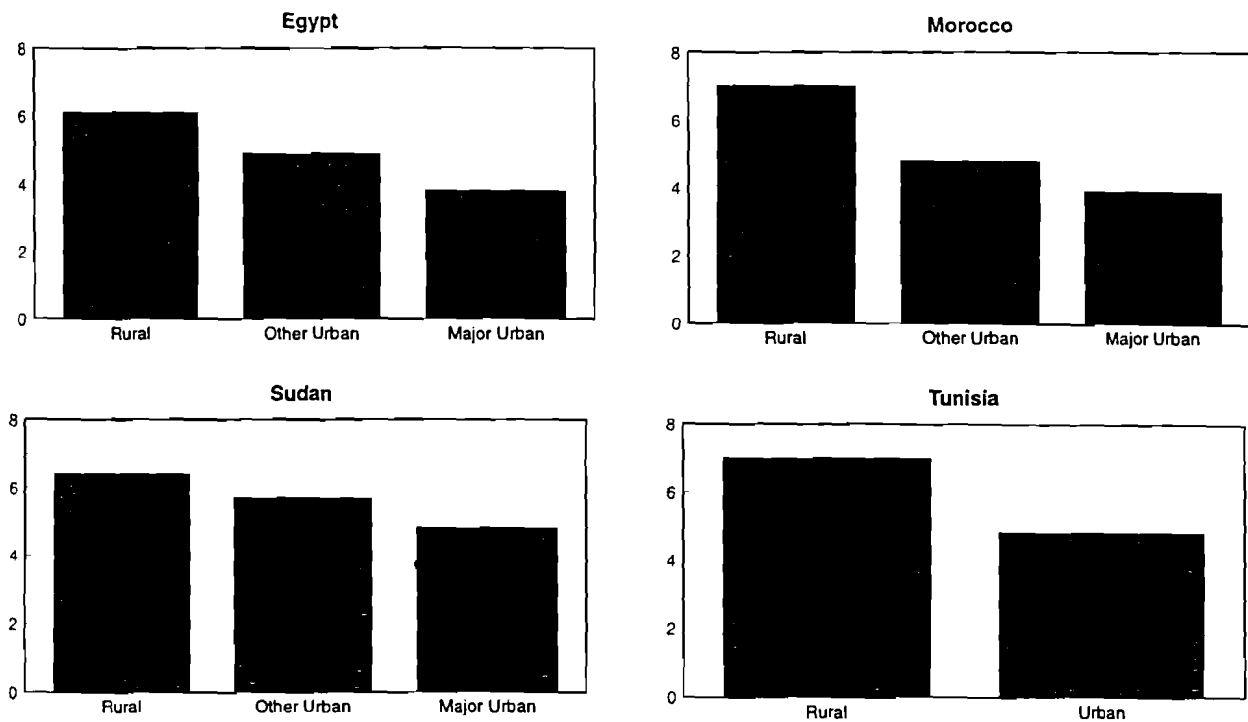


Figure 3. Total fertility rate by place of residence.

Differing compositional factors, such as education and access to and use of family planning methods, may explain some of the rural-urban fertility differences. Rural women are far less educated than urban women. In Sudan, for example, the DHS shows that 55% of the rural women have never attended school as compared with 33% of the urban women. Also, rural women have limited access to and low use of contraceptive methods in contrast to urban women, who have better access to family planning services. According to the WFS, the difference (in percentage points) between rural and urban use of contraceptive methods⁵ is 29 for Egypt, 30 for Morocco, 14 for Sudan and 22 for Tunisia. More recent results from the 1992 Egypt Demographic and Health Survey show the percentage of current users of modern contraceptive methods among currently married women to be 55.6% for the urban governorate, 58.5% and 54.4% in urban lower and upper Egypt, respectively, and 48.2% and 23.0% in rural lower and upper Egypt respectively (Khalifa 1994, p. 7). This same measure for Sudan is 11.3% in urban areas, and 2.2% in rural areas (Department of Statistics 1991). Modern contraceptive methods are more likely to have a greater role in lowering fertility in urban than in rural areas.

The social and cultural environment in rural areas is more conducive to high fertility than in urban areas. This is reflected in the persistence of traditional beliefs and values and the cultural support to women's reproductive role. Rural women marry at an earlier age than urban women. According to the WFS, the difference in the singulate mean age at marriage (SMAM) between rural and urban women is 3.2 years for Egypt, 2.9 years for Morocco, 1.9 years for Sudan, and 1.4 years for Tunisia. More recent findings from the DHS indicate that the median age at first marriage is on the rise, and that the rural-urban difference is widening. For women aged 25-29, the DHS results for the Sudan, for example, give a median age at first marriage of 23.2 years for urban women and 19.0 years for rural women--4.2 years difference. With education spreading in urban areas more rapidly than in the rural areas, this result is not unexpected. It is, therefore, expected that fertility desires in rural areas are higher than in urban areas. The WFS results show that, on average, rural women in Egypt, Morocco and Tunisia desire 4.8, 5.5 and 4.6 children, respectively, in contrast to 3.0, 3.9 and 3.4 children in major urban areas in the same countries (Table 4). The DHS for Sudan show that rural women desire 6.3 children, compared to 5.3 for urban women (Department of Statistics 1991).

Fertility and Women's Education

Education leads to higher social status for women and facilitates changes in fertility (UN 1987; Casterline et al. 1984; Cochrane 1979). Empirical evidence continues to accumulate in support of a strong negative relationship between women's education and fertility. Women's education acts on fertility through a set of mechanisms and variables, such as:

- School attendance for several years increases age at marriage and raises aspirations regarding a marriage partner.
- Women's education changes traditional values, attitudes and norms, and strengthens women's social status within households and in communities.
- Education facilitates women's employment in modern activities outside the home, therefore, women's family desires and health aspirations are likely to change.
- Educated women are more likely to use modern contraceptive methods.

Different cohorts have differential access to educational services. Younger generations in many countries are presently better educated than older generations, therefore, they may experience greater fertility decline. Countries differ from one to another with regard to the level of education (or years

⁵ This refers to the percentage of currently married women aged 15-49 who were currently using contraception by current residence, adjusting for the effects of age difference between residence groups (UN 1987).

of schooling) at which fertility starts to decline (Timur 1977). Access to educational services differs by residence. In addition, a particular level of education may affect fertility in urban and rural areas differently.

However, education could result in an increase in fertility. Empirical studies have shown that negative effects of women's education may not appear at the lowest levels of education (Cochrane 1979). Some primary education may increase rather than decrease fertility. Highest fertility often is found not among women without education, but among those with a few years of schooling. The positive effect of a low level of education is especially marked in rural areas and in less urbanized and poorer developing countries where income is low. One possible mechanism is that a few years of education, under backward conditions, may lead to a decline in breast feeding or improvement in health, which is not offset by such effects as marriage delay. In a pre-demographic transition stage, women's education may not instigate a movement towards lower fertility (Caldwell 1983). According to Caldwell, schooling of many children is economically rewarding for parents, therefore, fertility remains high.

The literature for North Africa documents varying experiences on education-fertility interrelations. In the early 1970s in Morocco, fertility was almost the same for all levels of education (Timur 1977). Studies done for Egypt, Algeria, Sudan and Tunisia during the 1960s and early 1970s document a different pattern: large fertility declines in response to a few years increase in women's education. In Egypt during the 1960s, women 30 years or older, who completed primary education, had 1.3 children less than women in the same age group with no education (Timur 1977). For Algerian women who had completed their fertile period, those with primary education had reduced their fertility by approximately 2 children fewer than women with no education. A survey of fertility and family planning done in Sudan in 1975 by Caldwell (as part of the Changing African Family Project) unravelled, for the first time, fertility differences by level of education in urban Sudan. Age standardized mean children ever born showed a small difference between women with no education and women with a few years of education. Women with secondary education had two children less than women with no education (Richard et al. 1982).

Data from the WFS and DHS provide comprehensive and convincing evidence in support of education-fertility interrelationships. On average over all WFS countries, seven or more years of schooling reduce fertility by about three children, while a few years of schooling lead to a slightly higher fertility, in contrast to women with no education (UN 1987). Results from the WFS for Egypt, Morocco, Sudan, and Tunisia show large fertility differences by level of education (Table 5). Women with no schooling have substantially higher fertility than women with seven or more years of education. The difference between these two levels of education amounts to 2 and 3 or more children when we consider CEB (children ever born), TFR and TMFR (total marital fertility rate). It is important to note that CEB is a cohort measure based on ever married women aged 40-49 for Egypt and Tunisia, and on all ever married women for Sudan and Morocco. TMFR and TFR are age standardized period measures.

Mirroring the lower fertility rates, one sees that education influences family desires and use of contraceptive methods. With an increasing level of education desired, fertility decreases and the percentage use of contraceptive methods increases (Table 5). Desired family size (DFS), defined as the mean desired family size for ever married women aged 15-49, is adjusted for the effects of age difference between education groups. The use of contraceptive methods, which is measured as the percentage of currently married women aged 15-49 currently using contraception, is adjusted for the effects of age differences between education groups (UN 1987).

Table 5. Fertility and family planning measures by years of education and place of residence (WFS results). CEB = children ever born. TMFR = total marital fertility rate. TFR = total fertility rate. DFS = desired family size. CU = contraceptives use. Source: UN 1987, Tables 112, 115, 122.

Country/ Fertility Measure	Years of Education				Difference (0-7+)
	0	1-3	4-6	7+	
Egypt					
CEB	6.8	7.2	6.5	3.7	3.1 (45.6%)
TMFR	6.5	6.4	6.2	3.8	2.7 (41.5%)
DFS	4.5	3.9	3.5	2.6	1.9 (42.2%)
CU	17.0	25.0	32.0	53.0	36.0
Morocco					
CEB	7.1	7.3	6.3
TMFR	7.0	5.5	5.8	4.6	2.4 (34.3%)
TFR	6.4	5.2	4.4	4.2	2.2 (34.4%)
DFS	5.1	4.0	3.9	3.4	1.7 (33.3%)
CU	16.0	37.0	53.0	56.0	40.0
Sudan					
CEB	6.1	6.9	5.8	3.9	2.2 (36.1%)
TMFR	6.7	7.4	6.9	5.1	1.6 (23.9%)
TFR	6.5	5.6	5.0	3.1	3.4 (52.3%)
DFS	6.5	6.1	5.4	5.0	1.5 (23.1%)
CU	2.0	11.0	12.0	35.0	33.0
Tunisia					
CEB	6.8	5.9	6.4	3.6	3.2 (47.1%)
TMFR	7.3	5.9	6.0	3.9	3.4 (46.6%)
DFS	4.3	4.0	3.6	3.2	1.1 (25.6%)
CU	25.0	46.0	50.0	62.0	37.0

The Maternal and Child Health Survey (MCHS) conducted in Egypt in 1991 provides more insights on education-fertility interactions. Controlling for age at first marriage, women with no education have systematically higher fertility than women with secondary or higher levels of education (Hosam Eldin 1994). Also, the same differential pattern prevails when we control for use of contraceptive methods. Among ever users of family planning methods, women with no education have on average 5.7 children ever born, compared to 4.2 for women with primary education and 3.0 for women with secondary or higher levels of education. The Sudan Demographic and Health Survey (SDHS) documents a similar large differential pattern by level of education. Women who had secondary education have on average 3.3 children, compared to 5.9 children for women with no schooling (Department of Statistics 1991).

Family planning and women's education are both weak in Sudan compared to remaining countries in North Africa. Also, in contrast to other countries in North Africa, desired fertility in Sudan is large. The WFS results show that women with no education have the highest desired fertility (Table 5). With seven or more years of schooling desired fertility declines by 1.5 children. Recent results from the Sudan Demographic and Health Survey show high desired fertility. The SDHS main report states that "although fertility in Sudan is low compared with most sub-Saharan countries, the desire for children is strong. One in three married women wants to have another child within two years and the same proportion wants another child in two or more years; only one in four married women wants to stop childbearing. The proportion of women who want no more children increases with family size and age.

The average ideal family size, 5.9 children, exceeds the total fertility rate (5.0) by approximately one child. Older women are more likely to want large families than younger women, and women just beginning their families say they want to have about five children" (Department of Statistics 1991, p. xvii). This phenomenon in Sudan requires more careful investigation and analyses.

Fertility and Family Planning Policies

Fertility and family planning policies are determined, in part, by the government and its understanding of population issues. At the international population conference that was held in Bucharest in 1974 all delegates from countries in North Africa argued for development and were against family planning as a means for resolving population problems. Ten years later, in 1984, the political stand of these governments changed, and in 1994, some countries were in an advanced stage of population policy development. Tunisia and Egypt were the first countries in North Africa to express concern about fertility, set fertility targets and specify measures and plans to achieve them.

The Tunisian government restricted polygamy in 1956, introduced family planning in the early 1960s, and adopted a flexible stand on abortion. These measures were strengthened further through improving women's education and increasing women's participation in modern activities. On the other hand, the official stand of the Egyptian government progressed from skepticism to sureness. During the 1960s and 1970s, population growth and its ramifications were seen as long-term problems undeniably important, but neither pressing nor urgent (Waterbury 1975). Population issues were of secondary importance. This situation has changed considerably in recent years. The government in Egypt has recently supported population and family planning more actively than ever before. Consequently, the use of contraceptive methods increased to about 47% in 1992, 37 percentage points more than in 1960.

Compared to Tunisia and Egypt, fertility and family planning policies in Morocco and Algeria are relatively recent. In Morocco the government started to support family planning in 1968, for women aged 28 years or more with at least four children (Sayed 1993). In Algeria the government did not endorse family planning until 1983, when it ensured that the services should be available to the entire population. Also, the population programs in Sudan and Libya are at infancy. In Sudan there is as yet no clear understanding of the population issues of the country. While some observers express alarm at the rapid rate of population growth, others applaud it as a means to solve what they claim is becoming a severe problem of labor shortage in the agricultural sector. Fertility in Sudan declined primarily because of increasing age at marriage due to increasing school attendance and the migration of males. However, the slow pace of fertility decline is mainly due to low women's education.

MORTALITY

Unlike fertility and family planning, mortality involves fewer controversial issues, probably because of its lower sensitivity to cultural and religious factors. However, in pure development terms, health and mortality are part of social welfare programs. They are closely linked to social development and the quality of life. Social development activities and services often are organized by place of residence. Rural residents have poor health and higher mortality levels primarily because of a lack of medical services and a poor health environment. Also, mortality is directly linked to the disease environment. Many diseases, such as malaria and tuberculosis, are influenced by ecological zones and local climate conditions. Environmental hazards at global and local levels, such as ozone layer depletion and air pollution, may also directly affect health and mortality. Therefore, mortality and health are more likely to be sensitive to environmental degradation than fertility (Lutz 1994). These aspects, together, are very important to consider when thinking about the role of mortality in future population trends.

Mortality Patterns and Differentials

Death rates are usually higher at infancy and old age than in the prime age groups. As in other regions, age specific mortality rates in North Africa diminish rapidly to age 4, then slowly to ages 5-9 (See Appendix A). Thereafter, mortality stays at a very low level to age group 45-49. After that the level increases at an accelerating rate. Mortality rates are very low, usually below 10 per 1000 population, for children 5-9 and 10-14 years and for adults 15-49 years of age. By contrast, starting approximately from age group 50-54 for males and 55-59 for females, mortality rates increase to levels above 10 per 1000 population. Thereafter the rates increase to large two digits in the age groups to 70-74 and three digits, in most cases exceeding the rate at infancy, for the open-end age intervals (75+ and 80+).

Infants are a special group highly vulnerable to the risk of death, because newborn babies are fragile and totally dependent on others for support to survive. Infant mortality is a very sensitive indicator of social development. As the standard of living goes up, so does the average level of health, and the health of babies improves faster and earlier than adults (Weeks 1994). Infant mortality was high and slowly declining in all countries in North Africa during the 1950s and 1960s. It declined more rapidly during the 1970s and 1980s (Table 6). The trend of the infant mortality rate shows a rapid downward pattern (Figure 4, Panel 4).

Table 6. Infant mortality rates. Source: UNECA 1992, Table 13.

Period	Algeria	Egypt	Libya	Morocco	Sudan	Tunisia
1950-1955	185	200	185	180	185	175
1955-1960	175	183	170	170	170	163
1960-1965	160	175	150	155	150	155
1965-1970	150	170	130	138	130	138
1970-1975	132	150	117	122	110	120
1975-1980	112	131	107	110	97	88
1980-1985	88	115	97	97	92	71
1985-1990	67	81	82	82	85	49
1990-1995*	55	67	68	68	78	43

* UN Population Division estimates for 1990-95 (The 1994 Revision) median variant projections.

Another population group at high risk of death are women during pregnancy and child birth. In 1986 the WHO estimated maternal mortality in Africa to be at a rate of 640 per 100,000 live births. Maternal mortality is considered a major public health issue in all countries in North Africa, particularly in rural areas where pregnancy is more frequent. Recent studies (Makhlouf et al. 1994) indicate that the rate of maternal mortality in Egypt was high during the 1960s and 1970s, and declined to 320 per 100,000 live births in 1986 and to 266 in 1991. The same rate was 332 in Morocco in 1992 and 552 in Sudan in the period 1983-89. With increasing age at marriage and increased use of contraceptive methods, maternal mortality is likely to decline to low levels in the future.

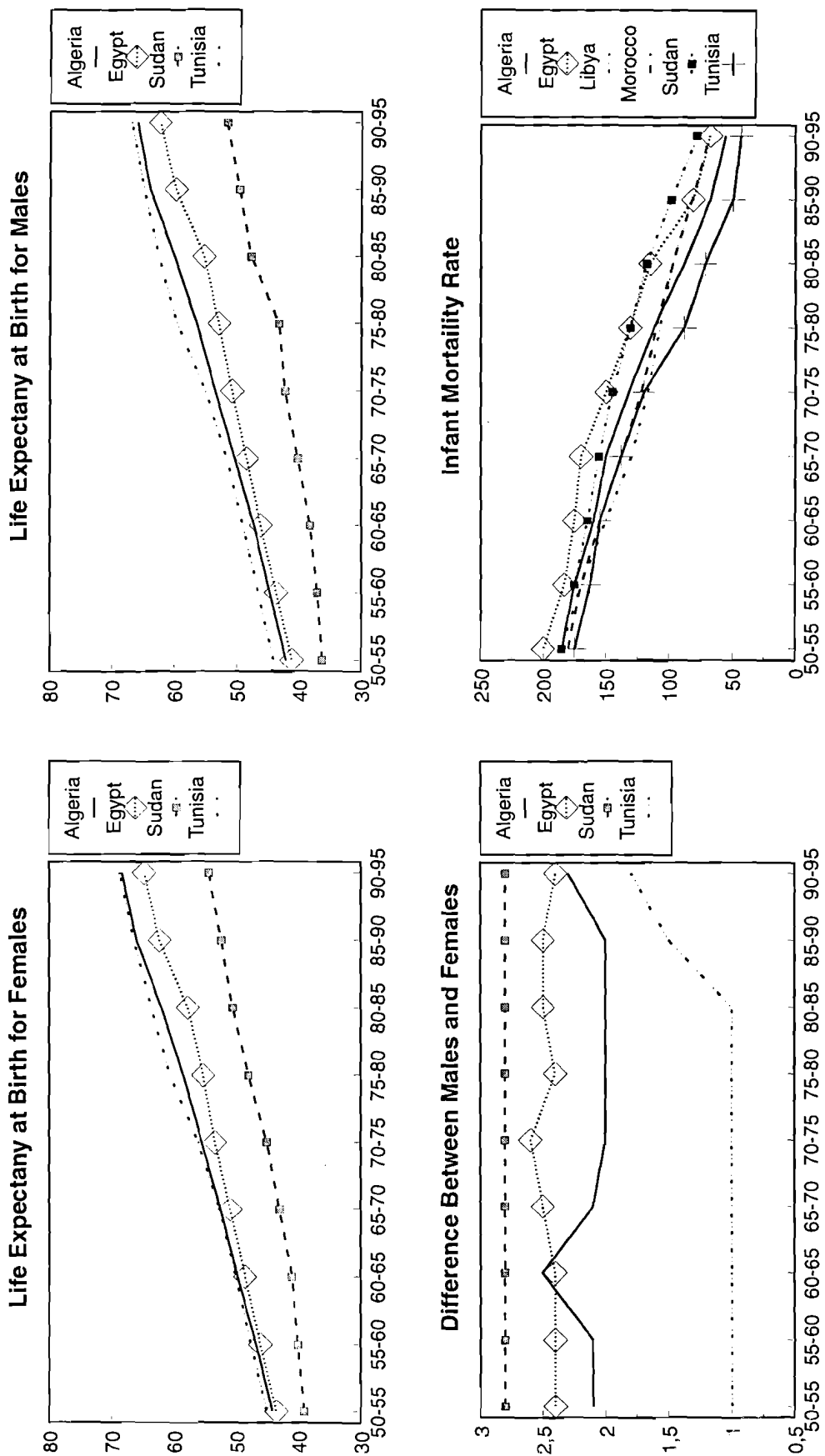


Figure 4. Trend in life expectancy at birth and infant mortality rate.

Gender differences in mortality are well established worldwide. Generally, women live longer than men primarily because of biological and social factors. Higher rate of heart disease for men, combined with men's higher risk behaviors, account for most of the difference in the gender gap (Weeks 1994). Data from North Africa show very low differences in life expectancy at birth by sex. These are shown in Table 7, and the difference over the period between 1950-1990 is depicted in Figure 4. Gender difference is almost constant in the range of 1 to 2.8 years for the entire period 1950-1990. Appendix life tables calculated by this author (Appendix A) show similar low sex differences in life expectancy at birth except for Sudan, where women outlived men by about 3 years. Gender difference in life expectancy at birth in Egypt indicates that women outlived men by about 6 years during the period between 1936 and 1949, and about 2.5 years during the 1950s, 1960s, 1970s, and 1980s. More recently this difference increased to 3.4 years in 1991. Egypt is the only country in North Africa for which gender mortality by place of residence (urban/rural) is available. Gender difference in life expectancy at birth for urban areas was 2.3 years in 1976. It increased to about 3 years in 1986. By contrast, the difference in rural areas was about 3.1 in 1976 and declined to 2.3 in 1986. These differences suggest that the gender gap is widening in urban areas and narrowing in rural ones.

Table 7. Life expectancy at birth by sex. Source: UN 1993, Table 7.

Period	Algeria		Egypt		Libya		Morocco		Sudan		Tunisia	
	F	M	F	M	F	M	F	M	F	M	F	M
1950-1955	44.2	42.1	43.6	41.2	43.9	41.9	43.9	41.9	39.1	36.3	45.1	44.1
1955-1960	46.8	44.7	46.1	43.7	46.6	44.3	46.6	44.3	40.1	37.3	47.6	46.6
1960-1965	49.8	47.3	48.6	46.2	49.2	46.7	49.2	46.7	41.1	38.3	50.1	49.1
1965-1970	52.5	50.4	51.0	48.5	51.8	49.0	51.8	49.0	43.1	40.3	52.6	51.6
1970-1975	55.5	53.5	53.4	50.8	54.5	51.4	54.5	51.4	45.1	42.3	56.1	55.1
1975-1980	58.5	56.5	55.3	52.9	57.5	54.1	57.5	54.1	48.1	45.3	60.6	59.6
1980-1985	62.0	60.0	57.8	55.3	60.0	56.6	60.0	56.6	50.6	47.8	63.6	62.6
1985-1990	66.0	64.0	62.3	59.8	62.5	59.1	62.5	59.1	52.4	49.6	66.4	64.9
1990-1995*	68.3	66.0	64.8	62.4	65.0	61.6	65.0	61.6	54.4	51.6	68.7	66.9

* UN Population Division estimates for 1990-95 (The 1994 Revision) median variant projections.

Mortality in North Africa has improved quite rapidly in the last three decades (Tables 6 and 7). The most rapid decline has been in the four Maghreb countries (Algeria, Libya, Morocco, Tunisia). During the period 1950-55 to 1990-95, life expectancy at birth for females increased by about 24.1 years for Algeria and 23.6 years for Tunisia, compared to 23.9 and 22.8 for males in the same countries, respectively. In Egypt, life expectancy at birth increased by 6.9 years for males and females for the period between 1976 and 1986 (See Appendix A). Thereafter (1986-1991), females gained slightly more years of life than males. By improving women's status, increasing women's education, spreading family planning, and declining fertility rates, women's life expectancy is likely to improve more.

Mortality improvement in Egypt between 1976 and 1986 was greater for the rural than the urban population. Life expectancy at birth increased by 8.2 and 7.4 years for rural males and females, and by 5.0 and 5.8 for their urban counterparts, respectively (See Appendix A). The gain in years of life is higher in rural than urban areas; three years more than the gains achieved during the same period by men and women in urban areas. It might be true that cities are unhealthy to live in. Proximity of rural areas to urban centers may facilitate access of rural inhabitants to modern health facilities. It is

possible that these improvements in mortality are distorted somewhat by misclassification of death events by place of occurrence and place of usual residence.

Mortality in Sudan has declined slowly, but its level still is high. Life expectancy at birth improved by about 7.3 years for males and females in the period 1970-75 to 1985-90. In view of the fact that infectious diseases, particularly malaria, are still widespread, the small decline in mortality in Sudan is not unexpected. Health development in Sudan is hampered by internal war, famine and drought. Political and social development efforts for a considerable period of time are needed to repair the damage caused by three decades of civil war and frequent famines and droughts.

FUTURE DEMOGRAPHIC PROSPECTS

The six countries in North Africa provide an example of moderate and slow demographic development. One important aspect of this demographic pattern is that fertility was sustained at a high level for about two decades. This undoubtedly will shape the demographic situation for several years to come. In the first place, high fertility produced a young age structure which is often associated with high momentum of population growth. Potential mothers for several decades to come have already been born. Therefore, the recent decline in fertility in the countries in North Africa will not have its full demographic impact for several years. Also, with sustained high fertility, the age composition of the population will be dominated by those 15 years or younger. The social consequences of a young age structure are inevitable, particularly the pressure on services and the increasing demand for education.

On the other hand, mortality decline in each of the countries in North Africa is impressive. All governments in this region implemented maternal and child health programs based on simple and low cost health technology. For example, immunization and oral rehydration therapy became widespread. The demographic impact of these health programs have not yet been fully assessed. However, they are likely to lead to substantial decline in infant and child mortality. Infant mortality may decline further to a level below 20 deaths per 1000 live births in Tunisia and Egypt, and below 40 in Morocco, Algeria, Libya, and the Sudan.

Another aspect of change in North Africa is the widening rural urban demographic differences. Basically there are two demographic regimes in each country: a rural high fertility regime and an urban low fertility regime. In both regimes mortality is declining. The use of contraceptive methods is substantially higher in the urban regime as compared to the rural. It is in rural areas where the greatest demographic challenge for governments in North Africa lies. Egypt provides a good example where the government has set a national goal of achieving 2 children per couple by the year 2015. Fertility has been projected to decline from 3.9 in 1992 to 2.9 in 2005 to 2.1 in 2015 (Khalifa 1994). To achieve replacement fertility, the use of contraceptive methods is targeted to reach a high level of about 74%. However, the main challenge for realizing these national goals lies in rural areas, particularly in upper Egypt, where fertility is high and the potential for decline is the greatest.

With differences in environment, social, and economic development, and varying political support of national population programs and activities, demographic change in these countries is bound to take a more divergent course than ever before. There are two powerful forces of demographic change in North Africa. On the one hand, there is social development and increasing government support of women's education, population and family planning programs. On the other hand, there are political, religious and cultural barriers to fertility decline. These forces, when viewed together, provide considerable uncertainties about future population trends. The degree of uncertainty varies from country to country, and within each country, from rural to urban areas. The downward trend in fertility in urban areas is irreversible, particularly in Egypt, Tunisia, and Morocco. In the 1980s Tunisia's population

targets were to reach an annual growth rate of 1.8% by 2001 and 1.1% by 2021 primarily through more use of contraceptive methods and a social program of better education and improving status of women (Sayed 1993). Fertility in Tunisia is likely to reach replacement level before any other country in the region.

Future population trends are associated with substantial uncertainties in Algeria, Libya, and the Sudan. With spreading pronatalistic views and programs, fertility in Algeria and Sudan may increase, particularly in rural areas. This is one extreme scenario which is not unusual in the Arab countries. For example, fertility in Egypt increased in the late 1970s and mid-1980s before it declined in the late 1980s. Another possible scenario for fertility in these countries is to follow a downward pattern in response to social development, increasing women's education, and the greater use of contraceptive methods. However, replacement fertility is very difficult to achieve, particularly in rural areas. In Libya, the all time high fertility level is unlikely to continue for long in the future. The changing Libyan economy, urbanization, improving women status, education and social change are likely to bring about a moderate decline in fertility.

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APPENDIX A: Life Tables for Countries in North Africa

Algeria Males 1982				Algeria Females 1982				k0 = 0.30428773 k1 = 1.33964646								
Age	MX	qx	PX	IX	LX	TX	ex	Age	MX	qx	PX	IX	LX	TX	ex	
<1	105.10	0.100	0.900	100000	93310	5967149	59.67	<1	95.40	0.091	0.909	100000	93665	6256994	62.57	
1-4	12.50	0.049	0.951	90015	347940	5873839	65.25	1-4	12.80	0.050	0.950	90894	351506	6163329	67.81	
5-9	1.90	0.009	0.991	85624	425892	5525899	64.54	5-9	2.00	0.010	0.990	86357	429421	5811824	67.30	
10-14	1.20	0.006	0.994	84814	422833	5100006	60.13	10-14	1.20	0.006	0.994	85497	426260	5382403	62.95	
15-19	1.80	0.009	0.991	84307	419721	4677153	55.48	15-19	1.80	0.009	0.991	84986	423102	4956143	58.32	
20-24	2.90	0.014	0.986	83551	414871	4257432	50.96	20-24	2.50	0.012	0.988	84225	418612	4533041	53.82	
25-29	3.00	0.015	0.985	82349	408801	3842561	46.66	25-29	2.90	0.014	0.986	83178	413018	4114429	49.47	
30-34	4.00	0.020	0.980	81123	401758	3433760	42.33	30-34	3.30	0.016	0.984	81981	406684	3701412	45.15	
35-39	6.10	0.030	0.970	79516	391848	3032003	38.13	35-39	4.40	0.022	0.978	80639	398985	3294727	40.86	
40-44	7.10	0.035	0.965	77127	379181	2640154	34.23	40-44	4.60	0.023	0.977	78884	390118	2895742	36.71	
45-49	8.10	0.040	0.960	74437	365094	2260974	30.37	45-49	5.00	0.025	0.975	77091	380886	2505625	32.50	
50-54	11.30	0.055	0.945	71482	347985	1895880	26.52	50-54	7.00	0.034	0.966	75187	369729	2124739	28.26	
55-59	16.70	0.080	0.920	67555	324777	1547895	22.91	55-59	10.60	0.052	0.948	72601	354009	1755010	24.17	
60-64	23.20	0.110	0.890	62140	294348	1223118	19.68	60-64	16.50	0.079	0.921	68852	331170	1401001	20.35	
65-69	34.00	0.157	0.843	55327	255829	928770	16.79	65-69	27.50	0.129	0.871	63397	297411	1069831	16.88	
70-74	43.10	0.195	0.805	46658	211506	672941	14.42	70-74	38.80	0.177	0.823	55241	252758	772421	13.98	
75-79	67.90	0.290	0.710	37581	161729	461436	12.28	75-79	64.20	0.277	0.723	45472	197172	519662	11.43	
80+	89.00	0.364	0.636	26674	299707	299707	11.24	80+	102.00	0.406	0.594	32894	322490	322490	9.80	
Algeria Males 1989																
Age	qx	PX	IX	LX	TX	ex	Age	qx	PX	IX	LX	TX	ex			
<1	0.062	0.938	100000	93810	6613470	66.13	<1	0.055	0.945	100000	95658	6648151	66.48			
1-4	0.010	0.991	93810	372982	6519660	69.50	1-4	0.010	0.990	94460	375343	6552493	69.37			
5-9	0.007	0.994	92919	463084	6146678	66.15	5-9	0.007	0.993	93487	465799	6177150	66.07			
10-14	0.006	0.994	92315	460189	5683594	61.57	10-14	0.005	0.995	92833	463003	5711351	61.52			
15-19	0.007	0.993	91761	457199	5223405	56.92	15-19	0.006	0.995	92368	460572	5248348	56.82			
20-24	0.007	0.993	91119	454044	4766206	52.31	20-24	0.006	0.994	91860	457924	4787776	52.12			
25-29	0.008	0.992	90499	450753	4312162	47.65	25-29	0.008	0.993	91309	454834	4329852	47.42			
30-34	0.009	0.992	89802	447102	3861409	43.00	30-34	0.010	0.991	90624	450970	3875018	42.76			
35-39	0.011	0.989	89039	442650	3414307	38.35	35-39	0.013	0.987	89764	445923	3424048	38.15			
40-44	0.014	0.986	88024	436950	2971657	33.76	40-44	0.016	0.984	88606	439395	2978125	33.61			
45-49	0.019	0.981	86756	429704	2534707	29.22	45-49	0.019	0.981	87152	431666	2538730	29.13			
50-54	0.028	0.972	85125	419646	2105003	24.73	50-54	0.028	0.972	85514	421563	2107064	24.64			
55-59	0.047	0.953	82733	403965	1685357	20.37	55-59	0.046	0.954	83111	406018	1685501	20.28			
60-64	0.064	0.936	78853	381566	1281392	16.25	60-64	0.054	0.946	79296	385852	1279483	16.14			
65-69	0.129	0.871	73773	345056	899826	12.20	65-69	0.141	0.859	75044	348806	893631	11.91			
70-74	0.189	0.811	64249	290920	554770	8.63	70-74	0.195	0.805	64478	290990	544825	8.45			
75-79	0.276	0.724	52119	224633	263850	5.06	75-79	0.305	0.695	51918	220015	253835	4.89			
80+	1.000	0.000	37734	39217	39217	1.04	80+	1.000	0.000	36088	33820	33820	0.94			

Source: National Board of Statistics (1991) Statistical Yearbook of Algeria No 15

Egypt Males 1976										Egypt Females 1976									
Age	Mx	qx	Px	Ix	Lx	Tx	ex	Age	Mx	qx	Px	Ix	Lx	Tx	ex				
<1	172.50	0.159	0.841	100000	89360	5131283	51.31	<1	173.2	0.159	0.841	100000	89639	5410850	54.11				
1-4	15.60	0.061	0.939	84120	322430	5041923	59.94	1-4	19.1	0.074	0.926	84060	319162	5321211	63.30				
5-9	2.10	0.010	0.990	79029	392877	4719493	59.72	5-9	1.7	0.008	0.992	77874	387560	5002049	64.23				
10-14	1.90	0.009	0.991	78204	389245	4326616	55.32	10-14	1.3	0.006	0.994	77215	384876	4614489	59.76				
15-19	2.00	0.010	0.990	77465	385473	3937371	50.83	15-19	1.5	0.007	0.993	76715	382200	4229613	55.13				
20-24	2.70	0.013	0.987	76694	381000	3551898	46.31	20-24	1.5	0.007	0.993	76142	379344	3847414	50.53				
25-29	3.20	0.016	0.984	75665	375444	3170898	41.91	25-29	2.1	0.010	0.990	75573	375970	3468070	45.89				
30-34	3.20	0.016	0.984	74464	369485	2795454	37.54	30-34	2.1	0.010	0.990	74784	372043	3092100	41.35				
35-39	4.60	0.023	0.977	73282	362412	2425969	33.10	35-39	2.8	0.014	0.986	74002	367543	2720057	36.76				
40-44	5.80	0.029	0.971	71616	353167	2063557	28.81	40-44	2.8	0.014	0.986	72974	362433	2352514	32.24				
45-49	9.80	0.048	0.952	69569	339858	1710390	24.59	45-49	5.1	0.025	0.975	71959	355447	1990081	27.66				
50-54	14.90	0.072	0.928	66241	319789	1370532	20.69	50-54	7.3	0.036	0.964	70147	344701	1634634	23.30				
55-59	23.10	0.109	0.891	61484	291306	1050743	17.09	55-59	11.7	0.057	0.943	67633	328938	1289933	19.07				
60-64	29.70	0.138	0.862	54770	255679	759438	13.87	60-64	15.7	0.076	0.924	63789	307379	960995	15.07				
65-69	58.30	0.254	0.746	47199	207174	503759	10.67	65-69	38.8	0.177	0.823	58970	269823	653616	11.08				
70-74	73.70	0.311	0.689	35191	149673	296584	8.43	70-74	49.5	0.220	0.780	48542	217050	383793	7.91				
75+	165.00	0.584	0.416	24240	146912	146912	6.06	75+	227	0.724	0.276	37851	166743	166743	4.41				
Egypt Males 1986										Egypt Females 1986									
Age	Mx	qx	Px	Ix	Lx	Tx	ex	Age	Mx	qx	Px	Ix	Lx	Tx	ex				
<1	98.80	0.094	0.906	100000	93534	5822173	58.22	<1	91.3	0.087	0.913	100000	93992	6098665	60.99				
1-4	7.00	0.028	0.972	90585	355663	5728640	63.24	1-4	7.6	0.030	0.970	91269	357818	6004672	65.79				
5-9	1.70	0.008	0.992	88084	438368	5372977	61.00	5-9	1.5	0.007	0.993	88536	440859	5646854	63.78				
10-14	1.10	0.005	0.995	87338	435541	4934609	56.50	10-14	0.9	0.004	0.996	87874	438423	5205996	59.24				
15-19	1.40	0.007	0.993	86859	432842	4499068	51.80	15-19	1.1	0.005	0.995	87479	436246	4767573	54.50				
20-24	2.00	0.010	0.990	86253	429206	4066226	47.14	20-24	1.3	0.006	0.994	87000	433646	4331327	49.79				
25-29	2.40	0.012	0.988	85395	424530	3637019	42.59	25-29	1.7	0.008	0.992	86436	430424	3897681	45.09				
30-34	2.90	0.014	0.986	84376	418967	3212489	38.07	30-34	2	0.010	0.990	85704	426475	3467257	40.46				
35-39	3.60	0.018	0.982	83162	412248	2793522	33.59	35-39	2.7	0.013	0.987	84852	421527	3040782	35.84				
40-44	4.00	0.020	0.980	81678	404509	2381274	29.15	40-44	2.7	0.013	0.987	83714	415875	2619254	31.29				
45-49	7.50	0.037	0.963	80061	393231	1976765	24.69	45-49	5	0.025	0.975	82591	408062	2203379	26.68				
50-54	13.60	0.066	0.934	77114	373398	1583534	20.54	50-54	8.8	0.043	0.957	80552	394437	1795317	22.29				
55-59	26.30	0.123	0.877	72042	338878	1210136	16.80	55-59	17.8	0.085	0.915	77084	369656	1400881	18.17				
60-64	29.70	0.138	0.862	63153	294814	871258	13.80	60-64	19.9	0.095	0.905	70516	336538	1031225	14.62				
65-69	60.70	0.264	0.736	54423	237697	576444	10.59	65-69	51.8	0.229	0.771	63832	284031	694687	10.88				
70-74	73.60	0.311	0.689	40082	170511	338746	8.45	70-74	59.5	0.259	0.741	49195	215398	410656	8.35				
75+	164.20	0.582	0.418	27624	168235	168235	6.09	75+	186.7	0.636	0.364	36455	195258	195258	5.36				

Egypt Urban Males 1976										Egypt Urban Females 1976									
Age	Mx	qx	Px	Ix	Lx	Tx	ex	Sx	Age	Mx	qx	Px	Ix	Lx	Tx	ex			
<1	173.10	0.159	0.841	100000	89326	5284564	52.85	0.831	<1	171.4	0.158	0.842	100000	89738	5515717	55.16			
1-4	11.30	0.044	0.956	84069	326019	5195238	61.80	0.963	1-4	13.3	0.052	0.948	84213	324803	5425978	64.43			
5-9	1.80	0.009	0.991	80353	399785	4869218	60.60	0.992	5-9	1.4	0.007	0.993	79849	397713	5101176	63.89			
10-14	1.60	0.008	0.992	79633	396642	4469434	56.13	0.991	10-14	1.1	0.005	0.995	79292	395416	4703463	59.32			
15-19	2.00	0.010	0.990	78998	393106	4072792	51.56	0.988	15-19	1.6	0.008	0.992	78857	392777	4308047	54.63			
20-24	3.00	0.015	0.985	78212	388267	3679686	47.05	0.985	20-24	1.6	0.008	0.992	78229	389647	3915270	50.05			
25-29	3.20	0.016	0.984	77048	382305	3291419	42.72	0.985	25-29	2.1	0.010	0.990	77605	386081	3525623	45.43			
30-34	2.90	0.014	0.986	75825	376505	2909114	38.37	0.983	30-34	2.2	0.011	0.989	76795	381957	3139542	40.88			
35-39	4.10	0.020	0.980	74733	370027	2532609	33.89	0.977	35-39	3.2	0.016	0.984	75955	376880	2757584	36.31			
40-44	5.20	0.026	0.974	73217	361574	2162582	29.54	0.967	40-44	3.3	0.016	0.984	74749	370809	2380705	31.85			
45-49	8.60	0.042	0.958	71338	349481	1801007	25.25	0.947	45-49	5.5	0.027	0.973	73526	362842	2009896	27.34			
50-54	13.50	0.065	0.935	68335	330965	1451526	21.24	0.918	50-54	7.8	0.038	0.962	71531	351089	1647054	23.03			
55-59	21.20	0.101	0.899	63873	303932	1120561	17.54	0.883	55-59	12.9	0.062	0.938	68795	333657	1295965	18.84			
60-64	29.50	0.137	0.863	57443	268277	816628	14.22	0.815	60-64	17.5	0.084	0.916	64496	309504	962308	14.92			
65-69	55.90	0.245	0.755	49552	218597	548351	11.07	0.729	65-69	44.2	0.199	0.801	59089	267224	652804	11.05			
70-74	72.80	0.308	0.692	37400	159360	329755	8.82	0.517	70-74	55.1	0.242	0.758	47330	209144	385579	8.15			
75+	151.90	0.550	0.450	25883	170394	170394	6.58	0.358	75+	203.3	0.674	0.326	35869	176435	176435	4.92			
Egypt Urban Males 1986										Egypt Urban Females 1986									
Age	Mx	qx	Px	Ix	Lx	Tx	ex	Sx	Age	Mx	qx	Px	Ix	Lx	Tx	ex			
<1	93.00	0.089	0.911	100000	93761	5785720	57.86	0.906	<1	77.5	0.075	0.925	100000	94582	6092416	60.92			
1-4	5.50	0.022	0.978	91113	359191	5691959	62.47	0.979	1-4	5.3	0.021	0.979	92539	365042	5997834	64.81			
5-9	1.70	0.008	0.992	89131	443578	5332768	59.83	0.994	5-9	1.3	0.006	0.994	90598	451375	5632791	62.17			
10-14	1.10	0.005	0.995	88376	440717	4889189	55.32	0.993	10-14	0.8	0.004	0.996	90011	449192	5181416	57.56			
15-19	1.60	0.008	0.992	87891	437776	4448472	50.61	0.990	15-19	1.2	0.006	0.994	89652	446971	4732224	52.78			
20-24	2.30	0.011	0.989	87191	433563	4010696	46.00	0.987	20-24	1.4	0.007	0.993	89115	444084	4285253	48.09			
25-29	2.80	0.014	0.986	86194	428095	3577133	41.50	0.986	25-29	1.9	0.009	0.991	88494	440460	3841169	43.41			
30-34	3.00	0.015	0.985	84996	421942	3149039	37.05	0.983	30-34	2.4	0.012	0.988	87657	435775	3400709	38.80			
35-39	4.10	0.020	0.980	83730	414574	2727097	32.57	0.979	35-39	3.3	0.016	0.984	86611	429655	2964934	34.23			
40-44	4.60	0.023	0.977	82031	405680	2312523	28.19	0.969	40-44	3.4	0.017	0.983	85194	422523	2535279	29.76			
45-49	8.20	0.040	0.960	80166	393100	1906843	23.79	0.944	45-49	6.1	0.030	0.970	83758	412750	2112756	25.22			
50-54	15.40	0.074	0.926	76945	371034	1513743	19.67	0.898	50-54	10.9	0.053	0.947	81242	395863	1700006	20.93			
55-59	28.90	0.135	0.865	71240	333159	1142709	16.04	0.852	55-59	22.3	0.106	0.894	76931	365157	1304143	16.95			
60-64	35.80	0.164	0.836	61640	283893	809550	13.13	0.785	60-64	26.5	0.124	0.876	68806	323511	938986	13.65			
65-69	65.10	0.280	0.720	51512	222953	525657	10.20	0.697	65-69	62.3	0.270	0.730	60256	262304	615474	10.21			
70-74	81.40	0.338	0.662	37092	155355	302704	8.16	0.487	70-74	67.4	0.288	0.712	44016	189612	353171	8.02			
75+	166.60	0.588	0.412	24548	147348	147348	6.00	0.322	75+	191.5	0.648	0.352	31321	163558	163558	5.22			

Egypt Rural Males 1976										Egypt Rural Females 1976										
Sx	Age	Mx	qx	Px	Ix	Lx	Tx	ex		Age	Mx	qx	Px	Ix	Lx	Tx	ex			
					k0 =	0.33								k0 =	0.35					
					k1 =	1.24								k1 =	1.239					
0.829	<1	171.90	0.158	0.842	100000	89394	5035678	50.36		<1	174.8	0.161	0.839	100000	89551	5349266	53.49			
0.959	1-4	18.30	0.071	0.929	84171	320277	4946284	58.77		1-4	22.7	0.087	0.913	83925	315574	5259715	62.67			
0.994	5-9	2.30	0.011	0.989	78227	388674	4626006	59.14		5-9	1.9	0.009	0.991	76636	381185	4944141	64.52			
0.993	10-14	2.00	0.010	0.990	77332	384815	4237332	54.79		10-14	1.4	0.007	0.993	75911	378284	4562956	60.11			
0.992	15-19	1.90	0.009	0.991	76563	381077	3852517	50.32		15-19	1.4	0.007	0.993	75381	375645	4184672	55.51			
0.991	20-24	2.50	0.012	0.988	75839	376934	3471440	45.77		20-24	1.5	0.007	0.993	74856	372935	3809027	50.89			
0.989	25-29	3.10	0.015	0.985	74897	371720	3094507	41.32		25-29	2	0.010	0.990	74296	369707	3436092	46.25			
0.987	30-34	3.50	0.017	0.983	73745	365654	2722787	36.92		30-34	2	0.010	0.990	73557	366028	3066385	41.69			
0.984	35-39	5.00	0.025	0.975	72466	358033	2357133	32.53		35-39	2.6	0.013	0.987	72825	361868	2700357	37.08			
0.979	40-44	6.30	0.031	0.969	70676	348121	1999100	28.29		40-44	2.4	0.012	0.988	71884	357364	2338489	32.53			
0.968	45-49	10.80	0.053	0.947	68484	333780	1650979	24.11		45-49	4.7	0.023	0.977	71027	351176	1981124	27.89			
0.950	50-54	16.10	0.077	0.923	64884	312367	1317198	20.30		50-54	6.9	0.034	0.966	69377	341239	1629949	23.49			
0.928	55-59	24.60	0.116	0.884	59863	282665	1004831	16.79		55-59	10.9	0.053	0.947	67024	326587	1288710	19.23			
0.863	60-64	29.80	0.139	0.861	52926	247016	722166	13.64		60-64	14.6	0.070	0.930	63468	306614	962122	15.16			
0.783	65-69	60.10	0.261	0.739	45587	199351	475150	10.42		65-69	35.8	0.164	0.836	58998	271728	655508	11.11			
0.458	70-74	74.40	0.314	0.686	33677	143035	275799	8.19		70-74	46.4	0.208	0.792	49305	221926	383780	7.78			
0.347	75+	174.10	0.607	0.393	23114	132764	132764	5.74		75+	241.3	0.753	0.247	39055	161854	161854	4.14			
Egypt Rural Males 1986										Egypt Rural Females 1986										
					k0 =	0.3269803								k0 =	0.34630686					
					k1 =	1.31586465								k1 =	1.32630291					
0.919	<1	104.10	0.099	0.901	100000	93340	5859508	58.60		<1	103.9	0.099	0.901	100000	93544	6089448	60.89			
0.982	1-4	8.10	0.032	0.968	90105	352709	5766168	63.99		1-4	9	0.035	0.965	90123	351971	5995904	66.53			
0.995	5-9	1.70	0.008	0.992	87232	434130	5413459	62.06		5-9	1.6	0.008	0.992	86936	432775	5643933	64.92			
0.995	10-14	1.00	0.005	0.995	86494	431434	4979329	57.57		10-14	0.9	0.004	0.996	86243	430287	5211158	60.42			
0.994	15-19	1.20	0.006	0.994	86062	429077	4547895	52.84		15-19	1.1	0.005	0.995	85856	428150	4780871	55.68			
0.992	20-24	1.70	0.008	0.992	85548	426000	4118818	48.15		20-24	1.3	0.006	0.994	85385	425598	4352721	50.98			
0.989	25-29	2.10	0.010	0.990	84824	421991	3692818	43.54		25-29	1.6	0.008	0.992	84832	422538	3927122	46.29			
0.986	30-34	2.70	0.013	0.987	83938	416986	3270826	38.97		30-34	1.8	0.009	0.991	84156	418971	3504585	41.64			
0.983	35-39	3.20	0.016	0.984	82812	410905	2853840	34.46		35-39	2.3	0.011	0.989	83402	414721	3085614	37.00			
0.977	40-44	3.50	0.017	0.983	81498	404094	2442935	29.98		40-44	2.1	0.010	0.990	82448	410175	2670893	32.39			
0.959	45-49	6.90	0.034	0.966	80084	393900	2038841	25.46		45-49	4.1	0.020	0.980	81587	403963	2260718	27.71			
0.922	50-54	12.10	0.059	0.941	77368	375934	1644941	21.26		50-54	7.3	0.036	0.964	79932	392782	1856755	23.23			
0.886	55-59	24.00	0.113	0.887	72824	344335	1269007	17.43		55-59	14.8	0.071	0.929	77066	372133	1463974	19.00			
0.811	60-64	25.20	0.119	0.881	64580	304529	924671	14.32		60-64	15.8	0.076	0.924	71567	344781	1091840	15.26			
0.723	65-69	57.20	0.250	0.750	56925	250441	620142	10.89		65-69	45.9	0.206	0.794	66128	297966	747059	11.30			
0.463	70-74	68.20	0.291	0.709	42681	183565	369701	8.66		70-74	55	0.242	0.758	52514	232100	449093	8.55			
0.350	75+	162.50	0.578	0.422	30247	186136	186136	6.15		75+	183.5	0.629	0.371	39818	216993	216993	5.45			

Tunisia Males 1985				Tunisia Females 1985				Morocco Males 1972				Morocco Females 1972			
Age	Mx	qx	Px	IX	Lx	Tx	ex	Age	Mx	qx	Px	IX	Lx	Tx	ex
<1	66.70	0.06	0.935	100000	95017	6638553	66.39	<1	59.30	0.06	0.942	100000	95524	68222149	68.22
1-4	4.70	0.019	0.981	93545	369685	6543536	69.95	1-4	4.70	0.019	0.981	94241	372388	6726625	71.38
5-9	1.00	0.005	0.995	91803	457756	6173851	67.25	5-9	1.00	0.005	0.995	92486	461159	6354237	68.71
10-14	0.70	0.003	0.997	91345	455960	5716095	62.58	10-14	0.60	0.003	0.997	92024	459460	5893078	64.04
15-19	1.10	0.005	0.995	91026	453932	5260135	57.79	15-19	0.80	0.004	0.996	91749	457864	5433618	59.22
20-24	1.60	0.008	0.992	90527	450902	4806204	53.09	20-24	1.20	0.006	0.994	91382	455600	4975755	54.45
25-29	2.10	0.010	0.990	89805	446776	4355301	48.50	25-29	1.50	0.007	0.993	90836	452549	4520155	49.76
30-34	2.10	0.010	0.990	88867	442109	3908526	43.98	30-34	2.10	0.010	0.990	90157	448525	4067605	45.12
35-39	2.50	0.012	0.988	87939	437074	3466417	39.42	35-39	2.30	0.011	0.989	89215	443628	3619081	40.57
40-44	3.20	0.016	0.984	86847	430925	3029343	34.88	40-44	2.70	0.013	0.987	88195	438137	3175453	36.00
45-49	5.10	0.025	0.975	85468	422176	2598418	30.40	45-49	3.80	0.019	0.981	87012	431132	2737315	31.46
50-54	7.10	0.035	0.965	83316	409606	2176242	26.12	50-54	5.30	0.026	0.974	85375	421515	2306183	27.01
55-59	10.90	0.053	0.947	80410	391812	1766636	21.97	55-59	8.00	0.039	0.961	83142	407885	1884668	22.67
60-64	17.50	0.084	0.916	76144	365400	1374824	18.06	60-64	14.20	0.069	0.931	79882	386262	1476783	18.49
65-69	28.40	0.133	0.867	69761	326605	1009424	14.47	65-69	25.60	0.120	0.880	74404	350540	1090521	14.66
70-74	50.20	0.223	0.777	60511	270169	682820	11.28	70-74	48.20	0.215	0.785	65453	293480	739981	11.31
75-79	99.40	0.398	0.602	47017	190164	412651	8.78	75-79	112.30	0.438	0.562	51376	202821	446501	8.69
80+	127.20	0.483	0.517	28300	222487	222487	7.86	80+	118.40	0.457	0.543	28852	243680	243680	8.45
Morocco Males 1972				Morocco Females 1972											
Age	Mx	qx	Px	IX	Lx	Tx	ex	Age	Mx	qx	Px	IX	Lx	Tx	ex
<1	142.70	0.13	0.867	100000	91076	5146704	51.47	<1	123.60	0.12	0.884	100000	92201	5267759	52.68
1-4	22.90	0.088	0.912	86680	325767	5055628	58.32	1-4	21.20	0.081	0.919	88359	333598	5175558	58.57
5-9	2.70	0.013	0.987	79088	392524	4729861	59.80	5-9	2.80	0.014	0.986	81171	402753	4841959	59.65
10-14	2.00	0.010	0.990	78028	388275	4337336	55.59	10-14	2.10	0.010	0.990	80043	398207	4439206	55.46
15-19	3.20	0.016	0.984	77251	383313	3949062	51.12	15-19	3.50	0.017	0.983	79207	392736	4040999	51.02
20-24	3.50	0.017	0.983	76025	376960	3565748	46.90	20-24	3.90	0.019	0.981	77833	385556	3648263	46.87
25-29	3.80	0.019	0.981	74706	370156	3188789	42.68	25-29	4.60	0.023	0.977	76330	377482	3262707	42.75
30-34	4.10	0.020	0.980	73300	362931	2818632	38.45	30-34	5.90	0.029	0.971	74594	367765	2885225	38.68
35-39	4.90	0.024	0.976	71813	354892	2455702	34.20	35-39	7.30	0.036	0.964	72425	355896	2517460	34.76
40-44	6.80	0.033	0.967	70075	344750	2100810	29.98	40-44	8.90	0.044	0.956	69829	341851	2161564	30.95
45-49	10.00	0.049	0.951	67732	330730	1756060	25.93	45-49	10.10	0.049	0.951	66789	326052	1819713	27.25
50-54	15.10	0.073	0.927	64428	310890	1425330	22.12	50-54	11.90	0.058	0.942	63500	308693	1493661	23.52
55-59	20.70	0.098	0.902	59740	284593	1114441	18.65	55-59	16.00	0.077	0.923	59831	288107	1184968	19.81
60-64	29.90	0.139	0.861	53862	251326	829848	15.41	60-64	23.50	0.111	0.889	55228	261431	896861	16.24
65-69	40.00	0.182	0.818	46369	211613	578521	12.48	65-69	36.60	0.168	0.832	49099	225739	635430	12.94
70-74	63.10	0.273	0.727	37939	164880	366908	9.67	70-74	58.60	0.256	0.744	40867	179270	409691	10.02
75-79	99.10	0.397	0.603	27600	111695	202029	7.32	75-79	93.50	0.379	0.621	30423	124448	230421	7.57
80+	184.20	0.631	0.369	16640	90334	90334	5.43	80+	178.30	0.617	0.383	18895	105973	105973	5.61

Source: UNECA (1992) Demographic Handbook for Africa

Sudan Males 1993						Sudan Females 1993									
Age	MX	qx	PX	IX	LX	TX	ex	Age	MX	qx	PX	IX	LX	TX	ex
				k0 =	0.33							k0 =	0.33		
				k1 =	1.24							k1 =	1.24		
<1	132.76	0.124	0.876	100000	91659	4989015	49.89	<1	110.52	0.105	0.895	100000	92983	5291448	52.91
1-4	15.15	0.059	0.941	87550	335989	4897356	55.94	1-4	15.03	0.058	0.942	89527	343685	5198465	58.07
5-9	3.56	0.018	0.982	82401	408006	4561367	55.36	5-9	3.60	0.018	0.982	84301	417372	4854779	57.59
10-14	2.60	0.013	0.987	80947	402226	4153361	51.31	10-14	2.78	0.014	0.986	82798	411245	4437408	53.59
15-19	3.89	0.019	0.981	79902	395814	3751135	46.95	15-19	3.96	0.020	0.980	81655	404431	4026163	49.31
20-24	5.54	0.027	0.973	78362	386674	3355321	42.82	20-24	5.15	0.025	0.975	80054	395384	3621732	45.24
25-29	6.05	0.030	0.970	76221	375656	2968647	38.95	25-29	5.87	0.029	0.971	78019	384677	3226348	41.35
30-34	6.93	0.034	0.966	73950	363706	2592991	35.06	30-34	6.64	0.033	0.967	75762	372871	2841671	37.51
35-39	8.32	0.041	0.959	71431	350171	2229285	31.21	35-39	7.48	0.037	0.963	73288	359980	2468800	33.69
40-44	10.47	0.051	0.949	68520	334213	1879115	27.42	40-44	8.48	0.042	0.958	70597	345950	2108820	29.87
45-49	13.33	0.065	0.935	65025	315058	1544902	23.76	45-49	10.03	0.049	0.951	67666	330384	1762870	26.05
50-54	18.17	0.087	0.913	60831	291466	1229844	20.22	50-54	13.60	0.066	0.934	64355	311619	1432486	22.26
55-59	24.83	0.117	0.883	55544	262139	938377	16.89	55-59	18.50	0.088	0.912	60123	287858	1120866	18.64
60-64	36.06	0.165	0.835	49052	225788	676238	13.79	60-64	27.95	0.131	0.869	54808	256856	833008	15.20
65-69	52.07	0.230	0.770	40939	182061	450451	11.00	65-69	41.41	0.188	0.812	47648	216786	576152	12.09
70-74	77.40	0.324	0.676	31508	133021	268390	8.52	70-74	65.01	0.280	0.720	38708	167566	359366	9.28
75-79	116.79	0.452	0.548	21291	83361	135369	6.36	75-79	101.00	0.403	0.597	27885	112443	191800	6.88
80+	224.35	0.719	0.281	11668	52008	52008	4.46	80+	209.71	0.688	0.312	16642	79358	79358	4.77