Egypt's Population Program: Assessing 25 Years of Family Planning

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Acknowledgments

Executive Summary

This report reviews the progress made to date under Egypt's family planning (FP) program and estimates the benefits that have already been realized. It documents the effects of the FP program on Egypt's demographic transition through a review of the country's major demographic indicators. To estimate the benefits realized, a scenario of a less successful FP program was created and compared with the cumulative public sector savings achieved as a result of Egypt's actual FP program for the period of 1980–2005. The health benefits for children and mothers were also analyzed.

Overall, Egypt's demography in the last century has followed a classic transition from high fertility and mortality to lower fertility and mortality. The total fertility rate fell from 5.6 in 1976 to 3.1 in 2005; it is clear that increases in FP use have been a significant factor in this decline. During that same time period, the contraceptive prevalence rate increased from 18.9 percent to 59 percent, and data show this trend was largely accomplished by an increased number of service delivery outlets. For example, the number of FP clinics in the public and NGO sectors rose from 3,862 in 1981 to 6,005 in mid-2005—an increase of more than 50 percent. Resources allocated to family planning have also been on the rise, increasing by approximately 400 percent from 1989 to 2003. In 2004, Egypt's crude birth rate (CBR) was 25.6, with a crude death rate (CDR) of 6.4.

The benefits of the FP program to date have been substantial, resulting in
- a population that is smaller by 12 million (nearly the size of Cairo);
- a more favorable age distribution, with 10 million fewer young people (not old enough to work);
- a lower infant mortality rate, resulting in more than 3 million fewer infant deaths during the last 25 years;
- a lower under-5 child mortality rate, resulting in about 6 million fewer early-childhood deaths during the last 25 years; and
- fewer maternal deaths, with 17,000 mothers' lives saved over the last 25 years.

The savings gained through the above results and a highly cost-effective FP program have led to additional broader benefits. The LE 2,402 million spent on family planning between 1980 and 2005 was more than offset by the LE 45,838 million estimated cost savings in child health, education, and food subsidies. These cost savings have allowed Egypt to maintain and improve the quality of public services in these sectors and ultimately the quality of life of Egyptians. Undoubtedly, as other studies have shown, other sectors, such as general health, housing, employment, and the economy, have also benefited from the FP program.

With an expected decline in donor funding for family planning in the near future, it is clear that Egypt would be wise to maintain the program at current and even higher levels by allocating funds to replace those expected to be reduced by international donors.

ملخص تنفيذي

يستعرض هذا التقرير النتائج التي حققها البرنامج القومي لتنظيم الأسرة طوال فترة الخمسة وعشرون سنة الماضية (1980 – 2005)، وذلك من خلال السعي لتقدير العائدات التي تم الوصول إليها، والعمل على توثيق انعكاسات برنامج تنظيم الأسرة على التحول الديموجرافى لمصر عن طريق مراجعة المؤشرات الديموجرافية الأساسية للدولة. وقد تطلب تقدير هذه العائدات المحققة، تبنى "سيناريو" يقوم على افتراض مستويات أقل لنجاحات برنامج تنظيم الأسرة وبالتالي مقارنة التكلفة الإضافية المطلوبة لأعداد السكان المقدرة في هذه الحالة، مع الوفورات التراكمية للإنفاق الحكومي التي أمكن تحقيقها نتيجة لإنجازات البرنامج الفعلي لتنظيم الأسرة في مصر، خلال الفترة الزمنية التي تغطيها الدراسة.

وبصفة عامة، فان دراسة التطور الديموجرافى لمصر خلال القرن الماضي تشير بوضوح إلى أنه يعكس النمط التقليدي للتحول نحو المستويات المنخفضة للإنجاب والوفيات بدلا من القيم المرتفعة المشاهدة في البداية. وفى الفترة الأخيرة، انخفض معدل الإنجاب الكلى (متوسط عدد الأطفال لكل سيدة) من 5,6 طفل في عام 1976 إلى 3,1 طفل في عام2005 ، وهو ما يرجع بصورة أساسية إلى الزيادة الكبيرة في نسبة مستخدمي وسائل تنظيم الأسرة. وتوضح البيانات أنه خلال نفس الفترة الزمنية، ارتفعت نسبة ممارسة تنظيم الأسرة، بين النساء المتزوجات في سن الإنجاب، من 18,9% إلى 59,0% في عام 2005 ، وذلك نتيجة مباشرة للزيادة الواضحة في أعداد وحدات تقديم الخدمة. وعلى سبيل المثال، فقد زادت أعداد وحدات تقديم خدمات تنظيم الأسرة، في القطاعين الحكومي وغير الحكومي، من 3862 في عام 1981 إلى 6005 في منتصف عام 2005، وهو ما يشير إلى زيادة تتعدى 50 %. وفى نفس الوقت، ارتفعت المخصصات المالية لتنظيم الأسرة بحوالى 400%، خلال الفترة من 1989 إلى 2003. ويقدر معدل المواليد الاجمالى لمصر، في عام 2004، بحوالى 25,6 لكل ألف من السكان بينما تصل قيمة معدل الوفيات الاجمالى إلى حوالي 6,4 لكل ألف من السكان.

وتعكس النتائج التالية التي رصدتها الدراسة، أهمية وضخامة العائدات التي حققها البرنامج القومي لتنظيم الأسرة خلال الفترة 2005-1980 ، والتي يمكن إيجازها فيما يلي:

- تناقص الزيادة في أعدد السكان، خلال الفترة، بحوالي 12 مليون نسمة (تساوى تقريبا عدد سكان القاهرة) ،
- توزيع عمري للسكان أكثر ملائمة، حيث تقل أعدادهم في الفئات العمرية الصغيرة، أقل من 15 سنة، بحوالي 10 مليون نسمة (ولكنهم مازالوا خارج قوة العمل)،
- معدلات أقل لوفيات الرضع، مما أسفر عن انخفاض أعداد الوفيات في السنة الأولى من العمر، بحوالي 3 مليون نسمة خلال الخمسة وعشرون سنة الماضية،
- معدلات أقل لوفيات الأطفال أقل من خمس سنوات، مما ساهم في إنقاذ حياة حوالي 6مليون طفل خلال الفترة محل الدراسة،
- انخفاض وفيات الأمهات، خلال هذه الفترة، بحوالي 17,000 أمكن الحفاظ على حياتهم.

وقد ساهمت الوفورات التي حققتها النتائج السابق الإشارة إليها، وكذا التطبيق الفعال لاعتبارات الرشادة الاقتصادية خلال تنفيذ البرنامج القومي لتنظيم الأسرة ، في الوصول إلى المزيد من المنافع الإضافية والوفورات في النفقات العامة، التي قدرت بحوالي 45,8 ألف مليون جنية، نتيجة لانخفاض متطلبات

الإنفاق على صحة الأطفال والتعليم ودعم الغذاء. وتزيد هذه الوفورات بدرجة كبيرة عن التكلفة الإجمالية المقدرة للبرنامج القومي لتنظيم الأسرة، خلال نفس الفترة محل الدراسة، والتي تصل إلى حوالي 2,4 ألف مليون جنية.

وبدون شك، فقد أتاحت تلك الوفورات في الأنفاق، الفرصة للحكومة المصرية للعمل على استمرارية والارتقاء بمستوى الخدمات العامة في القطاعات إلى تعرضنا لها، كما أنها تصب في النهاية في إطار الجهود الساعية للارتقاء بنوعية الحياة للمصريين. وبالإضافة إلى ذلك، أوضحت العديد من الدراسات أن القطاعات الأخرى مثل الصحة العامة والإسكان والعمالة والاقتصاد بصفة عامة، تستفيد أيضا من الإنجازات التي يحققها البرنامج القومي لتنظيم الأسرة.

وبالنظر الى الانخفاض المتوقع في المساعدات المخصصة لتنظيم الأسرة في المدى القريب، فانه يتوجب على مصر المحافظة على إستمراية المستوى الحالي للبرنامج القومي لتنظيم الأسرة ، بل والعمل على توسيع نطاقه، من خلال توفير الموارد المالية المطلوبة لاستعاضة العجز المتوقع نتيجة لانخفاض المعونات الخارجية.

Introduction

Egypt's family program has achieved considerable progress and now enjoys political support. However, with the prospect of donor phaseout for the family planning program (especially by USAID), it is useful to document the program's achievements to date and to estimate the benefits that have already accrued to Egypt.

To that end, this report reviews the progress achieved to date by Egypt's family planning program and estimates the benefits that the nation has realized since the early 1980s. The report provides a comparison with other countries and, by relying on major demographic indicators such as the total fertility rate (TFR) and crude birth rate (CBR), demonstrates the impacts of the family planning program on Egypt's demographic transition and examines Egypt's total population and age structure. To estimate the benefits already realized, the report constructs a "counterfactual" scenario that supposes a less successful family planning program and compares its outcome with the actual trajectory of events. Using a model similar to the one used by the RAPID and POLICY projects for *prospective* analysis, the report estimates *retrospectively*—for the period 1980 through 2005—the cumulative public sector savings realized as a result of the successful family planning program. The model also estimates health benefits for children and mothers. It clearly shows that the family planning program is responsible for the gains realized to date in Egypt.

Egypt's Demographic Transition and Family Planning

In the last century, the overall pattern of Egypt's demographic history followed a classic transition from high fertility and high mortality to lower fertility and lower mortality, thus resulting in a demographic transition. Figure 1 shows the path of the birth and death rates since 1900. In 1900, the CBR was 45.7 and the crude death rate (CDR) 34, with an annual population growth rate of 1.3 percent. In the 1920s, the death rate started to fall precipitously and, with it, the population growth rate increased as fertility remained high. By 1960, the population growth rate had climbed to 2.7 percent per year. It was not until the 1960s that fertility started to decline. The current CBR is 25.6, with a CDR of 6.4.

Figure 1.
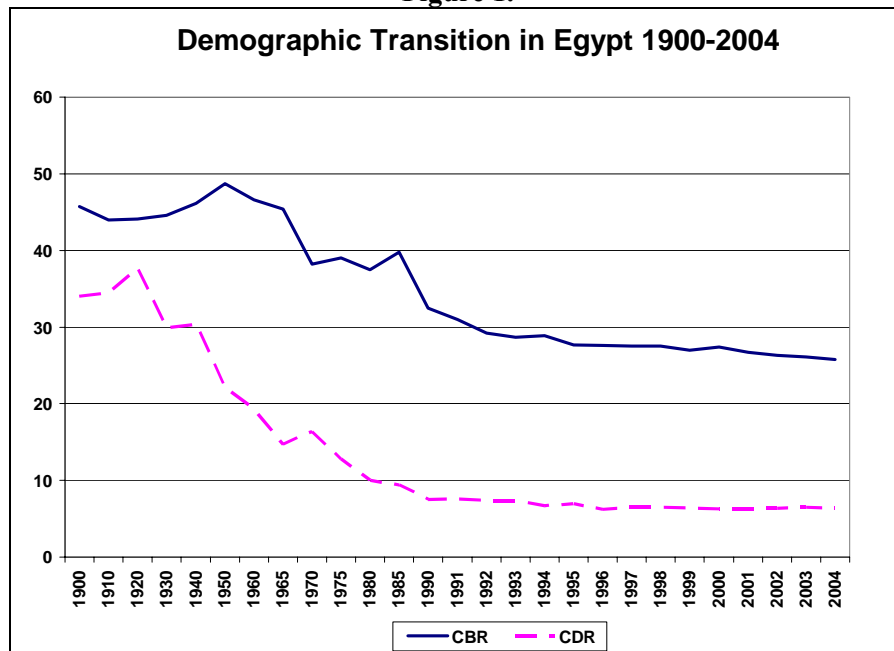
Source: Robinson and Zanaty (2005); CAPMAS.

Many factors can account for a decline in fertility, including:
- An increase in the age at marriage and/or a decline in the percentage of women of reproductive age who are married;
- An increase in natural sterility;
- An increase in the period of postpartum infertility associated with prolonged breastfeeding;
- An increase in spontaneous and induced abortion; and
- Increased use of contraception.

Such factors are measured by index numbers that demographers call proximate determinates. Table 1 demonstrates that, among these determinates, changes in the use of contraception is the single most important factor responsible for fertility decline, falling from 0.75 to 0.43, whereas the marriage index has not declined nearly as dramatically (from 0.65 to 0.57.) Postpartum infecundabilty remained fairly stable over the last 20 years.

Table 1. Evolution of Proximate Determinates

Index	1980	1988	1992	1995	2000
Index of contraception	0.75	0.60	0.51	0.50	0.43
Index of marriage	0.65	0.60	0.58	0.60	0.57
Index of infecundability	0.74	0.72	0.75	0.74	0.77

Source: Robinson and Zanaty (1995, 2005).

Table 2 clearly shows that increases in family planning use over time have been accompanied by a decline in fertility. The contraceptive prevalence rate (CPR) increased from 18.9 percent in 1976 to 59 percent in 2005. During the same period, the TFR fell from 5.6 to 3.1, according to the latest Demographic and Health Survey (DHS).

Table 2. Trends in TFR and CPR

Year	TFR	CPR
1976	5.6	18.8
1980	5.3	24.2
1984	4.9	30.3
1986	4.4	37.8
1992	4.1	47.1
1995	3.9	47.8
1997	3.6	54.6
1998	3.3	56.0
2000	3.5	56.1
2003	3.2	60.1
2005	3.1	59.0

Source: Various DHS reports; 1976 CPR: author's estimate.

Family Planning Service Availability

Ample data show that the increase in contraceptive prevalence has resulted from an increase in the number of service delivery outlets. Figure 2 indicates that the number of family planning

clinics in the public and NGO (nongovernmental organization) sectors rose from 3,862 in 1981 to 6,005 in mid-2005, a capacity increase of over 50 percent.

Figure 2.
Growth in Family Planning Clinics

Source: NPC. Annual Analytical Statistical Family Planning Services Reports, 1981 to 2004.
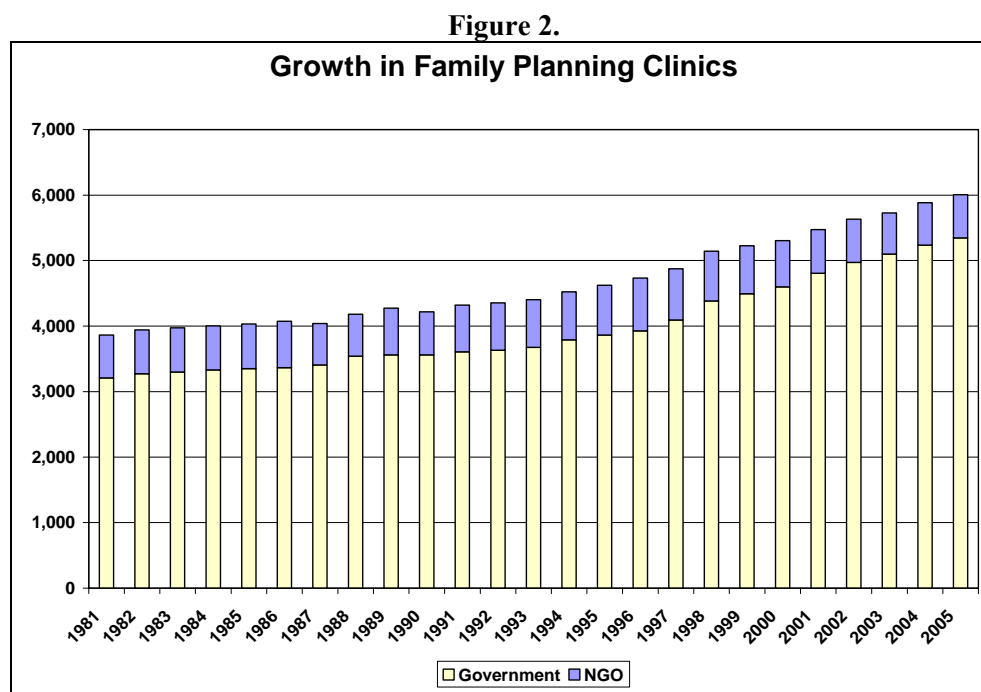
Similarly, Table 3 shows that the growth in clinical capacity was accompanied by an increase in the number of pharmacies in Egypt; pharmacies supply pills, condoms, other barrier methods, and sometimes injectables. Pharmacy growth rose by over 700 percent, from 3,880 outlets in 1978 (almost the same number of family planning clinics) to over 27,000 outlets in 2004.

Table 3. Growth in Pharmacies

Year	Number of Pharmacies
1978	3,880
1979	4,500
1984	7,042
1987	8,962
1990	12,070
1992	13,761
1993	15,777
1994	14,711
1995	16,249
1997	16,503
1998	20,838
1999	19,544
2001	27,160
2003	29,304
2004	27,179

Source: CAPMAS: Statistical Yearbooks, 1979 to 2004.

Couple-Years of Protection

The expansion in clinical and pharmacy capacity was accompanied by an increase in the number of contraceptives distributed as measured by couple-years of protection (CYPs), an indicator that measures the approximate number of couples who are protected for one year by the use of all methods of contraception. The indicator aggregates the quantities of all contraceptives used by couples by applying appropriate weighting factors to each type of contraceptive. Figure 3 shows that CYPs increased from 1.1 million in 1981 to 6.5 million in 2004, for an increase of more than 600 percent. The fluctuation in CYPs in the early 1990s is most likely explained by the transition that took place from the highly aggressive social marketing campaign launched in the mid-1980s (Family of the Future) to the campaign supported under the USAID bilateral program. What is important, however, is the overall increase.

Figure 3.
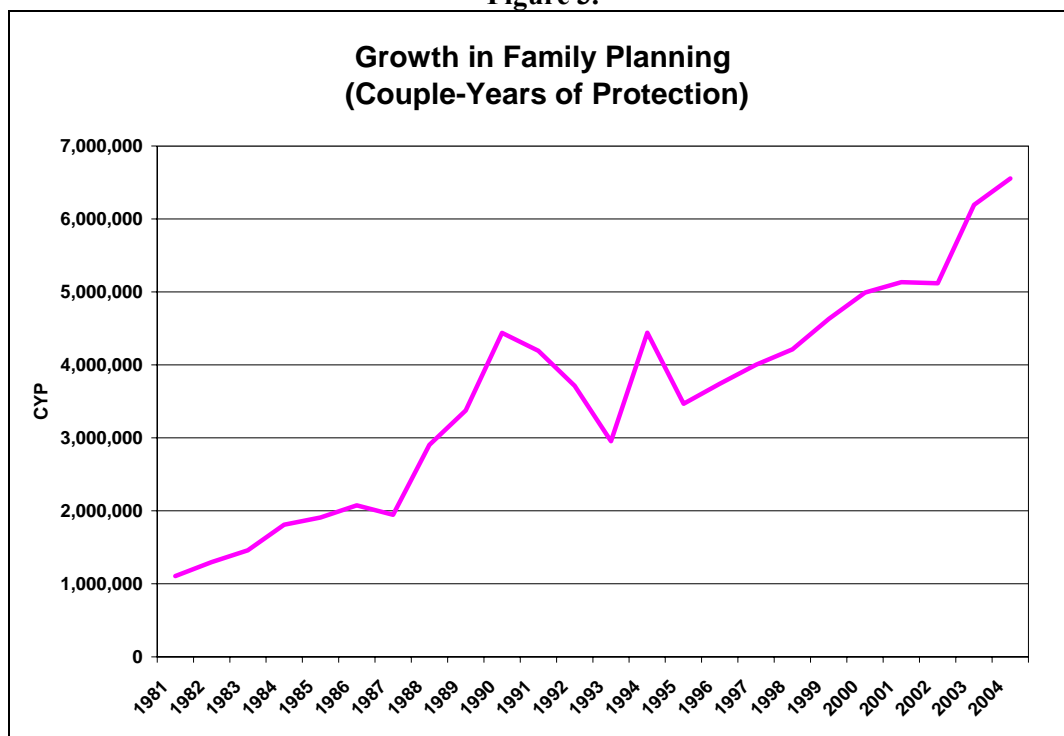
Source: NPC. Annual Analytical Statistical Family Planning Services Reports, 1981 to 2004.

Family Planning Expenditures

Resources allocated to family planning have also been on the rise, increasing by 400 percent in nominal terms from 1989 to 2003. In 1988 to 1989, total spending by the public, private, and NGO sectors was estimated at LE 44.7 million. By 2002–2003, the figure had increased to LE 206.2 million.

Users of Family Planning

The above phenomena have been accompanied by an increase in the *number* of women who use contraceptives. The increase in the CPR in combination with the natural growth in the number of married women of reproductive age has led to spectacular growth in the number of women who regularly use contraceptives. In 1980, 1.5 million women used some form of family planning. Current estimates of the number of married women, combined with the latest DHS suggesting that 6.4 million women use contraceptives, point to an increase of 400 percent as of 2005.

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Table 4. Total Expenditures on Family Planning by Type of Agency

Fiscal Year	NGOs	Government of Egypt	Donor Agencies	Client Payments	Total
1988–1989	243,045	20,873,347	19,914,857	3,679,611	44,710,860
1989–1990	456,475	22,296,679	31,198,496	6,448,728	60,400,378
1990–1991	1,499,080	24,463,323	39,282,950	7,059,875	72,305,228
1991–1992	1,368,559	29,566,150	39,218,511	9,216,419	79,369,639
1992–1993	2,044,418	24,848,395	35,393,209	9,947,464	72,233,484
1993–1994	1,707,683	29,409,294	26,942,872	8,505,452	66,565,301
1994–1995	1,229,779	52,666,486	34,390,242	7,324,477	95,610,984
1995–1996	1,117,568	45,445,310	41,734,131	9,546,471	97,843,480
1996–1997	1,130,566	57,993,888	52,323,778	8,596,190	120,044,422
1997–1998	927,334	83,403,992	61,511,406	10,242,190	156,084,922
1998–1999	812,504	90,892,285	53,935,055	9,092,186	154,732,030
1999–2000	125,807	94,823,727	58,831,694	10,723,721	164,504,949
2000–2001	109,044	119,059,356	75,067,763	13,828,839	208,065,002
2001–2002	2,987	125,551,109	82,446,658	15,070,578	223,071,332
2002–2003	52,842	121,756,736	67,873,356	16,562,497	206,245,430

Source: POLICY II Project/Egypt (forthcoming), *The Trends of the Cost of Family Planning Program in Egypt.*

Figure 4.
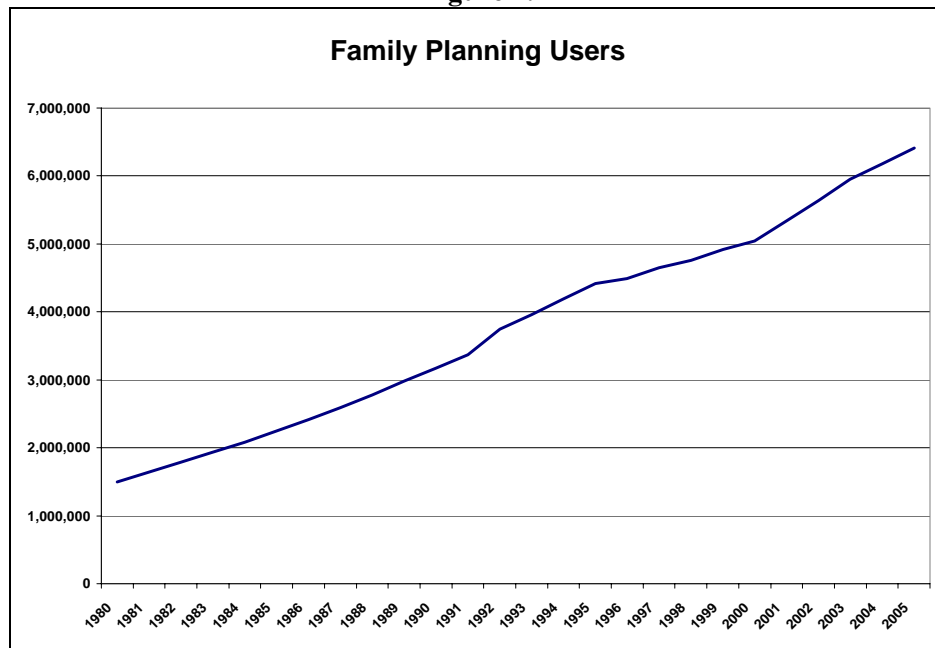
Source: Spectrum projections by author.

What Would Egypt Be Like if the Demographic Transition Had Not Occurred?

To determine what Egypt would be like if the demographic transition had not occurred, we must estimate the trajectory that fertility and mortality would have taken in the case of a less successful family planning

program absent a demographic transition or a slower-paced transition. We must therefore construct a hypothetical counterfactual scenario and compare it with the actual course of demographic events.

Of course, we cannot be certain what would have happened in the absence of program interventions, but our counterfactual scenario attempts to show what probably would have occurred in such a case. To this end, we make some assumptions that reflect what has occurred in countries that have not been as successful as Egypt in achieving a demographic transition and realizing the widespread use of contraception.

First, we assume that overall mortality, as measured by the crude death rate, would follow the same trajectory under both the counterfactual scenario and what we call the actual scenario. Second, we need to construct a counterfactual fertility trajectory over the period of interest. Given that the family planning period started to take shape in the late 1970s and early 1980s, we construct scenarios for the 25-year period 1980 to 2005. As we are interested in family planning and have demonstrated that family planning affects fertility, we will construct our two scenarios in terms of change in contraceptive prevalence. In view of known events, we need to find a trajectory for CPR for our counterfactual scenario.

One method of determining the counterfactual trajectory simply projects the trend in CPR growth evidenced in 1980. However, little reliable data on contraceptive use are available for the period before 1980, and existing data are inconsistent, making it impossible to establish a trend in CPR growth.[1] Instead, to develop an idea of CPR growth in Egypt, we looked at the experience of other countries in terms of contraceptive change over the course of the last 15 or so years. Figure 5 shows the average annual change by region for countries that had undertaken two or more Demographic and Health Surveys. We see that Egypt's average annual change in CPR for married women exceeded the average for the region (1.39 versus 1.15). By contrast, sub-Saharan Africa exhibited very slow growth, with a rate of 0.53 for all women and 0.72 for married women. The Asian Tiger countries recorded the highest annual gains in CPR.

Figure 5.
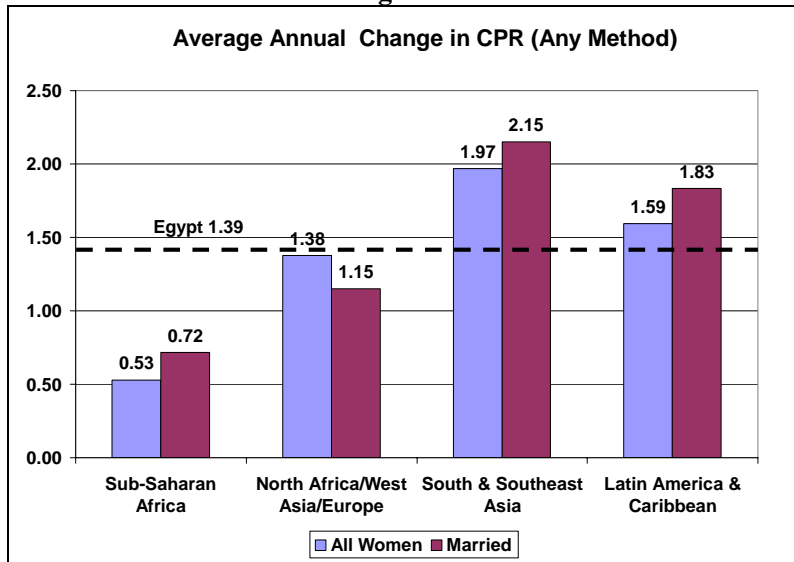
Source: Various DHS data downloaded from DHS website.

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[1] For example, Robinson and Zanaty (2005) report a simultaneous fall in fertility and contraceptive prevalence between 1975 and 1980.

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In constructing the counterfactual and imagining what might have happened in Egypt in the case of a weak family planning program, we determined that it is probably **not** reasonable to assume that **no** growth in CPR occurred. We therefore took the experience of sub-Saharan Africa as a worst-case scenario for our weak program model and selected an annual increase of 0.5 percent for the CPR in the counterfactual scenario.

Figure 6 presents application of the counterfactual as compared with actual growth. As we saw earlier, Egypt's 1976 CPR was 18.9 percent. By 2005, according to the latest DHS, the CPR had reached 59 percent (indicated by the solid line in Figure 6), representing the scenario we term the actual scenario.

By contrast, if Egypt followed a path more similar to that of sub-Saharan Africa with a CPR annual change of only 0.5 percent, Egypt's 2005 CPR would have increased to only 33.5 during the 25-year retrospective projection. Thus, the dashed line in Figure 6 shows the counterfactual CPR scenario.

Figure 6.

Source: Actual scenario: various DHS for Egypt; Counterfactual: author's calculations.
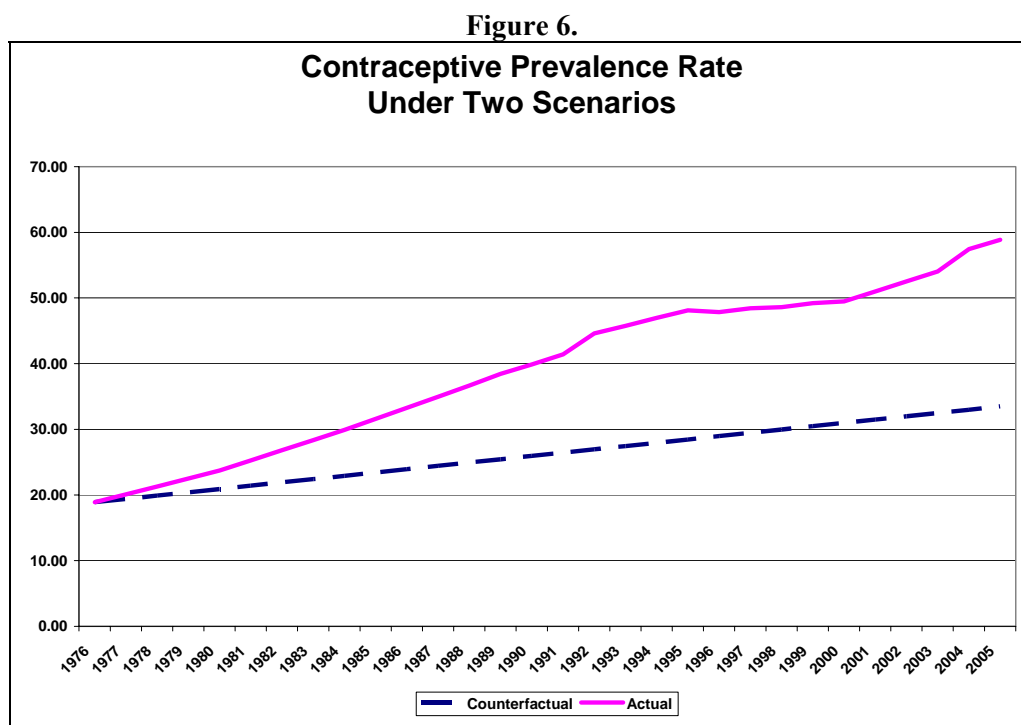
Fertility Impact

We used the FamPlan/Spectrum Model to estimate the impact on fertility of the slower change in contraceptive use. If the counterfactual scenario had in fact unfolded, the fertility rate would have declined from 5.6 in 1976 to 4.65 in 2005. However, in reality, the latest DHS for 2005 estimated a current fertility rate of 3.1, a difference of 1.5 children per woman, as shown in Figure 7.

Figure 7.

Fertility Under Two Scenarios
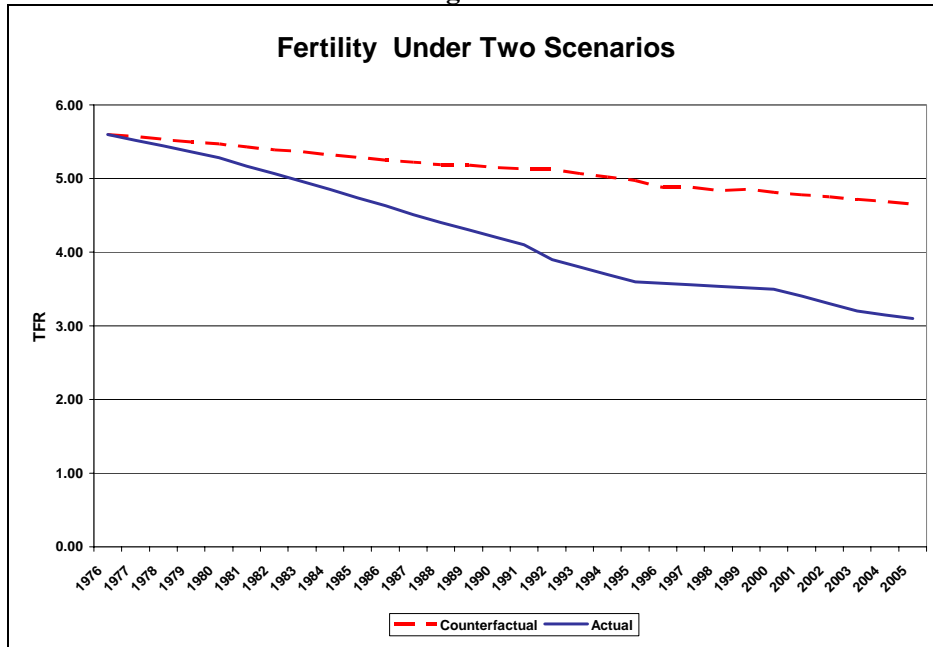
Source: Actual scenario: various DHS for Egypt; Counterfactual: author's calculations.

Figure 8 shows the impact of the counterfactual assumptions about contraceptive growth on the demographic transition. With a higher counterfactual fertility rate, the number of births would obviously have been greater; therefore, the crude birth rate would have fallen much less dramatically than in reality such that progress toward the demographic transition would have been slower. By 2004, the CBR would have been 34 versus 25. In terms of the population growth rate, the actual annual rate is estimated at 1.9 percent in 2004, whereas the counterfactual scenario places the growth rate at 2.8 percent, a difference of nearly 1 percent.

Figure 8.

Demographic Transition in Egypt 1900-2004 Under Two Scenarios
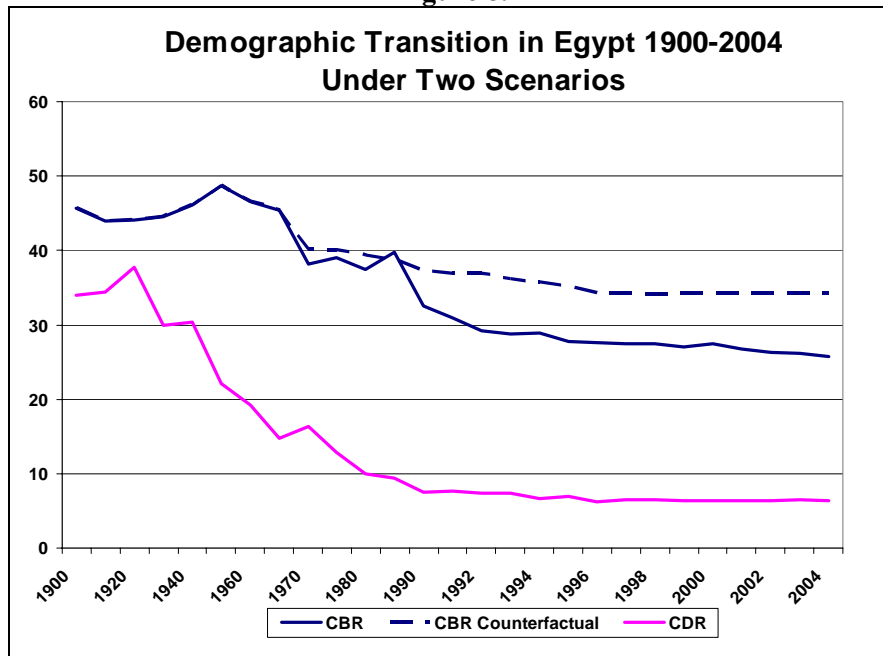
Source: Actual numbers: Robinson and Zanaty (2005); Counterfactual: author's calculations using FamPlan/Spectrum Model.

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Figure 9.

Total Population 1976-2005
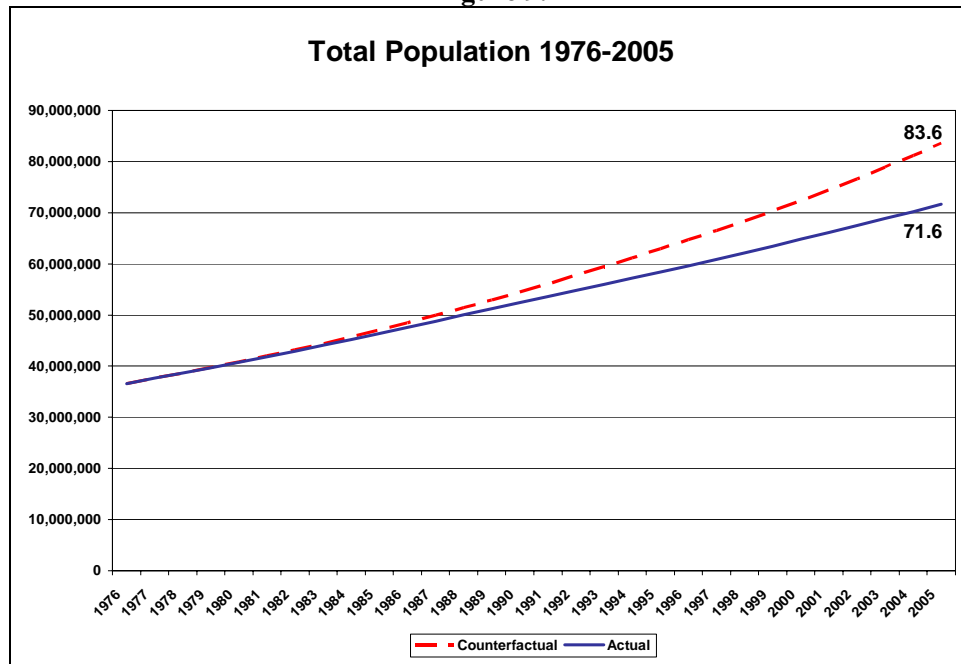
Source: Author's calculations based on Spectrum.

Figure 9 compares the counterfactual and actual scenarios in terms of total population size. A difference of 1 percent in the growth rate may seem small, yet the compound nature of population growth, especially in the context of an already large population, means that even a low growth rate results in enormous gains in population over time. With a higher rate of growth under the counterfactual's less successful family planning scenario, Egypt's population would have been higher today than it is in actuality. By 2005, we estimate that the population would have stood at 83.6 million in contrast to the 71.6 million that we calculate in accordance with our projection under the actual fertility scenario. The difference is 12 million people.

High fertility also affects the age structure of the population. Given that fertility by definition affects births, a higher fertility rate translates into a larger number of people in the youngest age groups. Table 5 shows clearly that, under the counterfactual scenario, the population under age 15 years would be significantly greater in terms of numbers and percentages than under the actual scenario. In fact, had fertility not fallen, the counterfactual projection points to 34 million youth under the age of 15 in 2005 versus only 23.8 million under the actual scenario.

We saw above that the overall difference in total population between the two scenarios was 12 million. Of that 12 million, 10.1 million—or 84 percent—fell in the age group under age 15. Stated another way, the actual scenario means that Egypt is responsible for meeting the education, health/social service, and employment needs of 10.1 million fewer youth as compared with the service demands imposed by the number of youth projected in the counterfactual.

Table 5. Age Structure of the Population Under Two Scenarios

Age	Counterfactual		Actual	
	Number	Percent	Number	Percent
0–4	13,004,100	15.6%	8,357,210	11.7%
5–9	11,100,600	13.3%	8,031,330	11.3%
10–14	9,978,020	11.9%	7,509,750	10.5%
15–19	8,860,280	10.6%	7,503,860	10.5%
20–24	7,541,710	9.0%	6,969,950	9.8%
25–29	6,177,280	7.4%	6,065,330	8.5%
30–34	4,686,060	5.6%	4,686,060	6.6%
35–39	4,470,440	5.3%	4,470,440	6.3%
40–44	4,484,610	5.4%	4,484,610	6.3%
45–49	3,452,020	4.1%	3,452,020	4.8%
50–54	2,629,160	3.1%	2,629,160	3.7%
55–59	2,162,960	2.6%	2,162,960	3.0%
60–64	1,604,910	1.9%	1,604,910	2.2%
65–69	1,372,060	1.6%	1,372,060	1.9%
70–74	984,594	1.2%	984,594	1.4%
75–79	577,216	0.7%	577,216	0.8%
80+	512,065	0.6%	512,065	0.7%
Total	83,598,096	100.0%	71,373,504	100.0%

Source: Author's projection based on Spectrum.

What Are the Health Benefits of Lower Fertility?

So far, we have looked at the likely demographic profile of Egypt had the family planning program not succeeded. In this section, we look at the consequences for some important health variables related to child mortality and maternal mortality.

Infant and Under-Five Mortality

DHS defines high-risk births as those that fall into one of the following risk categories (the four "toos"):

- Mother under age 18 (too young);
- Mother over age 34 (too old);
- Birth less than 24 months after previous birth (too close); and
- Birth to a mother who has had more than three births (too many).

DHS collects data on the risk factors facing women and on infant and child mortality. The data from five Egyptian DHS as presented in Figure 10 clearly demonstrate the relationship between births in the above risk categories and infant mortality rates. Each point shows how the percentage of births in a high-risk category is associated with a level of infant mortality. As the percentage of high-risk births falls, so do mortality rates. A similar picture holds for under-five mortality (U5MR).

As depicted in Figure 11, another relationship pertains to fertility rates and the percentage of births in a high-risk category. Higher fertility is often associated with long periods of childbearing; thus, more births occur in the "too young" and "too old categories." Moreover, births spaced too closely together often occur in high-fertility societies, with high parity and high fertility essentially the same.

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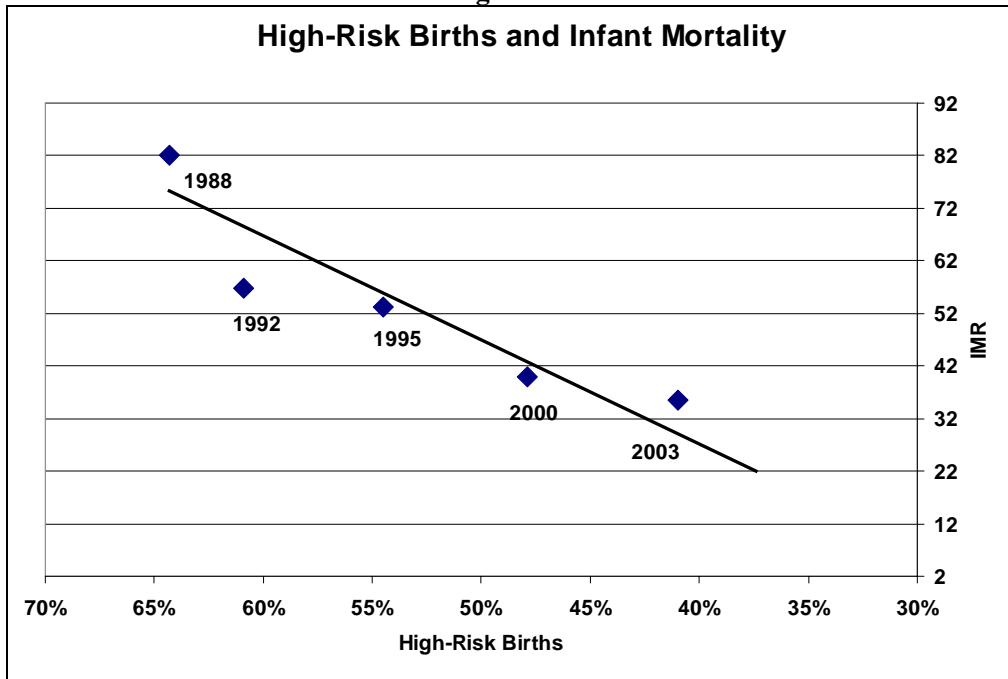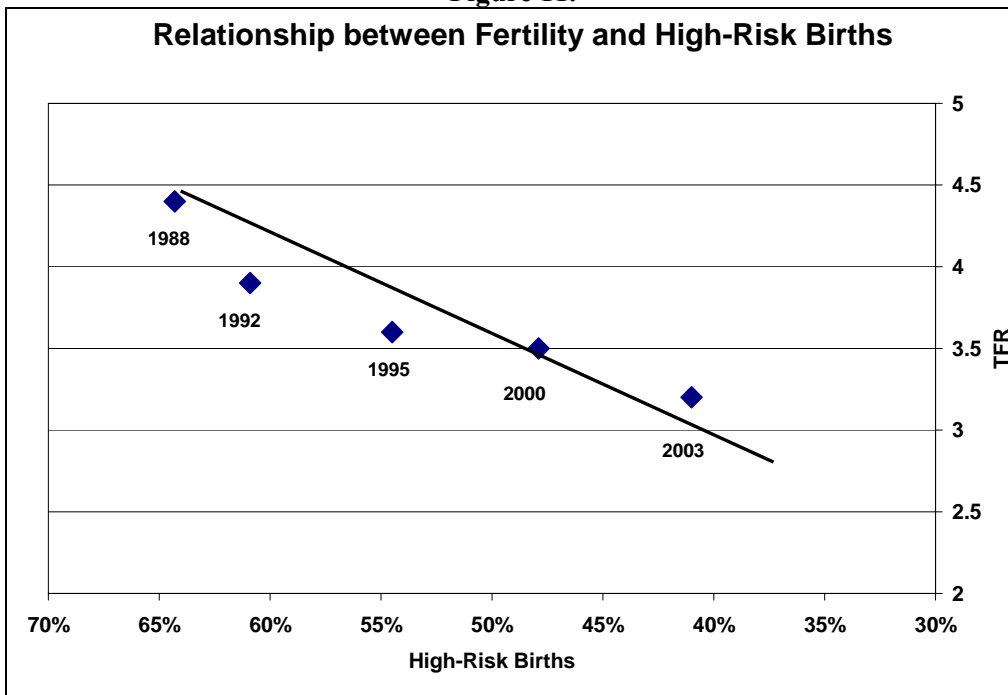**Figure 10.**

High-Risk Births and Infant Mortality

Source: Various Egypt DHS.

Figure 11.

Relationship between Fertility and High-Risk Births

Source: Various Egypt DHS.

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Using data from Egypt's several DHS, we followed Ross's analysis[2] and established the slope[3] of the relationship between the changes in IMR and U5MR and the changes in the percentage of at-risk women. We also estimated slopes for changes in TFR and changes in the percentage of at-risk women (Table 6).

Table 6. Slopes of Child Mortality Relationships

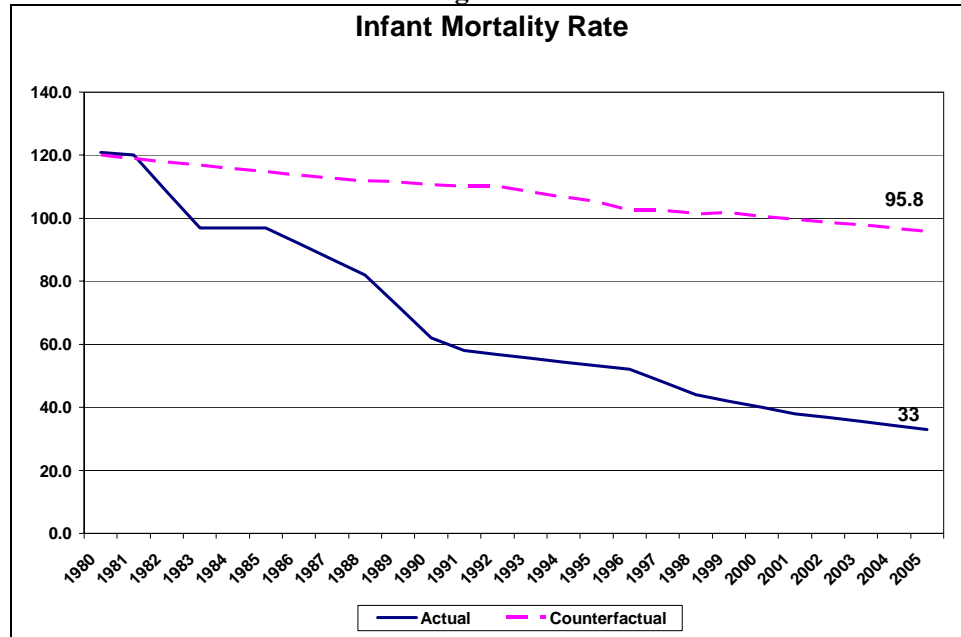|	
Change in infant mortality rate/Change in percent of at-risk births	1.81
Change in under-five mortality rate/Change in percent of at-risk births	2.90
Change in percent of at-risk births/Change in total fertility rate	16.40

Source: Various DHS.

We used these relationships to model the changes in contraceptive use's effects (through changes in fertility) on infant and under-five mortality associated with changes in the counterfactual scenario. Thus, the pathway for the model follows:

CPR $\rightarrow$ TFR $\rightarrow$ Percent of Women at Risk $\rightarrow$ IMR
CPR $\rightarrow$ TFR $\rightarrow$ Percent of Women at Risk $\rightarrow$ U5MR

We are therefore able to use these relationships to estimate how a higher level of fertility would have affected infant and under-five mortality rates under the counterfactual scenario.

Figure 12 shows that, if fertility followed the counterfactual scenario, the infant mortality rate would have declined only slightly from 121 in 1980 to 95.8 in 2004 instead of to 33 as it actually did with lower fertility.

Figure 12.

Source: Author's calculations.

[2] Email communication from John Ross, July 16, 2005.
[3] The slope is the change in IMR or U5MR due to a change in the percent of at-risk births.

Similarly, Figure 13 shows that, if the counterfactual fertility pattern had materialized, the under-five mortality rate would have fallen much more slowly according to our model.

Figure 13.

Source: Author's calculations.
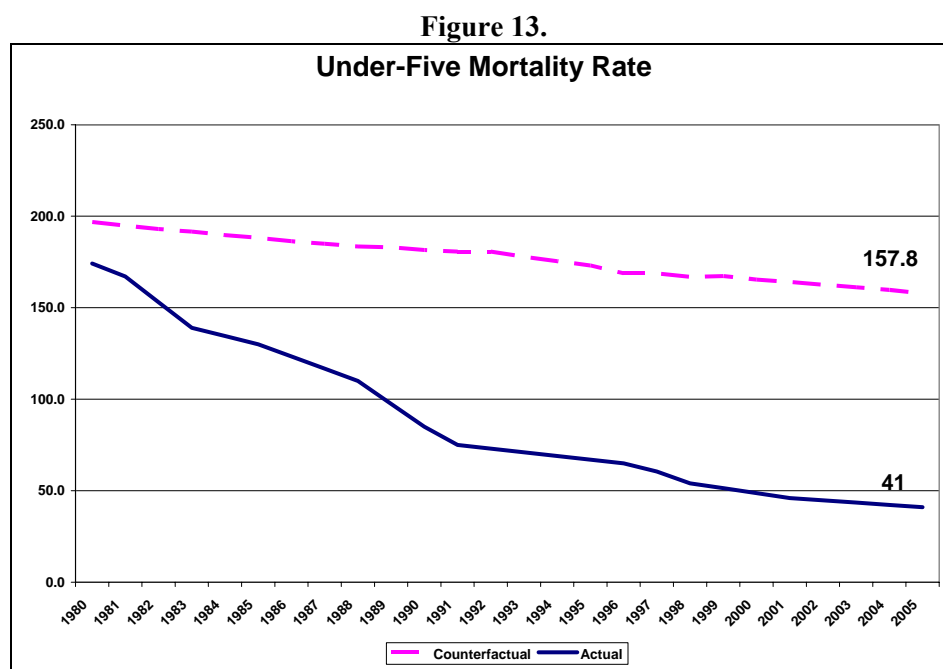
The pattern for under-five mortality rate is similar to that for the infant mortality rate and would have fallen to only 157.8 per 1,000 if fertility had remained high under the counterfactual scenario versus the actual rate of 41 per 1,000 as recently observed. Thus, the under-five mortality rate would have been almost four times higher under the counterfactual as under the actual scenario.[4]

We used the different mortality rates combined with the different sizes of the population under each scenario to estimate the annual number of infant and under-five deaths. Table 7 presents the estimates.

Table 7. Estimated Annual Infant and Under-Five Deaths

|	1980	1985	1990	1995	2000	2005
Infant Deaths						
Counterfactual	192,768	209,649	225,037	233,252	249,888	274,003
Actual	187,228	158,786	102,806	85,265	71,231	59,902
Deaths averted	5,540	50,863	122,231	147,987	178,657	214,100
Deaths prevented		29,135	80,657	83,500	107,826	113,997
Under-Five Deaths						
Counterfactual	315,796	343,801	369,355	383,301	411,125	451,383
Actual	269,993	212,806	140,944	107,382	86,665	74,424
Deaths averted	45,802	130,995	228,411	275,919	324,460	376,959
Deaths prevented	35,054	95,364	160,176	169,948	207,926	212,051

Source: Author's calculations.

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[4] We note that the underlying statistical model also predicts a difference in the under-five mortality rates in 1980; the actual rate was 174 per 1,000 while the model predicts a rate of 197 per 1,000.

The annual number of infant deaths would have been higher under the higher-fertility counterfactual scenario. Under the counterfactual, the number of infant deaths would have ***increased*** to 274,000 per year in 2005 as compared with ***falling*** to 60,000 per year in 2005 in the scenario that recreates the actual situation.

If we add across the row for infant deaths averted over the period 1980 to 2005, we can calculate that a total 3.1 million infant deaths were averted as a result of the lower fertility resulting from the successful family planning program.

The impact of fertility on infant deaths has two components. The first relates simply to the number of births—a higher fertility rate means a greater number of births and a greater number of babies at risk of death. The second component relates to the relationship discussed earlier with respect to fertility rates and the infant mortality rate. Hence, even if the number of births remained constant, we would expect a higher number of infant deaths in the case of higher fertility because the infant mortality rate would be higher. We considered such an effect by calculating the number of infant deaths that would have occurred in the case of the counterfactual population if the *actual* infant mortality rate were at work. Then, we subtracted the result from the counterfactual deaths. Table 7 shows difference in the row labeled "deaths prevented."

Figure 14 breaks down the annual infant deaths into the two components discussed above. Of the cumulative total of 3.1 million deaths averted between 1980 and 2005, 1.8 million can be attributed to the risk effect and 1.3 million to fewer births under the actual versus counterfactual scenario. Thus, it is interesting to see that more deaths were averted through the impact on the infant mortality rate than through the impact on the number of births. Clearly, family planning saves lives.

Figure 14.

Source: Author's calculations.
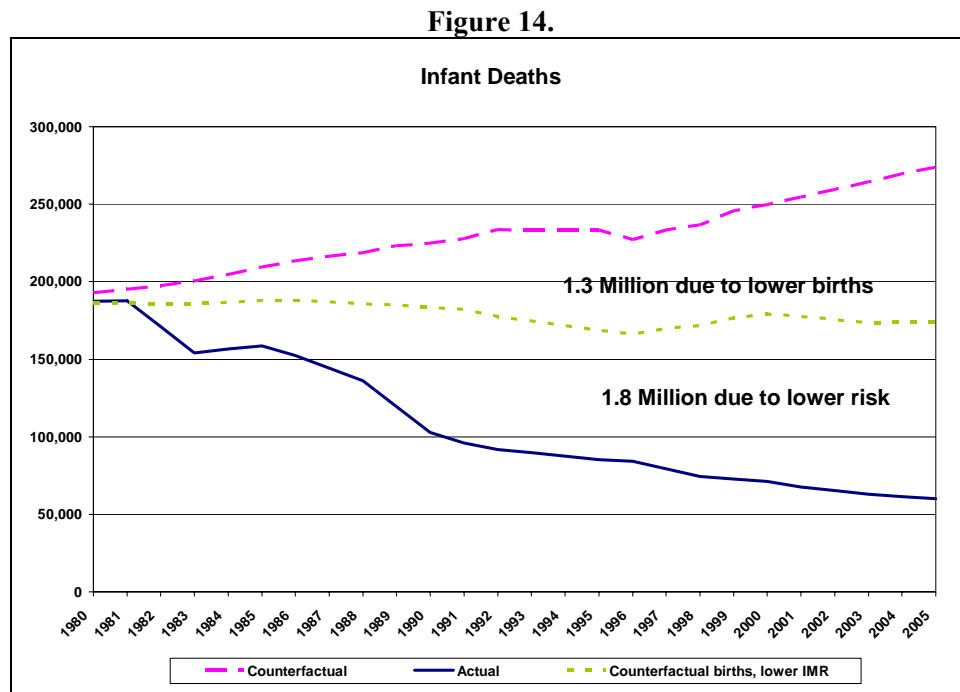
The differences in under-five mortality rate have an impact on the number of young children at risk of death. Table 7 shows the impact of the fertility scenarios on the annual number of under-five deaths. As noted, the statistical model predicts a higher under-five mortality rate in 1980 such that we already see differences in the annual number of under-five deaths (315,000 versus 279,000). By 2004, we estimate

that the combined effects of higher mortality rates and more young children mean that, under the counterfactual scenario, we expect 451,000 annual deaths among under-five children compared with our estimate of 74,000 in reality. Cumulatively, over the 25-year period, this amounts to over 6 million deaths averted among children under age five.

Again, we also calculated under-five deaths prevented. We see, for example, that, of an estimated 376,000 under-five deaths in 2005, 212,000 were prevented as a consequence of the lower mortality rate that actually occurred relative to that which we predicted under the counterfactual scenario.

Maternal Mortality

We also estimated the impact of lower fertility on the number of mothers who would have lost their lives due to complications of pregnancy or childbirth. While we are not able to link the maternal mortality ratio statistically with fertility as we did for infant and under-five mortality, we can calculate the impact of lower fertility on maternal deaths through its impact on the number of births. Figure 15 shows that during the period 1980 to 2005 over 17,000 mothers' lives were saved.

Figure 15.

Source: Author's calculations.
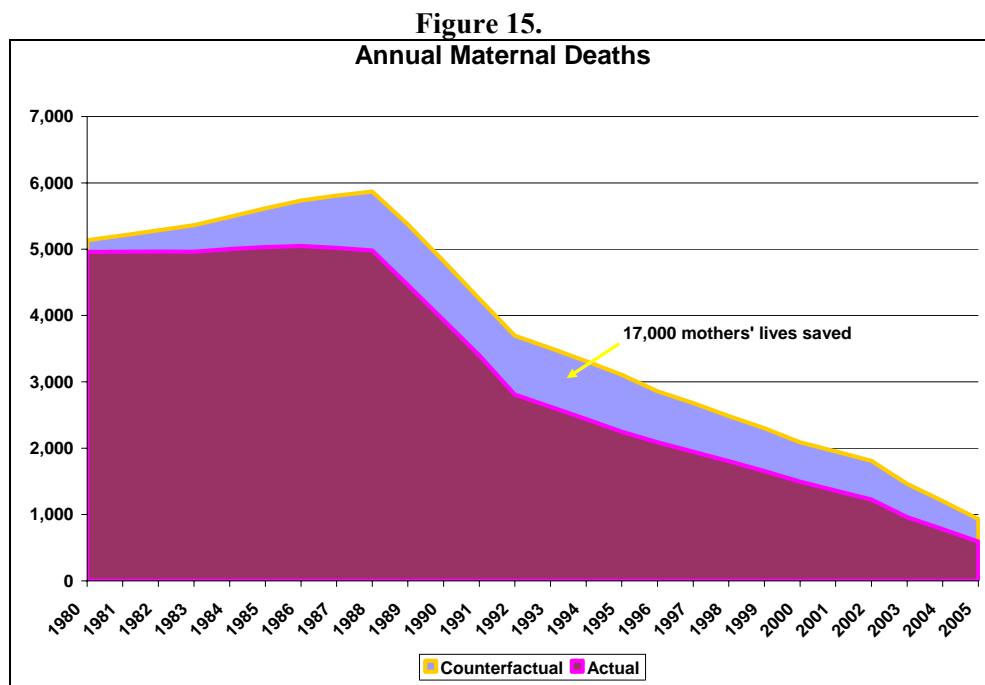
What Are the Benefits in Terms of Lower Expenditures on Health and Social Programs?

In this section, we look at the impacts of lower population growth on the costs of providing health, education, and food subsidies. The need to serve fewer people obviously results in cost savings. This retrospective study compares the amounts that we estimate were actually spent as compared with what might have been spent under the counterfactual scenario with its higher fertility rate.

Previous USAID studies of the impact of Egypt's lower fertility rate showed significant benefits of reduced fertility. Moreland's 1996 study in the mid-1990s showed that LE 1invested in family planning would save over LE 30 in subsidies for education, food, health, housing, and water and sanitation. Chao

(2004) more recently found that benefits from family planning were even higher, with a benefit-cost ratio of more than 40, even though the study did not include housing.

For several reasons, it is inappropriate to compare the benefit-cost ratios in the present analysis with those of the two earlier studies. First, the present study compares two scenarios in which fertility declines, although at different rates, whereas the previous studies held fertility constant in one scenario. Second, the time period for the present study is 25 years versus 30 for the other studies. Given that many benefits from changes in population growth are realized cumulatively over a long period, greater impacts are associated with a longer period. Third, the present study dates back to 1980, a period when social and health sector services were less prevalent; as a result, coverage rates were lower such that a smaller population would benefit from the services. Further, with Egypt a considerably poorer country 25 years ago, per capita spending in the social and health sectors was significantly lower. This means that estimated cost savings for a given change in population would be lower for the present study than for the other two.

Even after consideration of methodological differences in the various studies, the present study points to significant savings resulting from Egypt's family planning program, more than offsetting the program's actual costs.

Education

As for education, we estimate what might have happened if the counterfactual scenario had unfolded. We first performed a retrospective projection of the number of students at each pre-university level of education in Egypt by using published figures on enrollment rates and appropriate age groups (6–10 for primary, 11–13 for preparatory, and 14–16 for secondary).

Table 8. Projected Enrollment.

Enrollment Type	1980	1985	1990	1995	2000	2005
Primary Enrollment						
Counterfactual	4,024,555	5,066,370	6,766,920	8,667,708	9,457,101	10,963,498
Actual	4,024,555	5,009,119	6,348,949	7,480,754	7,289,101	7,948,889
Preparatory Enrollment						
Counterfactual	1,541,096	1,781,843	2,773,200	3,485,008	4,552,934	5,465,543
Actual	1,541,096	1,781,843	2,726,001	3,224,649	3,857,854	4,087,422
Secondary Enrollment						
Counterfactual	1,636,891	1,687,658	2,098,152	3,171,085	4,166,691	5,086,629
Actual	1,636,891	1,687,658	2,098,152	3,057,560	3,732,949	4,143,522
Total Enrollment						
Counterfactual	7,202,543	8,535,871	11,638,272	15,323,801	18,176,727	21,515,671
Actual	7,202,543	8,478,620	11,173,102	13,762,963	14,879,903	16,179,832

Source: Author's calculations.

Table 8 shows that, by 2005 under the counterfactual scenario, annual enrollment in all three cycles of pre-university enrollment would have topped 21 million versus just over 16 million as estimated for current enrollment.

We used education expenditures per student to calculate education costs, noting that lower enrollment translates into cost savings. Due to lack of historical education cost data, we used the same unit costs as

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Chao. Table 9 illustrates the counterfactual and actual scenarios. We estimate that by 2005 annual education costs would have reached LE 20,000 million if the counterfactual had held. However, with a lower number of children in school, costs were closer to LE 15,000 million. Cumulative savings over the 25-year period are estimated at LE 36,565 million.

**Table 9. Annual Education Costs for All Pre-University Cycles (millions of LE)**

	1980	1985	1990	1995	2000	2005
Counterfactual	6,669	7,773	10,526	14,050	16,906	20,096
Actual	6,669	7,727	10,153	12,733	14,013	15,270

Source: Author's calculations.
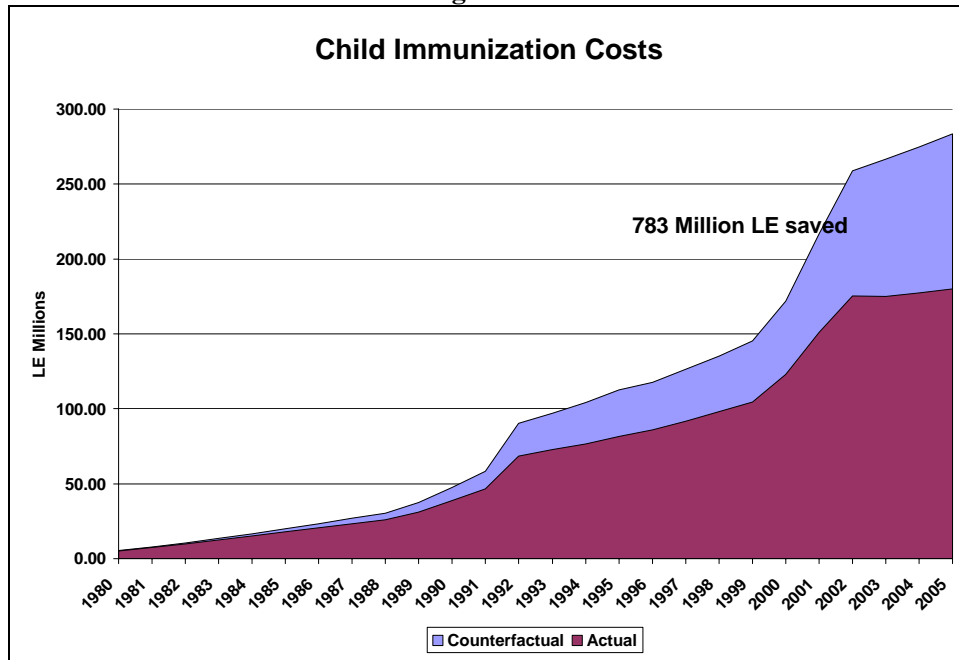
Childhood Immunizations

Next, we look at the cost of immunizing infants. Given that fertility affects the number of births, a higher fertility rate under the counterfactual scenario would have an immediate impact on the population under one year of age. In 1980, Egypt counted about 1.4 million children under one year old. By 2005, the number of infants was estimated to have grown to 1.7 million (see Figure 16). If, however, the counterfactual scenario had held, Egypt would have counted an additional 1 million infants, for a total of 2.7 million infants.

Figure 16.

Source: Author's calculations.

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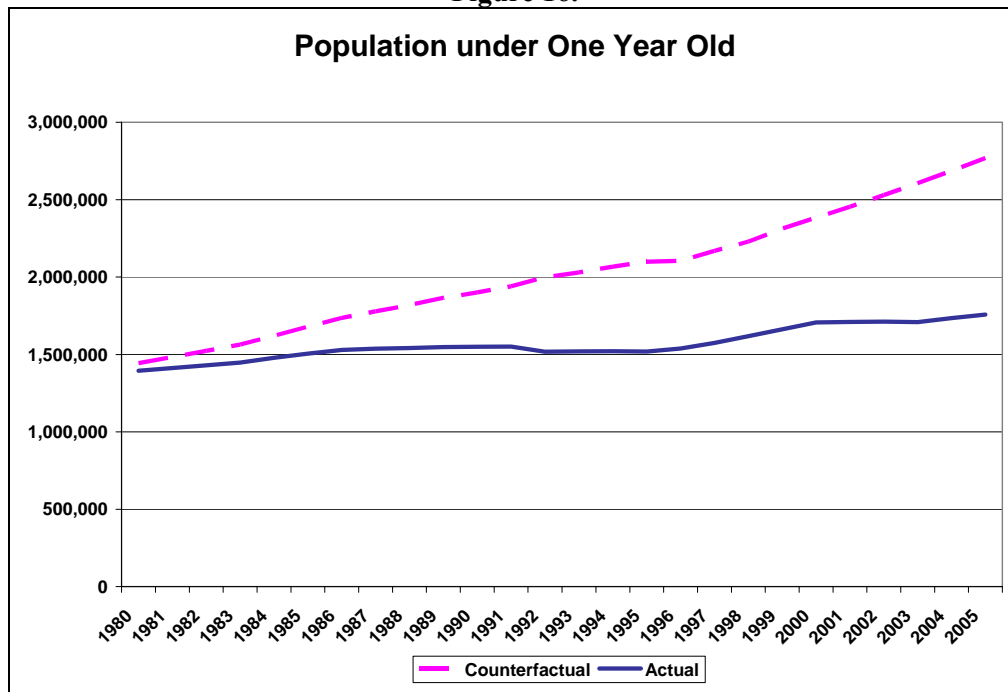
Figure 17.

Source: Author's calculations.

The additional 1 million infants would have required early childhood vaccinations. With no immunization cost data available for Egypt, we estimated child immunization costs by using international costs for a fully immunized child. On the basis of the differences in the number of infants in Figure 16, we estimated that by 2005 annual early child immunization costs would total LE 283 million under the counterfactual scenario versus LE 179 million under the actual scenario, representing a cumulative savings in child immunization costs of LE 783 million (see Figure 17).

Food Subsidies

Egypt has a long tradition of subsidizing basic food items, notably flour, bread, sugar, cooking oil, and a variety of other commodities (IFPRC, 2001). While Egypt's food subsidy program is designed to benefit the poor, a large segment of the population benefits mostly because subsidies for flour and bread reach virtually everyone. For this reason, we calculate food subsidy impacts for the total population rather than for a subpopulation.

During the 1980s and 1990s, per capita subsidies remained fairly constant at between LE 40 and LE 60. Then, in 2003, subsidies increased to over LE 100 per capita and in 2004, to LE 164, as depicted in Figure 18.

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Figure 18.

Food Subsidy per Capita
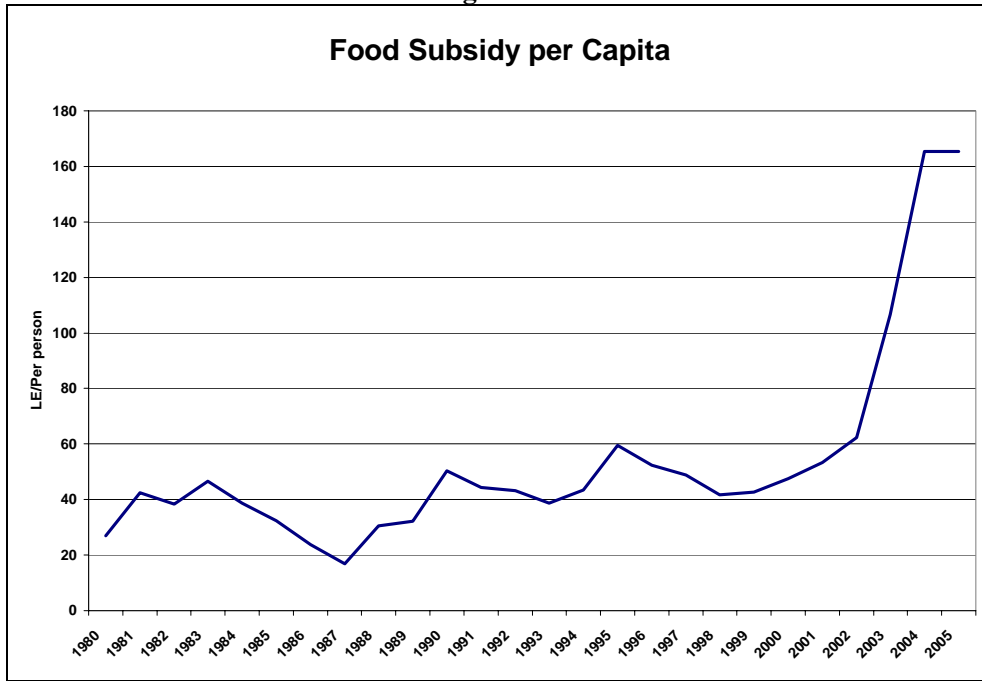
Source: Egypt Ministry of Supply and Domestic Trade.

Figure 19 shows the impact of the per capita increase in the food subsidy. Total spending for the subsidy topped LE 11,847 million in 2004 and would have increased by LE 2,000 million under the counterfactual to LE 13,830 million. Over the 25-year comparison period, the savings in food subsidies is on the order of LE 8,489 million as a result of Egypt's actual lower fertility as compared with the counterfactual projection.

Figure 19.

Food Subsidies

LE 8,489 Million

Counterfactual ■ Actual

Source: Author's calculations.

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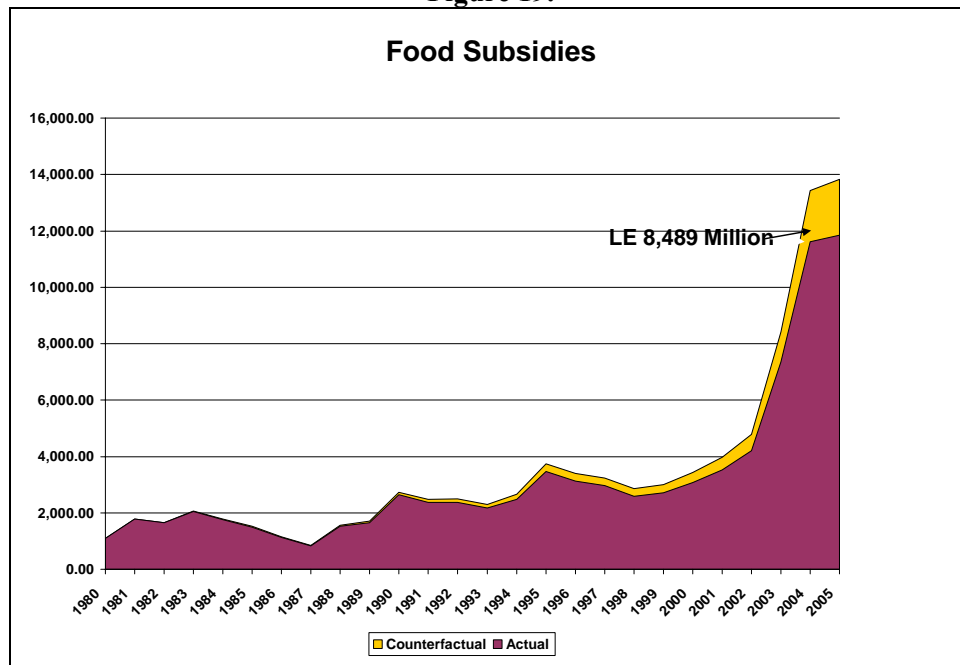
How Do the Savings Compare with the Costs of Family Planning?

We have seen significant cost savings in just three key sectors—education, immunizations, and food. How do the savings compare with the costs of family planning over this period?

Family Planning Expenditures

As noted, USAID commissioned a series of cost studies over the last 10 years. The studies, when combined with other data, allow us to estimate the cost of the family planning program between 1980 and 2005. Table 4 showed the evolution of costs based on the studies. Zanaty and Robinson also reported on donor funding for the period 1976 to 1998. With the Zanaty and Robinson data and estimates of the trend in family planning costs, we were able to estimate family planning costs for the period 1980 to 1987.

We estimate that, from 1980 to 2005, of a total LE 2,402 million spent on family planning, the government of Egypt spent LE 1,214 million, donors spent LE 978 million, and sponsoring agencies and clients spent LE 210 million (Table 10).

**Table 10. Estimated Family Planning Financing (millions LE)**

Financing Source	1980–1988	1988–2003	1980–2005
Government of Egypt	271	943	1,214
Donor	258	720	978
Sponsoring Agency and Client Pay	51	159	210
Total	580	1,676	2,402

Source: Family Planning Cost Studies and author's calculations.

Comparing Family Planning with Sector Savings

If we total the cumulative savings over the 25-year period for the three sectors of interest (education, immunizations, food), we arrive at a figure of LE 45,838 million in total cost savings for the sectors, a figure that exceeds by far the LE 2,402 million spent on the family planning program during the same period (see Figure 20).

Figure 20.
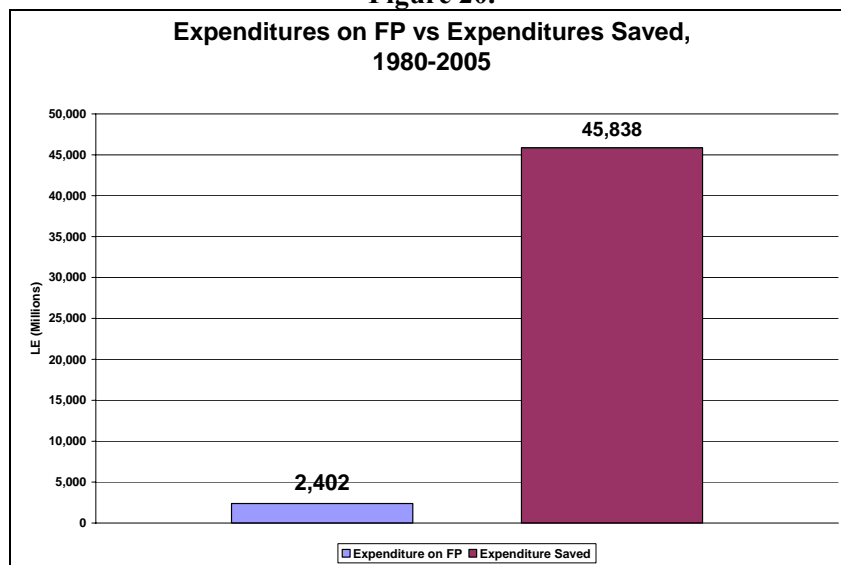
Source: Author's calculations.

Conclusion

In summary, we conclude that Egypt's family planning program has yielded many benefits for Egypt. These include:

- A population that is smaller by 12 million, nearly the size of Cairo;
- A more favorable age distribution, with 10 million fewer young people in the nonworking ages;
- A lower infant mortality rate, resulting in over 3 million fewer infant deaths during the last 25 years;
- A lower mortality rate for children under age five, resulting in over 6 million fewer early-childhood deaths during the last 25 years;
- Fewer maternal deaths, with 17,000 mothers' lives saved over the last 25 years; and
- Lower education, immunization, and food subsidy costs that far exceed family planning program costs.

These accomplishments are the result of a highly cost-effective family planning program. The LE 2,402 million spent on family planning during the 25-year period between 1980 and 2005 was more than offset by the LE 45,838 million cost savings in education, immunization, and food subsidies. These savings have allowed Egypt to maintain and improve the quality of public services in these sectors and ultimately the quality of life of Egyptians. Undoubtedly, as other studies have shown, other sectors, such as general healthcare, housing, job opportunities, and national economic growth, have also benefited from the family planning program.

With an expected decline in donor funding for family planning in the near future, the results presented here show that substantial benefits have already accrued to Egypt. It is clear that Egypt would be prudent to maintain the program at current and even higher levels by allocating funds to replace those that are expected to be reduced by the phaseout of international donors.

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