FamPlan

Version 4

A Computer Program for Projecting Family Planning Requirements

Spectrum System of Policy Models

By John Stover, Laura Heaton and John Ross
Futures Group

The POLICY Project

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FamPlan is based in methodologies developed by John Stover and John Ross of the Futures Group, and by Dennis Chao of Research Triangle Institute

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I. Introduction

A. Description of the Spectrum System

1. Components

The POLICY Project and its predecessor projects have developed computer models[1] that analyze existing information to determine the future consequences of today's population programs and policies. The new Spectrum Policy Modeling System consolidates previous models into an integrated package containing the following components:

Spectrum consolidates DemProj, FamPlan, Benefit-Cost, AIM, CR, RAPID, and PMTCT models into an integrated package.

- **Demography (DemProj)** – A program to make population projections based on (1) the current population, and (2) fertility, mortality, and migration rates for a country or region.
- **Family Planning (FamPlan)** – A program to project family planning requirements in order for consumers and/or nations to reach their goals of contraceptive practice or desired fertility.
- **Benefit-Cost** – A program for comparing the costs of implementing family planning programs, along with the benefits generated by those programs.
- **AIDS (AIDS Impact Model – AIM)** – A program to project the consequences of the AIDS epidemic.
- **Condom Requirements (CR)** – A program to forecast national condom requirements for both family planning and HIV/AIDS prevention, focusing on the critical groups at risk in the population.
- **Socioeconomic Impacts of High Fertility and Population Growth (RAPID)** – A program to project the social and economic consequences of high fertility and rapid population growth for sectors such as labor force, education, health, urbanization and agriculture.
- **Prevention of Mother-to-Child Transmission (PMTCT**) – A program to evaluate the costs and benefits of programs to reduce mother-to-child transmission of HIV.

[1] The terms "model" and "module" are used interchangeably in the Spectrum manuals to refer to the computer programs within the system.

2. Software Description

Spectrum is a Windows-based system of integrated policy models. The integration is based on DemProj, which is used to create the population projections that support many of the calculations in the other components—FamPlan, Benefit-Cost, AIM, CR, RAPID, and PMTCT.

Each component has a similarly functioning interface which is easy to learn and to use. With little guidance, anyone who has a basic familiarity with Windows software will readily be able to navigate the models to create population projections and to estimate resource and infrastructure requirements. The accompanying manuals contain both instructions for users, and equations for persons who want to know exactly how the underlying calculations are computed.

B. Uses of Spectrum Policy Models

Policy models are designed to answer a number of "what if" questions. The "what if" refers to factors that can be changed or influenced by public policy.

Policy models are designed to answer a number of "what if" questions relevant to entities as small as local providers of primary health care services and as large as international development assistance agencies. The "what if" refers to factors that can be changed or influenced by public policy.

Models are commonly computerized when analysts need to see the likely result of two or more forces that might be brought to bear on an outcome, such as a population's illness level or its degree of urbanization. Whenever at least three variables are involved (such as two forces and one outcome), a computerized model can both reduce the burden of manipulating those variables and present the results in an accessible way. Some of the policy issues commonly addressed by the Spectrum set of models include:

- the utility of taking actions earlier rather than later. Modeling shows that little in a country stands still while policy decisions are stalled and that many negative outcomes can accumulate during a period of policy stasis.
- the evaluation of the costs vs. the benefits of a course of actions. Modeling can show the economic efficiency of a set of actions (i.e., whether certain outcomes are achieved more effectively than under a different set of actions), or simply whether the cost of a single set of actions is acceptable for the benefits gained.

- the recognition of interrelatedness. Modeling can show how making a change in one area of population dynamics (such as migration rates) may necessitate changes in a number of other areas (such as marriage rates, timing of childbearing, etc.).
- the need to discard monolithic explanations and policy initiatives. Modeling can demonstrate that simplistic explanations may bear little relationship to how the "real world" operates.

A set of policies under consideration may not be acceptable to all stakeholders.

- the utility of "door openers." A set of policies under consideration may not be acceptable to all stakeholders. Modeling can concentrate on favored goals and objectives and demonstrate how they are assisted by the proposed policies.
- that few things in life operate in a linear fashion. A straight line rarely describes social or physical behavior. Most particularly, population growth, being exponential, is so far from linear that its results are startling. Modeling shows that all social sectors based on the size of population groups are heavily influenced by the exponential nature of growth over time.
- that a population's composition greatly influences its needs and its well being. How a population is composed—in terms of its age and sex distribution—has broad-ranging consequences for social welfare, crime rates, disease transmission, political stability, etc. Modeling demonstrates the degree to which a change in age and sex distribution can affect a range of social indicators.
- the effort required to "swim against the current." A number of factors can make the success of a particular program harder to achieve; for example, the waning of breastfeeding in a population increases the need for contraceptive coverage. Modeling can illustrate the need for extra effort—even if simply to keep running in place.

C. Organization of the Model Manuals

Each manual begins with a discussion of what the model does and why someone would want to use it. The manual also explains the data decisions and assumptions needed before the model can be run, and possible sources for the data. It defines the data inputs and outputs. The manual contains a tutorial, information on the methodology behind the model, a glossary, and a bibliography.

D. Information about the POLICY Project

The POLICY Project is a USAID-funded activity designed to create a supportive environment for family planning and reproductive health programs through the promotion of a participatory process and population policies that respond to client needs. To achieve its purpose, the Project addresses the full range of policies that support the expansion of family planning and other reproductive health services, including:

- national policies as expressed in laws and in official statements and documents;
- operational policies that govern the provision of services;
- policies affecting gender roles and the status of women; and
- policies in related sectors, such as health, education and the environment that affect populations.

The POLICY Project is implemented by the Futures Group in collaboration with Research Triangle Institute (RTI) and the Centre for Development and Population Activities (CEDPA).

More information about the Spectrum System of Policy Models and the POLICY Project is available from:

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E. What is FamPlan?

In the past several decades, more and more governments have become conscious of the importance of population and fertility as a key factor in human rights, the health of mothers and children, and social and economic development. Most developing countries now have population policies and programs and consider population in their national development plans. The 1994 International Conference on Population and Development (ICPD) held in Cairo encouraged all countries to adopt goals of meeting the reproductive health needs of their populations within the next few decades. Thus, it becomes increasingly important to (1) ensure that the adopted goals and timetables are feasible and (2) determine the requirements for achieving the goals. Only then will the goals be effectively used in development planning and the implementation of expanded family planning programs.

In 1986, The Population Council and The Futures Group developed the Target-Setting Model (Bongaarts and Stover, 1986). This model determined the family planning requirements to meet specific fertility goals. It could be used to determine the number of family planning users, new acceptors, and commodities required by method and source to achieve a total fertility rate (TFR) goal given estimates of changes in the other proximate determinants of fertility (i.e., the proportion of women of reproductive age in union, postpartum infecundability, etc.; see Chapter III). Researchers and family planning program managers widely used that model. It was implemented in two computer programs and produced in English, French and Spanish.

In 1993 The Futures Group produced a revised version of this model called Target-Cost. This version expanded the model's scope in several ways, primarily by adding a cost component to the calculations. A detailed manual was also prepared containing information on costing family planning programs. The computer program was available in English, French, Spanish, Russian and Vietnamese.

In 1989 Research Triangle Institute began the development of FamPlan. FamPlan could also project the numbers of users and acceptors required to meet a fertility or prevalence goal, but was used most often to project the future implications of achieving a certain number of acceptors of different family planning methods. In addition, FamPlan contained a module to calculate the costs and benefits of family planning and to calculate the improvements in per capita coverage of social services that

might be expected as a result of reduced population growth.

The new family planning module in Spectrum continues the FamPlan name and incorporates elements of the previous programs. The benefit-cost portion of the old FamPlan model has been moved to a separate module in Spectrum.

The new family planning module (FamPlan,Version 4) incorporates a number of changes suggested by users of earlier versions of both Target and FamPlan as well as changes required to meet the new needs of reproductive health programs following the ICPD guidelines. First, it includes a number of new options for setting program goals (meeting unmet need, achieving desired fertility). Second, it contains some modifications to the equations of the proximate determinants of fertility that have been developed from the wealth of new information from Demographic and Health Surveys since the original framework was developed. Third, the program includes some new options to make it more flexible (such as calculating on an age-aggregate or age-specific basis). Finally, the program has been rewritten in Windows and integrated into the Spectrum system of policy models under the POLICY Project.

It should be noted that the provision of high-quality family planning services is a complicated process requiring skilled and dedicated personnel; appropriate technologies, legislation and infrastructure; and adequate funds. Although FamPlan can be used to calculate the family planning program costs to achieve a particular goal, it does not imply that the goals can be achieved merely by allocating the necessary funds.

In recent years there has been much public discussion about the use of targets in family planning programs. In some programs, national targets are translated into regional, district, facility and even personnel targets. In some cases, individual family planning workers are given annual targets for new acceptors that they must meet. These approaches have been rightly criticized. They put the emphasis on achieving numerical contraception targets rather than on providing high-quality reproductive health services to those who need it. They also encourage misreporting by family planning workers trying to achieve impossible targets. India, for example—in recognition of these problems—announced the abolition of its national targeting system in April 1996. FamPlan is not intended to be used for setting individual targets for family planning workers.

FamPlan's purpose has always been to help planners and policymakers understand the requirements for achieving national goals. Users have always been encouraged to think about the needs of the population when considering future goals. This latest version of FamPlan includes additional options that make this point even more explicit. Goals can be set in terms of meeting unmet need or achieving the desired fertility rate. The use of FamPlan for examining national goals should not be confused with the practice of setting individual-level targets for family planning workers. In countries such as India, where target-driven approaches are being discarded, there is an urgent need for new approaches to setting goals and monitoring achievement. Various approaches based on unmet need and desired fertility have been proposed and are being tested. FamPlan can help in the development and application of these new approaches by illustrating the requirements to achieve various need-based goals.

F. Why Make Family Planning Projections?

Family planning projections may be made for several reasons. One of the most common reasons is to estimate the service and resource requirements to meet a family planning goal. The goal may be expressed in terms of demand (i.e., meeting unmet need, achieving the desired total fertility rate); resources available (how much can be done with a given level of expenditure); continuance or improvement of past trends (in terms of annual increases in prevalence or acceptors); health indicators (reducing the number or percentage of high-risk births); or in demographic terms (achieving a goal for population growth rate or the total fertility rate, such as replacement-level fertility). Family planning projections can help in setting the goal. By showing the resources required to achieve any proposed goal, these projections can help planners choose goals that are attainable and useful.

Once goals are chosen, it is important to estimate the service and resource requirements to achieve those goals. This is important at the aggregate level and even more important when disaggregated by sector. Thus the plan can be specific about the contribution expected from the commercial sector and from nongovernmental organizations (NGOs), for example. The public sector resources required to achieve the goal can be estimated and planned for several years.

Another important use of family planning projections is the examination of alternative program configurations. Rather than simply project the current configuration into the future, the analyst can ask, "What would happen if new methods were introduced? How much would it help if the commercial sector could be stimulated to contribute more? Would the addition of a small fee for public sector services have a significant impact on the ability of the program to achieve its goals?"

II. Steps in Making Family Planning Projections

There are six key steps in making most population-based projections within FamPlan. The amount of time spent on each step may vary, depending on the application, but most projection activities will include at least these six steps.

1. **Prepare a demographic projection.** FamPlan requires a population projection prepared with DemProj. This projection should be prepared first or at the same time as the FamPlan projection. The first year and final year of the DemProj projection will determine the span of the FamPlan projection; the DemProj manual contains instructions on the steps associated with this module.
2. **Collect data.** At a minimum, two types of base year data need to be collected: (1) information on the proximate determinants of fertility (see glossary) and (2) program characteristics, including method and source mix. Some additional information (unmet need, costs of services) is required for most projections. Since the projection will only be as good as the data on which it is based, it is worth the effort to collect and prepare appropriate and high-quality data before starting the projection.
3. **Make assumptions.** Family planning projections require assumptions about the future levels of the family planning goals and method characteristics. These assumptions should be carefully considered and based on reasonable selection guidelines.
4. **Enter data.** Once the base year data are collected and decisions made about projection assumptions, the FamPlan module of the Spectrum model can be used to enter the data and make a population projection.
5. **Examine projections.** Once the projection is made, it is important to examine it carefully. This includes consideration of the various family planning indicators produced. Careful examination of these indicators can act as a check to ensure that the base data and assumptions were understood and entered correctly into the computer program. This careful examination is also required to ensure that the consequences of the assumptions are fully understood.

6. **Make alternative projections.** Many applications require alternative projections. Once the base projection has been made, the program can be used to quickly generate alternative projections as the result of varying one or several of the model assumptions.

III. Family Planning Projection Inputs

FamPlan requires (1) data describing the use of family planning in the country or region being studied and (2) data about the use, effectiveness and costs of the different contraceptive methods and services. Some of these data (e.g., prevalence of contraceptive use) must be specific for the area being studied and some of the data (e.g., method effectiveness) can be based either on local data or on international averages when local data are unavailable. The purpose of this chapter is to discuss sources of data that can be used to specify the required inputs and to suggest default values that may be used when local data are unavailable. Each of the required variables is discussed below.

A. Projection Options and Assumptions

FamPlan contains a number of different options that can be used to tailor the model to the needs of different situations. The first four options are all alternative ways of specifying a fertility or contraceptive prevalence goal, while the fifth option relates to family planning expenditures. These options are explained below.

1. Goal Selection

In order to make a projection of family planning requirements, it is necessary to state the goal of the family planning program. In the FamPlan program, there are five possible goals from which you can select. They are:

Reducing Unmet Need for Contraception

This approach follows the recommendations of the 1994 International Conference on Population and Development. It allows you to specify the current use of contraception and the unmet need for contraception. Unmet need is concerned with exposure to an unintended pregnancy. As such, the concept includes both the current exposure to pregnancy and the wishes of a woman. To be at risk of a pregnancy, a woman needs to be in a relationship, be neither currently pregnant nor amenorrheic as a result of a recent pregnancy, be fertile and pre-menopausal, and not be using contraception. Fertility preferences are equally important. Women with an unmet need are those who are

at risk of pregnancy and either want no more children or want no children in the next two years. In sum, unmet need refers to couples who should logically be using contraception based on their fertility desires and susceptibility to a pregnancy, but for some reason are not using contraception.

There are three main categories of women who are classified as having an unmet need for contraception: (1) women who do not want another birth soon, but are exposed to the risk of pregnancy and are not using any method of contraception; (2) women who have had a recent birth that was unwanted or mistimed and did not use contraception to try to prevent that pregnancy; and (3) women who are currently pregnant but either did not want the current pregnancy or did not want it at this time and were not using contraception to try to prevent it. Estimates of unmet need are available from most fertility surveys.

Unmet need is often expressed as unmet need for spacing and for limiting. Unmet need for spacing refers to those women who say that they want more children in the future, but not within the next two years. Unmet need for limiting refers to those women who say they do not want any more children.

To use this goal with FamPlan, you specify the net percentage of current unmet need that will be converted to contraceptive use by some time in the future. This amount of unmet need is added to current prevalence to determine the required prevalence in the future. Calculations may be done separately for spacing and limiting or for both types of need combined.

For example, assume that the prevalence of contraception is currently 20 percent. Also assume that the unmet need for contraception is measured at 10 percent. If you specify that 50 percent of unmet need should be met by the year 2000, then prevalence in the year 2000 would be set at 25 percent (20 percent current prevalence plus one-half of unmet need).

Of course, reality is more complicated. During the projection period, some people who are currently using contraception will stop. Some people with an unmet need will start using while others will not. Some people who currently have no need for contraception will become users during the projection period. Finally, people will move in and out of the unmet need category during the projection period as their situation changes. Even if 100 percent of

current unmet need is satisfied by some future year, new unmet need may be created as fertility desires change, so that unmet need will not necessarily drop to zero.

This approach is not intended to suggest that prevalence will increase in the future simply by having more people with an unmet need start using contraception. However, this approach is a useful way for programs to think about the future when making projections of resource requirements, since it is grounded in current use and one measure of current need for contraception.

Achieving Desired Fertility

A second alternative is to specify the current level of the total fertility rate and the desired fertility rate and then to set a goal in terms of how quickly the desired fertility rate can be achieved. The desired fertility rate, also called the wanted total fertility rate, is an indicator similar to the total fertility rate. It indicates the average number of children that a woman would have *if her expressed fertility desires were achieved*. The wanted total fertility rate is calculated as the level of fertility that would have prevailed during the past few years if all unwanted births had been prevented. Unwanted births are defined as those births which would cause the number of surviving children to a woman to exceed her stated desired family size.

To choose this option in FamPlan, users specify the percent reduction in the difference between the actual TFR and the desired TFR by some future year. In this case, the future TFR is determined and FamPlan calculates the required prevalence to achieve this goal.

For example, suppose the current TFR is 5.0 and the desired TFR is 4.0. If the goal were to reduce the difference between the two by 50 percent by 2000, then the TFR goal for 2000 would be calculated to be 4.5.

Reaching a Goal for Contraceptive Prevalence

In this approach, a contraceptive prevalence goal for the future is set. Certainly when setting this goal, the analyst should take into account the current prevalence as well as the amount of unmet need and the proportion of women who say they intend to use contraception in the near future. Contraceptive goals may also be based on rules of thumb (i.e., the most successful programs increase prevalence by about two percentage points per year).

Reaching a Goal for the Total Fertility Rate

The program goal may also be expressed as a future level of the total fertility rate for the region or nation. This approach is often used when the goal is to calculate the program requirements to achieve replacement-level fertility by some future year.

Restricting Expenditures to a Specified Level

FamPlan projections can also be used to calculate the program performance that could be sustained with a given level of funding. In this approach, you specify the amount of funding available for the program for each year of the projection. FamPlan calculates the services that could be provided with this funding and the prevalence, as well as the consequences of that level of services upon the TFR. Care is needed to interpret projections made using this option. The program can calculate the amount of services that could be provided with a given level of funding; however, that does not mean that the demand for those services would necessarily be there just because the funding was available.

2. Contraceptive Methods

The family planning program must be described in terms of the contraceptive methods that are available. All methods that are available in the program or that might become available during the projection period should be included in the analysis. The methods that may be included in FamPlan projections are:

- Condom
- Female sterilization
- Injectable
- IUD (intrauterine device)
- Male sterilization
- Norplant (contraceptive implant)
- Pill
- Rhythm
- Traditional
- Vaginal barrier
- Vaginal tablets
- Withdrawal
- Other

3. Contraceptive Sources

Sources of contraception may also be specified in FamPlan projections. The user has complete flexibility in specifying sources. The list can be simple and generic, such as "public," "private," and "NGO" or may include specific sources such as "Ministry of Health clinics," "social marketing," "Profamilia," etc. All the important sources of family planning services and commodities should be included.

4. Age Group Aggregation

There are two age group options available in FamPlan: ages 15-49 clustered into one single age group, or seven five-year age groups (15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49). Either option will work reasonably well. More precise estimates will be produced with five-year age groups. However, the data requirements are considerably larger and the extra precision may not be needed for many projections. Generally, the five-year age group option should be chosen for full-scale applications that are made for planning purposes, and the single age group option may be used when the projections are being used to illustrate trends or to do initial examinations of potential future goals.

5. Induced Abortion Estimation

The specification of induced abortion is always a problem in FamPlan projections. Abortion is an important proximate determinant in many countries. However, good information about the amount of abortion is often not available. In practice, the number of abortions may have little impact on the projections if the abortion rate does not change significantly over the projection period. In many cases, users are tempted to assume that abortion will not change just because there are no good data on abortion.

In order to make it more likely that users will consider abortion carefully, FamPlan provides two methods of specifying the effects of abortion. In the first, the user specifies the total abortion rate. This is the average number of abortions that a woman would have during her lifetime if she survived to age 50 and had abortions according to the current pattern of age-specific abortion rates. This is the standard approach. When data are available they are often expressed in terms of the total abortion rate. The disadvantage to this approach is that the user may have little feeling for how this rate may change in the future.

In the second approach, the user specifies the proportion of unwanted pregnancies that end in abortion. It may be more difficult to find country-specific data to make this assumption, but the advantage to using this number is that it allows the total abortion rate to vary within the model in the future (even if the proportion of unwanted pregnancies ending in induced abortion remains constant) due to changes in prevalence and unmet need.

As noted, however, it is very difficult to obtain a good empirical estimate of the proportion of unwanted pregnancies which terminate in induced abortions. This type of information needs to come from surveys—but abortions are notably underreported in surveys, especially in those countries where abortion is illegal and/or is socially disapproved. That a pregnancy was unintended is also underreported in retrospective surveys.

This option of FamPlan, then, serves best as a modeling option. It permits comparing the consequences of all vs. some vs. none of the unintended pregnancies being terminated by abortions. A recent figure for the United States showed that nearly half (47 percent) of its unintended pregnancies end in abortion (and 13 percent in miscarriage; Gold, 1990). This figure could be a starting point for illustrative comparisons.

B. Fertility Level

A family planning projection may require an assumption about the total fertility rate if the goal is to achieve a certain TFR or to reduce the difference between the desired TFR and the actual TFR. (For other goals, the TFR is calculated as an output of the projection.)

1. The Total Fertility Rate

Base Year Estimates of the Total Fertility Rate

The TFR is the number of live births a woman would have if she survived to age 50 and had children according to the prevailing pattern of childbearing at each age group. It is a synthetic measure since no individual woman will necessarily have this number of children (since it is usually not a whole number of births) and it is not an average of the number of live births for currently living women. Rather, it expresses the current level of fertility in terms of the average number of live births that would occur per woman if the current age-specific fertility rates remained constant and all women survived to age 50.

Estimates of the TFR are available from a number of sources. The best sources will be national fertility surveys, which have been conducted by most countries. A large number have been conducted under a series of international projects, including the Demographic and Health Surveys (DHS), the Centers for Disease Control and Prevention (CDC) Fertility Surveys, the Contraceptive Prevalence Surveys (CPS) and the World Fertility Surveys (WFS). Information from these and other national surveys is collected and reported in a variety of sources, including summary reports from the DHS, the Population Reference Bureau's *World Population Data Sheet*, and the *World Development Indicators* from the World Bank. Internet sources of information include the U.S. Census Bureau (http://www.census.gov/ipc/www/), and Macro International (http://www.macroint.com/dhs/).

Future Assumptions of the Total Fertility Rate

There are several means by which a TFR goal may be selected.

1. **National projections.** Many countries have official population projections that include assumptions about the future course of TFR, often with several variants. If population projections are being made for planning purposes, it is often recommended that the official assumptions and projections be used.

2. **National goals.** Many countries have national population goals that often include TFR. It is often useful to use these goals as a starting point for projections. One projection may assume that the TFR goal is achieved, while others may examine the effects of a delay in achieving the goal. Sometimes goals are expressed in terms of crude birth rates, population growth rates, or contraceptive prevalence rates instead of TFR. In these cases, different TFR assumptions may be tried to discover a TFR projection that is consistent with the national goals for these other indicators.

3. **United Nations projections.** The population projections prepared by the United Nations Population Division and reported in *World Population Prospects* include three assumptions (low, medium and high) about future fertility for each country included in the report. These fertility assumptions may be used. The disadvantage to using these projections is that it is not clear what "low," "medium" and "high" mean. The U.S. Census Bureau projections also contain a set of TFR assumptions.

4. **Recent trends and international experience.**
If information is available on TFR for several years, it may be useful to analyze the trends in TFR and develop a future assumption based on continuing past trends. It should be noted, however, that past trends cannot be expected to continue for very long into the future. TFR rarely declines at a constant pace throughout an entire demographic transition. Rates of decline are often slow at first, increase during the middle of the transition, and slow again as they approach replacement-level fertility. **Table 1** shows the experience with fertility decline for a number of countries with good estimates of fertility from two different years.

Table 1: Historical Declines in TFR for Selected Countries

Country	First Year	TFR	Second Year	TFR	5-Year Change
Uganda	1988	7.4	1995	6.9	-0.4
Senegal	1986	7.3	1993	6.0	-0.9
Ghana	1988	6.9	1993	5.5	-1.4
Mali	1987	6.7	1996	6.7	0.0
Kenya	1989	6.7	1993	5.4	-1.6
Zambia	1992	6.5	1996	6.1	-0.5
Tanzania	1992	6.3	1996	5.8	-0.5
Guatemala	1987	5.9	1995	5.1	-0.5
Average for high-fertility countries	–	**6.7**	–	**5.9**	**-0.7**
Zimbabwe	1988	5.3	1994	4.3	-0.9
Nepal	1987	5.1	1996	4.6	-0.3
Bolivia	1989	4.9	1994	4.8	-0.1
Morocco	1987	4.6	1992	4.0	-0.5
Egypt	1988	4.4	1992	3.9	-0.6
Peru	1986	4.1	1992	3.5	-0.5
Morocco	1992	4.0	1995	3.3	-1.2
Average for medium-fertility countries	–	**4.6**	–	**4.1**	**-0.6**
Egypt	1992	3.9	1995	3.6	-0.5
Dominican Republic	1986	3.7	1991	3.3	-0.4
Dominican Republic	1991	3.3	1996	3.2	-0.1
Indonesia	1987	3.3	1991	3.0	-0.4
Indonesia	1991	3.0	1994	2.9	-0.3
Colombia	1990	2.9	1995	3.0	0.1
Colombia	1986	3.3	1990	2.9	-0.6
Average for low-fertility countries	–	**3.4**	–	**3.1**	**-0.3**

Source: Various Demographic and Health Surveys.

5. **Socioeconomic development and population program effort**. Studies have shown that the pace of fertility decline is related to the level of socioeconomic development of a country and the amount of effort put into the family planning program (Bongaarts, Mauldin, and Phillips 1990). These studies are summarized in **Table 2**, which shows the decline in the TFR as a function of these two factors. This experience can be used to develop realistic assumptions about the rate at which fertility could decline in the future in any given country. **Table 2** shows that the most rapid fertility declines experienced during this period were for countries with strong family planning programs and high levels of socioeconomic development.

Table 2: Declines in TFR from 1975 to 1990 by Level of Program Effort During 1982-1989 and Socioeconomic Setting in 1985

Socioeconomic Setting, 1985	Program Effort, 1982-1989							
	Strong		Moderate		Weak		Very Weak or None	
High	Mexico	1.7	Jamaica	1.7	Jordan	1.5	Kuwait	2.4
	Taiwan	1.5	Korea, PDR	1.4	Brazil	1.2	Iraq	0.7
	Colombia	1.3	Panama	1.1	Lebanon	1.1	*Average*	*1.5*
	Korea, Rep	1.3	Trinidad & Tobago	0.8	Venezuela	1.0		
	Mauritius	0.7			Costa Rica	0.7		
	Singapore	0.3	Cuba	0.6	*Average*	*1.1*		
	Average	*1.1*	Chile	0.5				
			Average	*1.0*				
Upper Middle	Thailand	1.8	Tunisia	2.0	Algeria	2.6	Libya	0.8
	Indonesia	1.5	Botswana	1.8	Peru	1.7	Saudi Arabia	0.7
	Sri Lanka	1.2	Ecuador	1.6	Zimbabwe	1.4		
	China	1.1	Dominican Republic	1.5	Guyana	1.3	*Average*	*0.7*
	Average	*1.4*			Syria	1.2		
			El Salvador	1.3	Iran	1.0		
			Egypt	1.1	Turkey	1.0		
			Philippines	0.9	Guatemala	0.8		
			Malaysia	0.6	Paraguay	0.6		
			Average	*1.4*	Congo	0.0		
					Average	*1.2*		
Lower Middle	India	1.0	Morocco	2.0	Honduras	1.5	Bolivia	1.2
			Vietnam	1.4	Kenya	1.4	Myanmar	1.0
			Average	*1.7*	Zambia	0.8	Liberia	0.0
					Tanzania	0.7	Cote d'Ivoire	-0.0
					Papua New Guinea	0.6	Lao PDR	-0.1
					Pakistan	0.5	Congo	-0.2
					Haiti	0.5	Cambodia	-0.6
					Cameroon	0.5	*Average*	*0.2*
					Nigeria	0.5		
					Lesotho	0.4		
					Ghana	0.4		
					Madagascar	0.3		
					CAR	0.2		
					Average	*0.6*		
Low			Bangladesh	2.0	Rwanda	1.7	Mauritania	0.9
			Nepal	0.8	Senegal	0.6	Sudan	0.7
			Average	*1.4*	Afghanistan	0.2	Malawi	0.2
					Mali	0.0	Chad	0.0
					Guinea	0.0	Somalia	0.0
					Burundi	0.0	Benin	0.0
					Togo	0.0	Ethiopia	-0.2
					Mozambique	0.0	*Average*	*0.3*
					Sierra Leone	0.0		
					Burkina Faso	0.0		
					Guinea Bissau	-0.2		
					Uganda	-0.4		
					Niger	-0.5		
					Average	*0.1*		

Source: W. Parker Mauldin and John Ross, unpublished analysis.

6. **Socioeconomic status**. An alternative method of estimating a likely decline in the fertility rate is to examine TFR by socioeconomic status. National fertility surveys usually report TFR by urban/rural residence and education. Typically, TFR is lower for urban women than for rural women, and lower for women with more than a primary education. If we can estimate the proportion of women who will be urban residents or who will have more than primary education in the target year, a new estimate of TFR can be prepared, assuming that TFR remains constant by socioeconomic group. For example, assume that the TFR is 4 for urban women and 6 for rural women, and that 30 percent of the population is urban. The total TFR will be 5.4. If it is expected that in the target year, 50 percent of the population will be urban, and that the new urban migrants will adopt the behavior of current urban dwellers, then the TFR will drop to 5.0 (0.5 x 4 + 0.5 x 6). This approach will indicate the decline in TFR that might be expected from development alone, without a significant increase in family planning efforts.

C. Contraceptive Prevalence

A family planning projection may require an assumption about contraceptive prevalence if the goal is to achieve a certain level of prevalence or to meet unmet need. (For other goals, contraceptive prevalence is calculated as an output of the projection.)

Contraceptive prevalence consists of the percentage of women of reproductive age who are in union and who use contraception. Estimates of prevalence are usually derived from national surveys, including the DHS. Recent estimates of contraceptive prevalence are given for more than 100 countries in **Table 3**. Prevalence may be further disaggregated to use of contraception for spacing and limiting. These categories are constructed from survey questions that ask respondents whether they want any more children and, if so, when they want them. Those who are using contraception and report that they want no more children are classified as using contraception for limiting. Those who are using contraception and report that they do want more children but not right away are classified as using contraception for spacing.

Table 3: Contraceptive Prevalence of Women in Union by Year of Survey

Country	Prevalence	Year
AFRICA		
Algeria	47	1992
Benin	9	81/82
Botswana	33	1988
Burkina Faso	8	1993
Burundi	9	1987
Cameroon	16	1991
Cen. African Rep.	24	94/95
Cote D'Ivoire	11	1994
Egypt	46	1992
Ethiopia	4	1990
Gambia	12	1990
Ghana	20	93/94
Kenya	33	1993
Lesotho	23	91/92
Liberia	6	1986
Madagascar	17	1992
Malawi	13	1992
Mali	5	1987
Mauritania	3	1990
Mauritius	75	1991
Morocco	50	1995
Namibia	29	1992
Niger	4	1992
Nigeria	6	1990
Reunion	67	1990
Rwanda	21	1992
Senegal	7	92/93
South Africa	50	87/89
Sudan	8	1993
Swaziland	20	1988
Tanzania	20	1994
Togo	12	1988
Tunisia	60	1994
Uganda	5	88/89
Zaire	8	1991
Zambia	15	1992
Zimbabwe	48	1994
ASIA		
Bahrain	53	1989
Bangladesh	46	1994
China	83	1992
Hong Kong	81	1987
India	41	92/93
Indonesia	55	1994
Iraq	14	1989
Japan	59	1994
Jordan	35	1990
Kazakhstan	59	1995
Kuwait	35	1987
Lao PDR	19	1993
Malaysia	48	1988
Nepal	23	1991
Oman	9	88/89
Pakistan	12	90/91
Philippines	40	1993
Qatar	32	1987
Rep. Korea	79	1991
Singapore	74	1982
Sri Lanka	66	1993
Syria	36	1993
Thailand	66	1987
Turkey	63	1993
Viet Nam	65	1994
Yemen	7	91/92
EUROPE		
Austria	71	81/82
Belgium	79	1991
Bulgaria	76	1976
Czech Rep.	69	1993
Denmark	78	1988
Finland	80	1977
France	75	1994
Germany	75	1992
Hungary	73	1993
Italy	78	1979
Netherlands	80	1993
Norway	76	1988
Poland	75	1977
Portugal	66	79/80
Romania	57	1993
Slovakia	74	1991
Spain	59	1985
Sweden	78	1981
Switzerland	71	1980
United Kingdom	82	1993
Yugoslavia	55	1976
NORTH AMERICA		
Canada	73	1984
U.S.A.	71	1990
OCEANIA		
Australia	76	1986
New Zealand	70	1976

Country	Prevalence	Year	Country	Prevalence	Year
CARIBBEAN			**LATIN AMERICA**		
Bahamas	62	1988	Belize	47	1991
Barbados	55	1988	Bolivia	45	93/94
Cuba	70	1987	Brazil	66	1986
Dominican Rep.	56	1991	Colombia	66	1990
Guadeloupe	44	1976	Costa Rica	75	92/93
Haiti	18	1994	Ecuador	57	1994
Jamaica	62	1993	El Salvador	53	1993
Martinique	51	1976	Guatemala	23	1987
Puerto Rico	70	1982	Guyana	31	1975
Trinidad & Tobago	53	1987	Honduras	47	91/92
			Mexico	53	1987
			Nicaragua	49	1992
			Guyana	31	1975
			Paraguay	48	1990
			Peru	59	91/92
			Venezuela	49	1977

Source: United Nations Population Division, 1996, *World Population Monitoring 1996*, Table A. 23.

Although trends in prevalence vary from country to country, in the most successful programs, contraceptive prevalence increases by about two percentage points a year. Increases above this rate are not likely to be sustainable over the long term. **Table 4** shows the historical experience with changes in contraceptive prevalence for a number of countries. Note that few countries sustained prevalence increases of 2 percent or more for the 10-year period. Most experienced increases between 1 and 2 percent and many had increases of less than 1 percent.

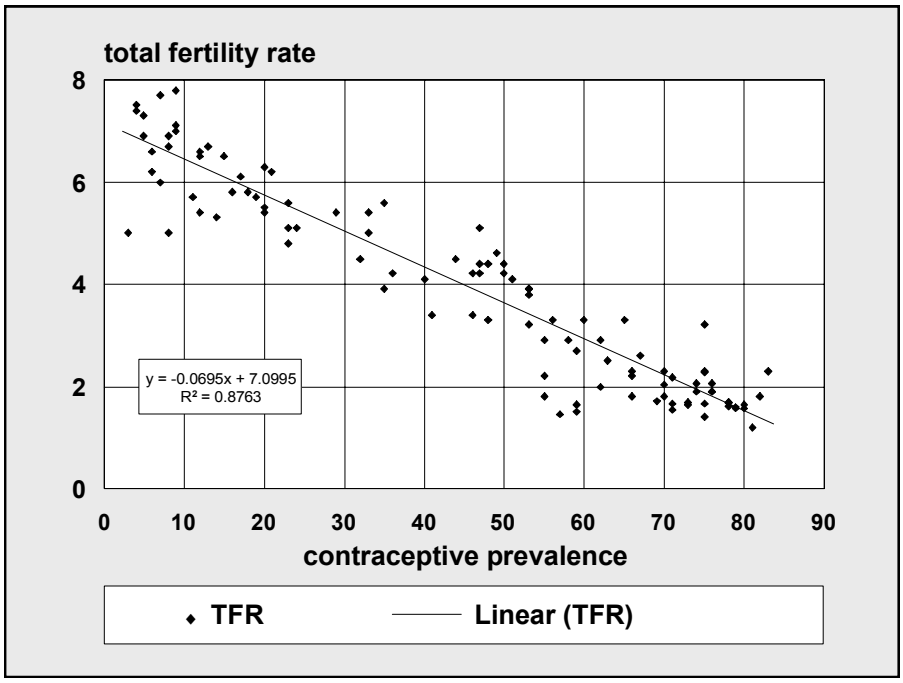
Table 4: Annual Increase in Contraceptive Prevalence Around 1980-1990 for Selected Countries, by Prevalence at the Beginning of the Period

Annual Percentage-Point Increase in Contraceptive Prevalence			
Prevalence circa 1980	**Less than 1.0**	**1.0-1.9**	**2.0 or More**
Less than 15 percent	Ghana Haiti Iraq Malawi Mauritania Nigeria Pakistan Senegal Sudan	Cameroon Lesotho Nepal Rwanda	
15-34 percent	Guatemala Jordan	Bolivia Botswana Ecuador Egypt Honduras India Indonesia Kenya Malaysia Morocco Nicaragua Philippines Tunisia	Bangladesh Grenada Mexico Sri Lanka
35-49 percent	Dominica El Salvador Saint Lucia	Barbados Colombia Dominican Republic Iran Paraguay Peru South Africa Zimbabwe	Algeria Antigua Saint Vincent and Grenadines
50-64 percent	Panama Puerto Rico Trinidad and Tobago	Jamaica Singapore Thailand Turkey	Republic of Korea
65+ percent	Costa Rica Hong Kong Mauritius		China

Source: *Levels and Trends of Contraceptive Use as Assessed in 1996.* New York: United Nations, 1996, Table 6.

As shown in **Figure 1**, contraceptive prevalence and total fertility rates have a close linear relationship. Each increase of 10 points in prevalence is associated with a decline in the total fertility rate of 0.7 births. The variation around the regression line is due to differences in the pattern of contraceptive use and differences in the other proximate determinants.

Figure 1: Total Fertility Rate by Contraceptive Prevalence of Women in Union, Circa 1990



D. Method Protection Attributes

"Method protection attributes" refers to the characteristics of method practice that are needed to calculate the number of users, acceptors and commodities required to meet the chosen goals. For the temporary methods (condoms, injections, pills and vaginal tablets), the key attribute is couple-years of protection, or CYP (defined below). The connection between the method used and the goal sought is in terms of the protection given to couples against unwanted pregnancy. For the longer-term methods (IUD and Norplant), the key attribute is the average duration of use. For the permanent methods (female and male sterilization), the duration of use is determined from the average age at the time of sterilization.

1. Commodity Units per CYP

FamPlan calculates the commodity consumption needed to achieve the family planning goal. For the temporary methods (condoms, injections, pills and vaginal tablets) the commodities needed are calculated from the number of units required to provide one couple-year of protection. One CYP is the protection required by one couple using a contraceptive method for an entire year.

For temporary hormonal methods, the number of units per CYP is determined by the recommended usage pattern and by any wastage that occurs. Theoretically, one CYP requires 13 cycles of pills or four injections of Depo-Provera or six injections of Noristerat, since these are the amounts required to protect one woman for an entire year. The actual number of units per CYP may be larger than this theoretical number because of wastage. For injectables, this wastage factor is likely to be small since it depends only on the clinical warehousing and distribution system. For pills the wastage factor could be considerably higher, particularly when pills are provided free.

For coitus-dependent methods (condoms and vaginal tablets), the number of units per CYP depends on the frequency of coitus and on wastage.

In 1997, USAID revised its recommended CYP factors based on a comprehensive study by the EVALUATION Project (Stover et al., 1997). These recommendations for the temporary methods are shown in **Table 5**.

Table 5: Standard Values of Commodity Units per CYP for Temporary Methods

Method	Units per CYP
Oral contraceptives	15 cycles
Condoms	120 condoms
Vaginal foaming tablets (VFTs)	120 tablets
Depo-Provera (injectable)	4 doses
Noristerat (injectable)	6 doses

Source: Stover et al., 1997.

2. Average Duration of Use

For the long-term methods (IUD and Norplant), the average duration of use determines the number of new acceptors (and thus the service requirements) required to achieve a certain number of users or method prevalence. Information on the average duration of use for the IUD is available from some DHS studies, from randomized clinical trials, and from follow-up studies. Stover et al. (1997) concluded that the average duration of use for IUDs is about 3.5 years. Since very little country-specific data are available, this figure is recommended for most countries.

The EVALUATION Project also reviewed information on duration of use of Norplant. Data are available from 11 countries. The recommended figure for average duration of use for Norplant is 3.5 years.

3. Average Age of Users

The single-age-group version of FamPlan does not require any age-specific information. All inputs such as "percent in union" and "percent using a method" refer to the entire group of women of reproductive age. Age-specific information is required only in the calculation of the number of users of each method who age out of the reproductive years. In practice, this calculation is only significant in the case of male and female sterilization. In this case, FamPlan estimates the percentage of users of each method who are aged 45-49 from the average age at the time of sterilization.

Aging out of the reproductive years is significant to a family planning model because the protection given by a long-term contraceptive method becomes moot after menopause. An IUD may be maintained in place, and of course a sterilization doesn't become reversed. But these methods no longer protect against pregnancy. The younger a couple is at the time a procedure is performed, then the more years of actual protection are given before such protection is no longer relevant.

The average age at the time of sterilization is usually available from service statistics or national surveys. **Table 6** shows the average age at the time of female sterilization for a number of countries.

Table 6: Average Age at Sterilization

Country/Region	AVSC Data*	DHS Data**
Africa	**36**	**36**
Ethiopia	35	-
Gambia	36	-
Ghana	37	-
Guinea	37	-
Kenya	33	33
Liberia	34	-
Madagascar	35	-
Malawi	35	-
Mali	39	-
Mauritius	33	-
Namibia	-	39
Nigeria	36	-
Rwanda	35	-
Sierra Leone	38	-
Tanzania	37	-
Uganda	36	-
Zaire	36	-
Zambia	37	-
Zimbabwe	36	-
Asia	**31**	**31**
Bangladesh	29	-
Indonesia	34	32
Nepal	28	-
Pakistan	34	33
Philippines	30	30
Sri Lanka	30	30
Thailand	-	29
Latin America	**31**	**31**
Bolivia	35	31
Brazil	32	31
Colombia	31	30
Dominican Republic	28	28
Ecuador	32	31
El Salvador	27	28
Guatemala	31	30
Mexico	31	36
Nicaragua	30	-
Paraguay	35	30
Peru	34	32
Trinidad & Tobago	32	-
Venezuela	32	-
North Africa / Near East	**36**	**35**
Egypt	38	39
Jordan	-	35
Morocco	36	33
Tunisia	35	33
Turkey	34	-

*AVSC= AVSC International (formerly the Association for Voluntary Surgical Contraception)

**DHS = Demographic and Health Surveys

Source: Stover et al., 1997.

E. Method Effectiveness

As used in FamPlan, method effectiveness is the proportion of users who do not become pregnant during a year of method use. For each method used in FamPlan, it is necessary to specify an average effectiveness rate, or the extent by which the practice of a method of contraception lowers fecundability. It is determined by both a population's ability to conceive and the extent of contraceptive method failure.

The EVALUATION Project recently reviewed a large number of studies of method effectiveness (Stover et al., 1997). That study found that method failure rates ranged from about 4 to 20 percent for the pill, 1 to 8 percent for the IUD and 11 to 40 percent for barrier methods. Failure rates for Norplant and injectables were found to be nearly zero. Based on these results, the recommended effectiveness rates for use in FamPlan are shown in **Table 7**. While the method failures normally do not make a large demographic impact, they can constitute a significant proportion of pregnancies at a given time.

Table 7: Effectiveness of Contraceptive Methods

Method	Effectiveness
Pill	92%
IUD	96%
Barrier methods	81%
Norplant	100%
Injectable	100%
Sterilization	100%

Source: Stover et al., 1997.

F. Method Mix

Method mix is the percentage of all users who use a particular method. These figures should sum to 100 percent. The best source of method mix for the base year is likely to be a national survey such as DHS, WFS or CPS.

Survey data can provide information useful to estimating future method mix patterns. Those who intend to use family planning in the future are often asked which methods they prefer to use. This preferred method mix may indicate which methods may be in demand in future years. Another approach is to examine the current mix of contraceptive users who are deemed "knowledgeable" about contraception. A "knowledgeable" user is often defined as a user who knows at least four modern methods. An alternative definition is users who have spontaneous

awareness of two supply methods and one clinical method and who also know where they can obtain each of these methods. The current method mix of these knowledgeable users may indicate likely future changes in method use if knowledge and access improve. A third approach is to examine the method mix currently being used by urban, educated women. These women are assumed to have good knowledge of methods and access to services. The method mix of this group may indicate likely future directions if the family planning program is able to increase knowledge and access.

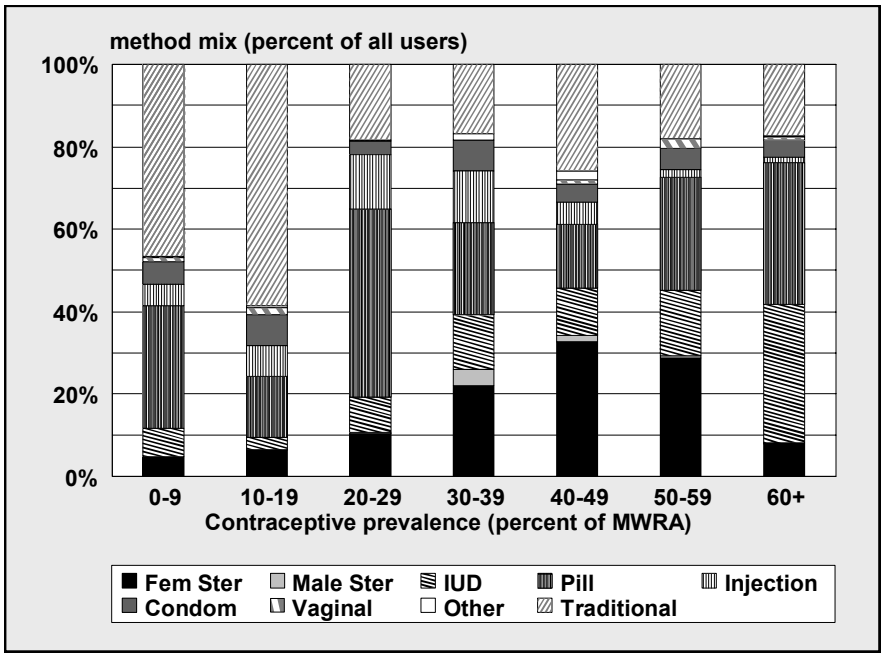
A more detailed approach to future method mix involves the definition of an appropriate method mix. An appropriate mix is the distribution of methods when every woman who needs to use contraception uses a method suited to her fertility goal and personal characteristics. For example, women who wish to delay the next birth are candidates for a temporary method of contraception, such as orals or the injectable. For those who do not want more children, sterilization or another long-term method is ideal. There are some women who have unrecognized physical health conditions or personal characteristics that place them at an elevated risk for problems related to pregnancy and childbearing. Included in this category are women who are too young or too old to have a child, women who recently had a birth and should ideally wait at least two years before having another child, and those who already have many children and, for health reasons, should not have more. Methods suited to the particular circumstances of current and potential users can define an appropriate method mix. The FamPlan model can be used to examine the resources required to allocate this appropriate method mix to the population.

More information on these approaches to defining the future method mix can be found in several publications of the OPTIONS Project. For more information see Galway and Stover (1995). The OPTIONS Project also developed a computer program, entitled MIX, to implement this methodology.

If the TFR is changing appreciably during the projection period, it is likely that method mix will also change. In addition, there may be specific program goals set by the family planning program regarding method mix. Whatever the case, careful thought should be given to how method mix will change in the future since a particular mix has different effects on a number of factors, including average effectiveness, prevalence, costs, and the logistics burden.

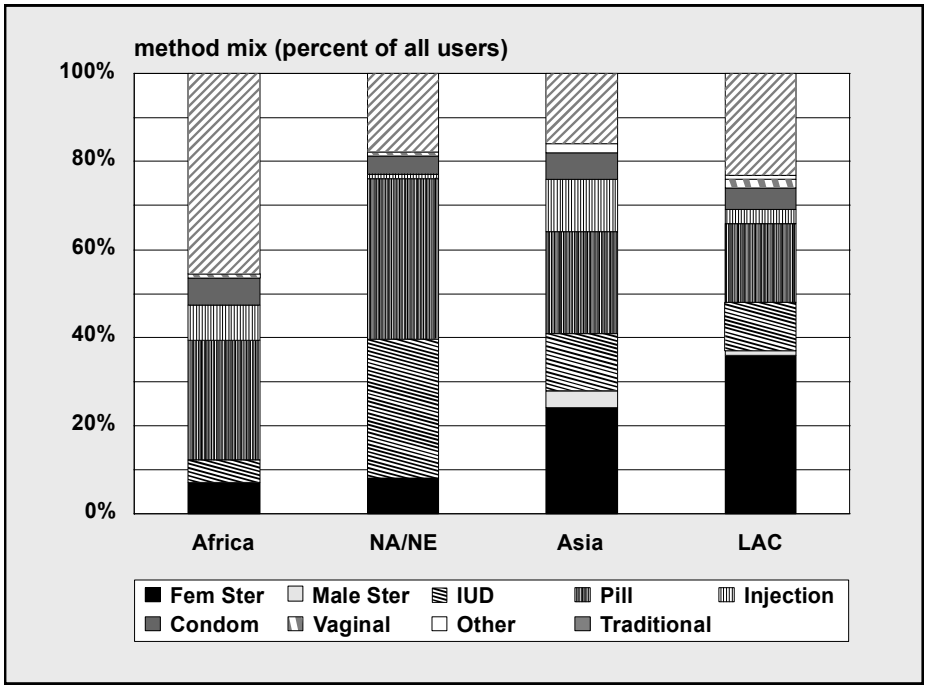
Figure 2 shows the average pattern of method mix for 69 Demographic and Health Surveys at different levels of prevalence. This chart includes countries at all prevalence levels and from all geographic regions. Thus African countries dominate the bars for low prevalence levels while Asian counties dominate the highest prevalence bars. Although there is considerable variation across countries, some generalizations are possible. The proportion of all use that is labeled as traditional methods generally declines as prevalence increases and the use of long-term methods (sterilization and IUD) increases. **Figure 3** shows the method mix pattern by region.

Figure 2: Average Method Mix by Prevalence



MWRA = married women of reproductive age

Figure 3: Average Method Mix by Region



LAC = Latin America and Caribbean
NA/NE = North Africa and Near East

G. Source Mix

FamPlan can also project requirements by source if information on sources is available. If information is unavailable or output on requirements by source is not desired, the inputs for source mix can be ignored. If source-specific information is required, the source mix in the base year and future years must be entered. The source mix is the percentage of all users of a particular method who obtain services from each source. The best information on source of services and supplies is usually a national survey. The mix of sources is affected by several factors, including regulation, the extent of government involvement in family planning services, and the strength of the private sector. For a good discussion of changes in source mix over time, see Cross et al. (1991). For a discussion of factors affecting source mix, see Winfrey, Heaton, and Dayaratna (1997).

Survey questions concerning source of supply have improved over time to enable a more accurate determination, particularly for the DHS round of surveys. However, determining the base year source mix is not always a straightforward exercise. Even though the categorization of source types has improved, some respondents may not correctly identify the true nature of their source. For example, some respondents may only

know that they go to a "clinic" for their services and supplies and not whether the clinic is operated by the public, private or NGO sector.

Another area of confusion arises in situations where a specific source of supply receives support from a variety of entities. For example, a source may receive public funding to operate and be located within a public sector structure but have services and supplies actually provided by private doctors. Classification of such a source as a public or a private one becomes difficult.

Table 8: Percent Distribution of Sources of Family Planning Services for Selected Countries

		Source				
Country	Year	Modern Prevalence	Private Sector	NGO	Public	Other
Sub-Saharan Africa						
Botswana	1988	31.7	8.0	–	91.5	.5
Cote d'Ivoire	1994	4.3	53.0	–	25.5	21.5
Ghana	1993	10.1	52.2	–	43.3	4.5
Kenya	1993	27.3	11.4	13.3	71.7	3.6
Madagascar	1992	5.1	26.0	32.1	38.8	3.1
Malawi	1992	7.4	22.0	–	69.9	8.1
Mali	1996	4.5	31.0	4.0	52.8	12.2
Nigeria	1990	3.5	47.0	4.0	37.0	12.0
Senegal	1993	4.8	31.1	–	59.1	9.8
Uganda	1995	7.8	41.5	–	47.7	10.8
Zambia	1992	8.9	30.4	5.6	56.1	7.9
Zimbabwe	1994	42.2	11.7	–	85.1	3.2
North Africa and Near East						
Egypt	1995	45.5	53.3	9.4	35.7	1.6
Jordan	1990	26.9	59.5	–	24.3	1.5
Morocco	1992	35.5	33.3	3.0	62.6	1.1
Tunisia	1988	40.4	22.5	–	76.5	1.0
Turkey	1993	34.5	43.3	–	54.8	1.9
Yemen	1992	6.1	33.0	2.2	56.8	8.0
Asia				–		
Bangladesh	1993	36.2	9.7	–	79.3	11.0
Indonesia	1994	52.1	46.9	–	48.6	4.5
Kazakhstan	1995	46.1	–	–	93.0	7.0
Nepal	1996	26.0	8.8	5.3	80.5	5.4
Pakistan	1991	9.0	30.0	–	55.7	14.3
Philippines	1993	24.9	26.6	–	71.7	1.7
Sri Lanka	1987	40.6	10.2	0.1	87.6	2.1
Thailand	1987	63.3	14.8	0.8	83.6	0.8

(continued)

Table 8, continued

Country	Year	Source				
		Modern Prevalence	Private Sector	NGO	Public	Other
Latin America						
Bolivia	1994	17.7	63.4	–	33.3	3.3
Brazil	1986	56.0	68.4	1.0	28.9	1.7
Colombia	1995	59.3	43.3	28.8	27.1	.8
Dominican Rep.	1991	51.7	54.7	10.0	32.5	2.8
Ecuador	1987	35.8	33.3	13.5	46.7	6.5
El Salvador	1985	44.3	10.3	11.9	76.3	1.5
Guatemala	1995	26.9	30.1	40.3	27.1	2.5
Mexico	1987	44.6	36.1	–	62.1	1.8
Peru	1992	32.8	39.4	6.0	48.3	6.3

Source: DHS Final Country Reports.

Table 8 shows the mix of public, private and NGO sources for a number of countries that have had a recent DHS.

H. Costs of Services

The FamPlan module in Spectrum allows for input of cost information associated with the provision of family planning services and supplies. Service costs are specified by method and source. For the temporary methods (condoms, injectables, pills, vaginal barriers and vaginal tablets), costs are specified as cost per user. For the long-term methods (sterilization, IUD, Norplant), costs are specified as costs per acceptor. Costs generally refer to the public sector costs of providing the services.

A second input related to the total cost of services is the fee paid by users. This information is used to determine public sector revenues and net public sector costs.

Various estimates of the costs of family planning services have been made. Most of these studies estimate the annual expenditure on family planning rather than the costs (which would amortize capital investments over the lifetime of the capital goods). The World Bank compiled a set of estimates on expenditure per user in 1980 (Bulatao, 1985). These figures were calculated on the basis of estimates of per capita public expenditures on population programs in 1980 from various sources. Another set of data, prepared from figures submitted by governments on their family planning expenditures, was published in *Family Planning and Child Survival* (Ross, 1988). Population Action International recently prepared estimates of family planning expenditures from all sources for 79 countries (Conly, Chaya, and Helsing, 1995). Since each of these studies used different approaches and different data sources, the results are not

strictly comparable. However, they do provide the best picture available of the overall pattern of expenditure on family planning services. Several country-specific studies of family planning expenditure are available to supplement these three sources. The information on cost per user from the Population Action International study is shown in **Table 9**.

More detailed studies have been conducted for a small number of countries. The results of these studies are summarized in Table 10.

Determining the costs of family planning programs is not a simple exercise. No systematic series of surveys or reports exists to give easy access to method-specific costing data. Yet the use of reasonable costing data makes FamPlan an attractive tool for rationally planning a program's expansion or reconfiguration. The figures in Tables 9 and 10 are all methods and sources combined. Therefore, their utility will be in providing a reliability check against summary costs generated by a FamPlan application. Method- and source-specific figures are provided later in this section.

Table 9: Expenditures per Family Planning User (US Dollars)

Region	Cost per user
Sub-Saharan Africa	
Benin	17.91
Botswana	39.50
Burkina Faso	26.07
Burundi	18.64
Cameroon	12.40
Central African Republic	17.97
Chad	5.71
Congo	13.55
Cote d'Ivoire	56.10
Ethiopia	14.17
Gabon	1.39
Ghana	23.73
Guinea	45.39
Guinea-Bissau	16.78
Kenya	17.92
Lesotho	92.02
Liberia	33.77
Madagascar	8.02
Malawi	19.63
Mali	69.07
Mauritania	99.64
Mauritius	12.67
Mozambique	8.80
Niger	96.60
Nigeria	15.15
Rwanda	45.34
Senegal	61.52
Sierra Leone	6.87
South Africa	17.92
Sudan	7.63
Tanzania	17.00
Togo	30.11
Uganda	42.11
Zaire	9.16
Zambia	13.18
Zimbabwe	14.71
North Africa and Near East	
Algeria	10.28
Egypt	8.92
Jordan	20.31
Morocco	13.96
Tunisia	27.24
Turkey	8.88
Yemen	38.59

Region	Cost per user
Asia	
Afghanistan	14.58
Bangladesh	15.12
China	6.38
Hong Kong	17.42
India	4.59
Indonesia	12.66
Iran	11.00
Malaysia	12.89
Mongolia	6.36
Nepal	8.18
Pakistan	18.19
Papua New Guinea	116.43
Philippines	7.11
Singapore	4.33
South Korea	6.19
Sri Lanka	9.36
Taiwan	15.28
Thailand	5.29
Vietnam	2.51
Latin America and Caribbean	
Bolivia	23.39
Brazil	7.66
Colombia	7.57
Costa Rica	25.19
Dominican Republic	8.61
Ecuador	18.79
El Salvador	18.17
Guatemala	32.81
Haiti	42.47
Honduras	21.29
Jamaica	19.49
Mexico	13.08
Nicaragua	16.40
Panama	17.31
Paraguay	11.89
Peru	5.39
Trinidad and Tobago	14.15

Source: Conly, Chaya, and Helsing, 1995.

Table 10: Government Expenditure per Family Planning User (US Dollars)[2]

Country	Year	Expenditure per User	Data Source
Bangladesh	1991	14.10	1
Ecuador	1994	11.22	1
Ghana	1993	25.06	1
Jamaica	1990	35.51	2
Kenya	1993	25.03	3
Thailand	1988/89	13.34	4

Sources: 1. Thompson and Janowitz, 1996 a through c; 2. Scott and Kocher, 1992; 3. Abel, 1995; 4. Leoprapai et al., 1991.

As **Table 10** illustrates, there is considerable variation by country, year, and source of data. Much of this variation is clearly due to the difficulty of estimating total expenditures and to differences among definitions used by those preparing the estimates.

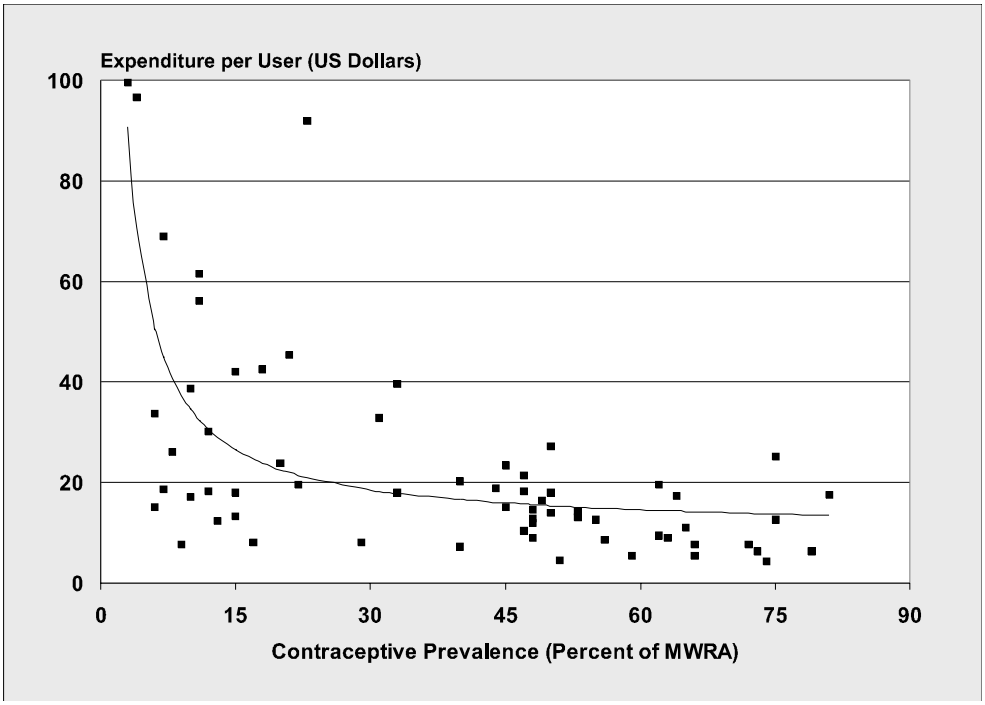
Figure 4 presents the results of a regression analysis that illustrates the relationship between expenditure per user and contraceptive prevalence. In this figure, observations from **Table 9** are plotted versus total prevalence. The smooth curve depicts the inverse relationship between expenditure per user and prevalence. The equation for this curve is:

$$\text{Expenditure/user} = \frac{10.51 + 240.68}{\text{prevalence}}.$$

This figure illustrates that cost per user may decline as prevalence increases. This fact seems to suggest an economy of scale or efficiency gained as prevalence increases. This relationship should be considered for projecting cost per user or acceptor into the future.

[2] Expenditure figures in Table 10 and Tables 12 through 18 are from various years and sources and are not adjusted for inflation.

Figure 4: Relationship Between Expenditure per User and Contraceptive Prevalence



The figures on aggregate expenditure per user vary significantly from country to country. Some of this variation is due to different cost structures and differences in implementation approach. Some of the variation is due to different source and method mixes. An indication of how cost may vary by source is given in **Table 11**.

Table 11: Cost per CYP by Source of Family Planning (U.S. Dollars)

Country	Cost per CYP
Full Clinic	
Colombia	1.80
Ghana	11.58
India	3.29
Indonesia	14.83
Mexico	1.90
Thailand	6.74
Weighted Average	**3.89**
Full Clinic with Community-Based Distribution	
Bangladesh	14.91
Brazil	3.61
Mexico	5.78
Morocco	9.03
Nigeria	6.17
Weighted Average	**14.00**
Clinic Without Sterilization	
Brazil	5.65
Colombia	6.69
Egypt	4.46
India	6.21
Kenya	4.27
Morocco	9.38
Zimbabwe	19.57
Weighted Average	**6.10**
Sterilization Clinic	
Colombia	0.24
India	1.88
Weighted Average	**1.85**
Community-Based Distribution	
Egypt	3.73
Indonesia	5.00
Kenya	24.34
Mexico	27.21
Zimbabwe	14.96
Weighted Average	**9.93**
Social Marketing	
Bangladesh	1.96
Colombia	Profit
Egypt	2.03
Ghana	7.86
India	2.15
Indonesia	1.32
Mexico	1.58
Morocco	15.39
Nigeria	14.51
Zaire	13.53
Zimbabwe	15.89
Weighted Average	**2.14**

Source: Barberis and Harvey, 1997.

Costs also vary by method. Several studies have examined costs by method and reported these costs on either a per procedure or a per visit basis. Tables 12 through 18 present data collected from various sources. Not surprisingly, cost differentials exist even in the same country. These data are not strictly comparable since different definitions of cost have been used, but they do serve to illustrate the range of costs that is experienced in programs today.

Table 12: Costs of Female Sterilization Procedures

Country	Date	Cost per Sterilization (US$)	Cost per CYP (US$)	Source
Bangladesh	1985	98.00	–	1
Bangladesh, public sector	1993	19.73	–	2
Colombia	1985	31.42	–	3
Colombia	1990	126.97	18.90	4
Dominican Republic	1990	–	5.14	5
Ecuador	1995	33.65	–	6
Guatemala	1983/84	68.00	–	1
Haiti	1986	300.00	–	7
Honduras	1988	96.00-101.00	–	1
Honduras, rural	1994	37.04	–	8
Honduras, urban	1994	39.76	–	8
Indonesia	1987	42.76	–	9
Indonesia	1988	37.00	–	1
Kenya, public sector	1993	96.34	–	10
Latin America, private sector	1985	50.00-666.00	–	11
Mexico, rural clinic	1988	40.00	–	12
Mexico, urban hospital	1988	173.00	–	12
Morocco	1986	133.00	–	1
Thailand	1988/89	48.75	5.25	13

Sources: 1. Janowitz, Bratt, and Fried, 1990; 2. PDEU, Bangladesh, 1996 a and b; 3. Jaramillo et al. 1986; 4. Bratt, 1992; 5. Janowitz and Bratt, 1992; 6. Thompson and Janowitz, 1996 a through c; 7. Bogue, 1986; 8. Dmytraczenko, 1997; 9. PKMI, 1988; 10. Abel, 1995; 11. Lewis, 1985; 12. Nortman and Tsui, 1989; 13. Leoprapai et al., 1991.

Table 13: Costs of Male Sterilization Procedures

Country	Date	Cost per Sterilization (US$)	Cost per CYP (US$)	Source
Bangladesh, public sector	1993	12.28	–	1
Colombia, male-only clinics	1988/89	127.86	10.22	2
Colombia, mixed clinics	1988/89	152.95	12.23	2
Thailand	1988/89	45.79	5.88	3

Sources: 1. PDEU, Bangladesh, 1996 a and b; 2. Vernon, Oheda, and Vega, 1991; 3. Leoprapai et al., 1991.

Table 14: Costs of IUD Insertion

Country	Date	Cost per Insertion (US$)	Cost per CYP (US$)	Source
Bangladesh, NGO clinics	1993	2.27	4.14	1
Bangladesh, outreach	1985	18.00	–	2
Bangladesh, public sector clinics	1993	2.00-3.00	4.56	1
Colombia	1990	13.75	17.07	3
Haiti	1986	40.00	–	4
Honduras	1988	11.00	–	2
Honduras, rural	1994	10.00	–	5
Honduras, urban	1994	8.91	–	5
Kenya	1993	26.73	–	6
Mexico, NGO clinics	1993	4.24	–	7
Mexico, rural	1989	10.00-13.00	–	8
Mexico, urban	1989	18.00-24.00	–	8
Philippines	1984	9.00	–	2
Thailand	1989	10.00	–	2
Thailand	1990/91	2.64	4.07	9
Thailand, public sector	1988/89	18.44	8.25	10

Sources: 1. PDEU, Bangladesh, 1996 a and b; 2. Janowitz, Bratt, and Fried, 1990; 3. Bratt, 1992; 4. Bogue, 1986; 5. Dmytraczenko, 1997; 6. Abel, 1995; 7. Suárez and Brambila, 1994; 8. Nortman and Tsui, 1989; 9. Janowitz et al., 1994; 10. Leoprapai et al., 1991.

Table 15: Costs of Oral Contraceptive Delivery

Country, by Type of Distribution	Date	Cost per Acceptor Visit (US$)	Cost per CYP (US$)	Source
Clinic/Health Center				
Bangladesh, NGO	1993	0.85	5.67	1
Bangladesh, public sector	1993	1.00	6.52	1
Honduras	1988	7.63	31.15	2
Honduras, urban	1994	4.97	–	3
Honduras, rural	1994	5.04	–	3
Mexico, urban	1989	8.80	22.00	4
Mexico, rural	1989	1.73	6.00	4
Morocco, urban	1987	–	7.40-34.10	5
Morocco, rural	1987	–	24.74-30.29	5
Philippines	1984	7.57	21.09	2
Thailand	1988	4.38	18.62	2
Community-Based Distribution				
Bangladesh, NGO	1993	–	6.77	1
Bangladesh, public	1993	–	5.86	1
Colombia	1984-86	–	13.79	2
Colombia	1990	0.85	12.76	6
Dominican Republic	1990	–	8.82	7
Honduras	1988	–	18.47	2
Mexico	1989	–	11.00	4
Peru	1986-87	–	6.18	2
Social Marketing				
Bangladesh	1985	–	5.62	2
Colombia	1984-86	–	4.69	2
Colombia	1990	0.63	9.45	6
Dominican Republic	1990	–	2.50	8
Dominican Republic	1990	–	6.53	6
Ecuador	1990	–	11.30	8
Ghana	1990	–	4.10	8
Honduras	1989	–	11.94	2
Indonesia	1990	–	1.10	8
Zimbabwe	1990	–	11.40	8
Unspecified Distribution Type				
Thailand, public	1988/89	7.70	6.54	9

Sources: 1. PDEU, Bangladesh, 1996 a and b; 2. Janowitz, Bratt, and Fried, 1990; 3. Dmytraczenko, 1997; 4. Nortman and Tsui, 1989; 5. Knowles and Emrich, 1989; 6. Bratt, 1992; 7. Janowitz and Bratt, 1992; 8. Stover and Wagman, 1991; 9. Leoprapai et al., 1991.

Table 16: Costs of Condom Delivery

Country	Date	Cost per Visit (US$)	Cost per CYP (US$)	Source
Clinic				
Bangladesh, public	1993	1.00-2.00	–	1
Bangladesh, NGO	1993	1.11	–	1
Social Marketing				
Bangladesh	1985	–	6.55	2
Barbados	1990	–	11.80	3
Colombia	1990	0.23	34.13	4
Dominican Republic	1990	–	5.90	3
Dominican Republic	1990	–	23.62	5
Ghana	1990	–	6.10	3
Honduras	1989	–	14.77	2
Indonesia	1990	–	1.10	3
Mexico	1990	–	3.80	3
Zimbabwe	1990	–	12.70	3
Community-Based Distribution				
Bangladesh, NGO	1993	–	7.25	1
Bangladesh, public	1993	–	7.18	1
Colombia	1990	0.49	73.02	4
Dominican Republic	1990	–	50.53	5
Honduras	1988	–	21.72	2
Outreach				
Bangladesh	1985	–	11.01	2
Unspecified Distribution Type				
Thailand, public	1988/89	8.87	9.65	6

Sources: 1. PDEU, Bangladesh, 1996 a and b; 2. Janowitz, Bratt, and Fried, 1990; 3. Stover and Wagman, 1991; 4. Bratt, 1992; 5. Janowitz and Bratt, 1992; 6. Leoprapai et al., 1991.

Table 17: Costs of Injectable Delivery

Country	Date	Cost per Acceptor Visit (US$)	Cost per CYP (US$)	Source
Hospital				
Thailand	1990/91	1.45	5.17	1
Clinic				
Bangladesh, NGO	1993	1.49	7.98	2
Bangladesh, gov	1993	–	8.52	2
Unspecified Distribution Type				
Thailand, public	1988/89	10.23	10.70	3

Sources: 1. Janowitz et al., 1994; 2. PDEU, Bangladesh, 1996 a and b; 3. Leoprapai et al., 1991.

Table 18: Costs of Implant Procedures

Country	Date	Cost per Acceptor Visit (US$)	Cost per CYP (US$)	Source
Hospital				
Thailand	1990/91	25.47	28.18	1
Clinic				
Colombia	1990	62.76	31.55	2
Unspecified Distribution Type				
Thailand, public	1988/89	59.45	–	3

Sources: 1. Janowitz et al., 1994; 2. Bratt, 1992; 3. Leoprapai et al., 1991.

If country-specific estimates of the costs of family planning are not available and cannot be developed with the time and resources available, it is possible to make a rough estimate of costs using the information in the tables presented above. The information in these tables indicates that costs are likely to be in the ranges shown in **Table 19**.

Table 19: Ranges of Cost by Method

Method	Cost
Female sterilization	$ 30-100 per procedure
IUD	$ 9-20 per insertion
Orals	$ 6-34 per CYP for clinics
	$ 6-18 per CYP for community-based distribution
	$ 4-12 per CYP for social marketing
Condoms	$ 6-20 per CYP
Injectables	$ 5-11 per CYP
Implant	$ 25-60 per implant

I. Proximate Determinants of Fertility

For many years, the factors which directly affected fertility levels were called "intermediate fertility variables," being intermediate between major social forces, like urbanization and education, and childbearing. They included all factors which determine whether a conception transpires and whether that conception ends in a live birth.
As better measures and a greater understanding of this set of factors evolved, the variables were reduced in number and labeled as "proximate determinants of fertility" or variables which directly impinge on fertility outcomes.

With the increased ability to measure these several variables, the most important variables in terms of influencing resulting fertility were found to be: the proportion of women in sexual union, the duration of the period of inability to conceive following a birth, and the level and quality of contraceptive practice and to a lesser degree, the underlying capability to conceive, the level of induced abortion, and the prevalence of pathological sterility.

1. Percentage in Union

In order to determine the number of women of reproductive age who are in union, FamPlan requires an estimate of the percentage of women 15-49 who are in union. The best source for this figure will usually be a national census or national survey such as the DHS, WFS, or CPS.

The information presented in **Table 20** consists of recent estimates available on the percentage of women of reproductive age (WRA) in union for a number of countries. For many of these countries, the information comes from the most recent DHS or CPS survey. Another useful source for this information is Ross, Mauldin, and Miller (1993).

Table 20: Percentage of Women of Reproductive Age Who Are in Union

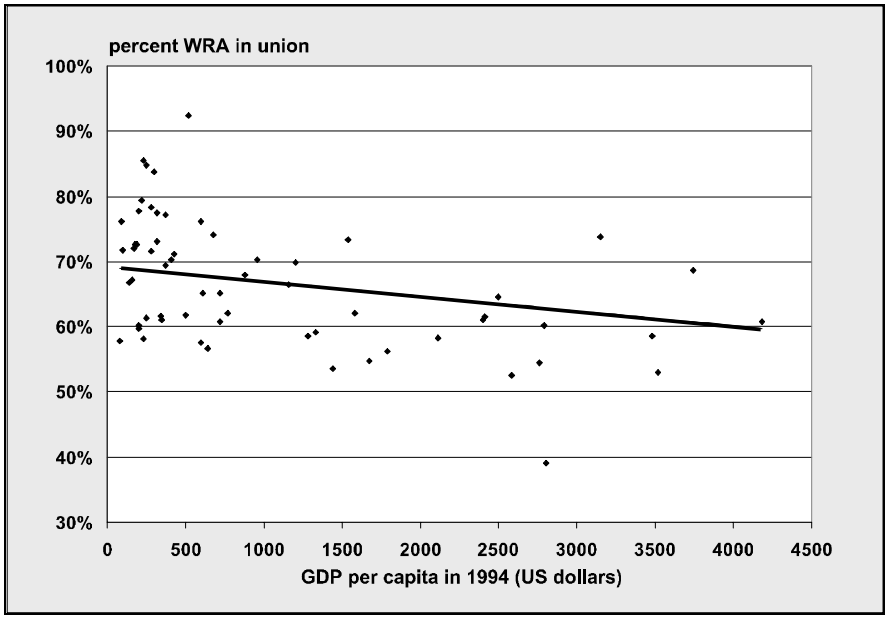
Region and Country	Percent in Union
Sub-Saharan Africa	
Angola	56.5
Benin	77.1
Botswana	39.1
Burkina Faso	83.8
Burundi	67.2
Cameroon	74.1
Central African Republic	69.4
Chad	72.6
Cote d'Ivoire	65.1
Ethiopia	71.8
Ghana	70.3
Guinea	92.4
Kenya	61.4
Lesotho	60.8
Liberia	67.5
Madagascar	59.7
Malawi	72.0
Mali	84.8
Mauritius	73.8
Mozambique	76.1
Niger	85.5
Nigeria	78.3
Rwanda	57.8
Senegal	76.2
Sudan	55.5
Togo	73.0
Tanzania	66.8
Uganda	72.6
Zambia	61.1
Zimbabwe	61.8
AVERAGE	**68.9**
Middle East	
Egypt	65.1
Iran	75.1
Iraq	69.5
Jordan	53.6
Kuwait	67.9
Lebanon	57.6
Saudi Arabia	67.0
Syria	65.9
Tunisia	56.2
Yemen	71.6
AVERAGE	**65.0**

Region and Country	Percent in Union
Latin America	
Argentina	60.0
Belize	63.1
Bolivia	62.0
Brazil	60.1
Chile	53.0
Colombia	54.7
Costa Rica	61.0
Cuba	62.9
Dominican Republic	59.2
Ecuador	58.6
Guatemala	69.9
Guyana	48.0
Haiti	58.1
Honduras	57.5
Jamaica	73.4
Mexico	60.8
Nicaragua	61.6
Panama	52.5
Paraguay	62.1
Peru	58.3
Trinidad & Tobago	68.7
Venezuela	54.5
AVERAGE	**60.0**
Asia	
Bangladesh	79.4
Hong Kong	53.2
India	77.4
Indonesia	68.0
Kazakhstan	66.5
Korea, Rep.	60.9
Malaysia	58.5
Nepal	77.8
Pakistan	71.1
Singapore	52.1
Sri Lanka	56.7
Thailand	61.5
Turkey	64.6
Uzbekistan	70.3
Vietnam	60.2
AVERAGE	**65.2**

Sources: DHS and CPS reports; Ross and Miller, 1993.

The percentage of women in union usually changes as a country develops. Typically, the average age at first marriage rises with development. The result of this change is that the percentage of women in union declines. **Figure 5** shows that the percentage of women in union is generally lower at higher levels of per capita gross domestic product (GDP). For most countries, the percent in union is likely to decline as the country develops, education enrollment increases, and the percentage of the population living in urban areas increases, primarily due to the increase in the age at first marriage. Model users should consider this pattern when estimating future values of the percentage of WRA in union.

Figure 5: Percentage of WRA in Union versus GDP Per Capita



2. Duration of Postpartum Insusceptibility

Postpartum insusceptibility is the period after a birth during which a woman is not exposed to the risk of pregnancy either because of postpartum amenorrhea or because of postpartum abstinence. FamPlan requires an estimate of the average duration of postpartum insusceptibility, expressed in months. Estimates may be available from national surveys such as a DHS. Data for a number of countries that have had DHS surveys are provided in **Table 21**.

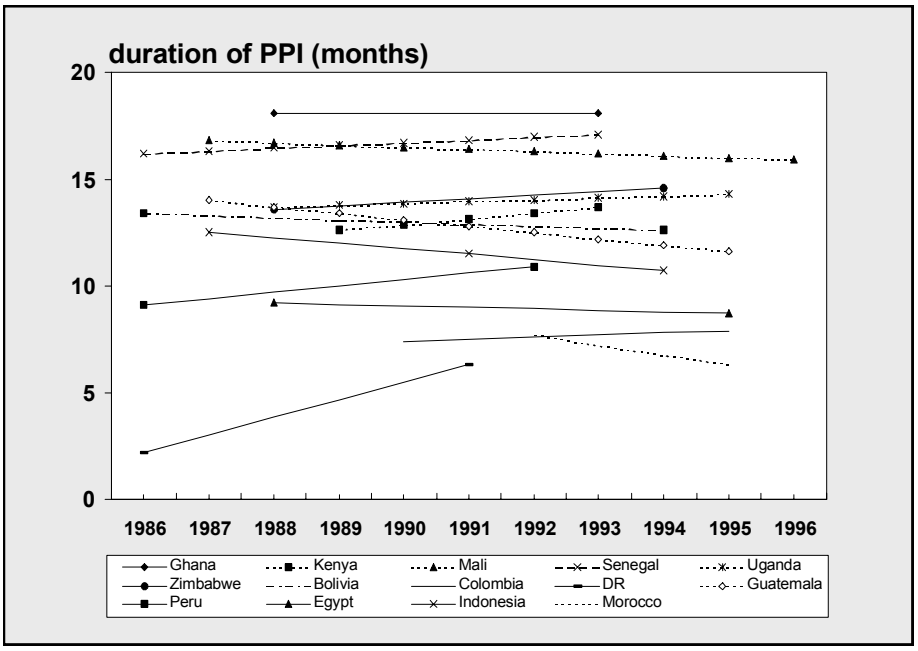
Table 21: Mean Duration of Postpartum Insusceptibility (PPI), in Months

Country	Year	PPI	Country	Year	PPI
Sub-Saharan Africa			**Latin America**		
Botswana	1988	15.6	Bolivia	1989	13.4
Burkina Faso	1993	22.1	Bolivia	1994	12.6
Burundi	1987	19.2	Brazil	1986	5.6
Cameroon	1991	16.8	Brazil (NE)	1991	5.5
CAR	1995	17.3	Colombia	1995	7.9
Cote d'Ivoire	1994	17.6	Dominican Republic	1991	6.3
Ghana	1993	18.1	Ecuador	1987	9.5
Kenya	1993	13.7	El Salvador	1985	9.9
Liberia	1986	13.2	Guatemala	1995	11.6
Madagascar	1992	14.5	Haiti	1995	13.9
Malawi	1992	14.1	Mexico	1987	17.5
Mali	1996	15.9	Paraguay	1990	7.8
Namibia	1992	15.2	Peru	1992	10.9
Niger	1992	15.8	Trinidad & Tobago	1987	4.8
Nigeria	1990	19.6			
Ondo State, Nigeria	1986	24.1	**Asia/Near East/ North Africa**		
Rwanda	1992	17.1	Bangladesh	1994	12.1
Senegal	1993	17.1	Egypt	1995	8.7
Sudan	1990	15.2	India	1993	11.9
Tanzania	1992	16.7	Indonesia	1994	10.7
Togo	1988	20.3	Jordan	1990	6.1
Uganda	1995	14.3	Kazakhstan	1995	7.5
Zambia	1992	14.8	Morocco	1995	6.3
Zimbabwe	1994	14.6	Pakistan	1991	10.6
			Philippines	1993	8.0
			Thailand	1987	8.7
			Tunisia	1988	7.8
			Turkey	1993	5.7
			Yemen	1991	9.1

Source: Demographic and Health Survey reports.

Postpartum infecundability has a tendency to decline as a country develops, due to reductions in the prevalence and duration of breastfeeding and the decline of the practice of postpartum abstinence. The increase in female employment in the formal labor force and the increase in urbanization that usually occur over time can make it more difficult for women to breastfeed for long periods. However, a number of countries have implemented programs to encourage more breastfeeding. The recent experience as measured by the DHS is shown in **Figure 6**. In the past 10 years, some countries have experienced declines in the duration of postpartum insusceptibility, while others have experienced increases. For all 14 countries shown in **Figure 6** there was no net change in the duration of postpartum insusceptibility.

Figure 6: Change in the Average Duration of Postpartum Insusceptibility (PPI) for Selected Countries



Source: Various Demographic and Health Surveys.

3. Total Abortion Rate

The total abortion rate is the average number of induced abortions a woman would have if she survived to age 49 and had abortions at the prevailing age-specific rates. Thus, in concept, it is similar to the total fertility rate. Since abortions are illegal in many countries, data on abortion are not widely available. Information that is available for developing countries is usually derived from incomplete statistics, surveys, or indirect estimates based on hospital data. **Table 22** presents data primarily compiled by The Alan Guttmacher Institute (in 1997) on total abortion rates for a number of countries, and in addition contains several special estimates based on recent survey data.

Table 22: Total Abortion Rates in Selected Countries

Country	Source	Year	Total Abortion Rate*
Albania	1	1993	1.353
Australia	1	1988	0.498
Bangladesh	1	1993	0.114
Brazil	1	1991	1.333
Bulgaria	1	1994	1.572
Canada	1	1993	0.459
Chile	1	1990	1.589
China	1	1992	1.074
Colombia	1	1989	1.180
Cuba	1	1990	1.635
Czech Republic	1	1994	0.714
Denmark	1	1994	0.477
Dominican Republic	1	1992	1.530
England/Wales	1	1993	0.441
Finland	1	1994	0.282
France	1	1993	0.396
Hong Kong	1	1987	0.381
Hungary	1	1995	1.041
Iceland	1	1994	0.381
India	1	1991	1.059
Israel	1	1992	0.465
Italy	1	1994	0.330
Japan	1	1994	0.423
Kazakhstan	2	1995	1.75
Kyrgyzstan	3	1993	1.3-1.6
Mexico	1	1990	0.816
Mongolia	4	1990	2.1
Netherlands	1	1994	0.180
New Zealand	1	1994	0.471
Norway	1	1993	0.483
Peru	1	1989	1.813
Romania	5	1990	1.70
Romania	5	1993	3.39
Russia	6	1994	2.04
Russia **	7	1996	2.28-2.80
Singapore	1	1993	0.681
Slovak Republic	1	1995	0.714
South Korea	1	1990	1.092
Spain	1	1993	0.228
Sweden	1	1995	0.546
Switzerland	1	1990	0.255
Tajikistan	3	1993	1.0-1.4
Tunisia	1	1988	0.408
Turkey	1	1992	0.798
Turkmenistan	3	1993	1.0-1.2
USA	1	1992	0.777
Uzbekistan	8	1996	0.668
Vietnam	1	1993	3.00

*The total abortion rate was estimated from data on abortion rate per 1,000 women aged 15-44 for those data from source 1.

** Three sites in Russia.

Sources: 1. Unpublished tables prepared by Stanley Henshaw of the Alan Guttmacher Institute, 1997; 2. NIN and Macro International, 1996; 3. Turner, 1993; 4. Neupert, 1992; 5. IMCC and CDC, 1995; 6. Entwisle and Kozyreva, 1997; 7. RCPOMR and CDC, 1996; 8. IOG and Macro International, 1997; 9. Darsky and Dworak, 1992.

If information is unavailable, the total abortion rate may be set to zero. On the other hand, if a significant amount of abortions does take place, it is advisable to make some estimate of the rate in order to be able to use the model to examine the effects of reducing the abortion rate.

The induced abortion rate is the only one of the proximate determinants that can affect the required level of prevalence, even if it remains constant.

It should also be noted that the induced abortion rate is the only one of the proximate determinants that can affect the required level of prevalence, even if it remains constant. This is because the calculation of the abortion index includes the TFR and the prevalence rate. Therefore, if the abortion rate is not set to zero, careful consideration should be given to both the present and future rates. With a TFR of 7, an abortion rate of 1 means that one-eighth of pregnancies are ended by abortions, but at a TFR of 2, an abortion rate of 1 means that one-third of all pregnancies are terminated by abortions.

4. Sterility

The sterility variable measures both natural sterility and pathological sterility. Since natural sterility is not likely to change much, the major effect will be from pathological sterility. In practice, this variable is likely to be significant only in societies with high levels of pathological sterility resulting in significant infertility and subfecundity. This effect is most pronounced in certain regions of sub-Saharan Africa, where primary and secondary infertility are caused by sexually transmitted diseases. The extent of sterility is gauged by the percentage of women who are childless at the end of the reproductive period. The best sources will be national surveys and censuses that report the percentage of women childless at ages 45-49. **Table 23** presents data on percentages of childless women from a number of DHS reports. These data presume a strong prevailing norm that all married women attempt to have at least one child.

Table 23: Percentage of Women Who Remain Childless at Ages 45-49

Country	Year	Percent Childless	Country	Year	Percent Childless
Sub-Saharan Africa			**Latin America**		
Botswana	1988	3.2	Bolivia	1994	4.4
Burkina Faso	1993	3.1	Brazil	1986	8.8
Burundi	1987	2.1	Colombia	1995	9.2
Cameroon	1991	10.3	Dominican Rep.	1991	4.9
CAR	1995	8.1	Ecuador	1987	5.2
Cote d'Ivoire	1994	3.4	El Salvador	1985	4.0
Ghana	1993	2.7	Guatemala	1995	4.5
Kenya	1993	1.1	Haiti	1995	6.5
Liberia	1986	2.6	Mexico	1987	3.0
Madagascar	1992	10.1	Paraguay	1990	4.9
Malawi	1992	1.1	Peru	1992	3.9
Mali	1996	3.8	Trinidad & Tobago	1987	3.9
Namibia	1992	3.4			
Niger	1992	1.9			
Nigeria	1990	4.0	**Asia/ Near East/**		
Rwanda	1992	0.6	**North Africa**		
Senegal	1993	2.4	Bangladesh	1994	0.7
Sudan	1990	4.4	Egypt	1995	3.9
Tanzania	1992	4.1	India	1993	3.7
Togo	1988	2.9	Indonesia	1994	4.7
Uganda	1995	2.2	Jordan	1990	4.0
Zambia	1992	1.4	Kazakhstan	1995	4.6
Zimbabwe	1994	1.1	Morocco	1995	3.7
			Morocco	1987	4.9
			Pakistan	1991	5.5
			Philippines	1993	8.5
			Romania	1996	5.7
			Thailand	1987	6.1
			Tunisia	1988	2.2
			Turkey	1993	2.9
			Yemen	1991	0.7

Source: Demographic and Health Survey reports.

IV. Projection Outputs

FamPlan will calculate and display family planning indicators by year. A number of demographic and family planning indicators can be displayed. A complete list of indicators available is given below with definitions for those that are not obvious.

- **Abortions.** The number of induced abortions occurring during the year.
- **Acceptors.** The number of new users of a particular method in a particular year. A woman is classified as an acceptor if she starts using a method during the year and was not using that method at the start of the year. Previously she may have been using nothing or she may have been using a different method. Acceptors are calculated only for long-term methods where acceptance requires special service: IUD, sterilization, and implants. For short-term methods (pill, condom, injectable, vaginal, traditional) a new acceptor is difficult to identify and there is little difference in service requirements between an acceptor and a continuing user.
- **Births.** The number of live births occurring during a year.
- **Commodities.** The amount of supplies required for different methods to provide a specified level of family planning services. Commodities are expressed in terms of numbers of condoms, sterilization kits, injectable vials, IUDs, Norplant implants, pill cycles, and vaginal tablets. They can be displayed for any method and for all sources or any combination of sources.
- **Cost per user.** The public sector cost of providing family planning, per family planning user.
- **Effectiveness.** The average effectiveness of the methods selected, weighted by the number of users. This is the proportion of women using a method who will not become pregnant in that year.
- **Fecundity.** The calculated total fecundity rate. Total fecundity is the average number of children who would be born to women if none of the proximate determinants were acting to reduce fertility from its biological maximum. In the model, fecundity is calculated for the base year only. It remains constant in all other years.

- **Gross cost.** The total public sector cost of providing family planning services. Gross cost can be displayed for all methods and sources or for any combinations of methods and sources.
- **Growth rates.** The increment in total number of contraceptive users from year to year. These are net figures, consisting of new users and the continuing users who remain after previous users either have discontinued or have "aged out."
- **MWRA.** The number of women of reproductive age who are married or in union.
- **Net cost.** The net public sector cost of family planning services. This figure is equal to gross cost minus revenue collected. Net cost can be displayed for all methods and sources or for any combinations of methods and sources.
- **Pregnancies.** The number of pregnancies occurring during a year. Pregnancies can be wanted, unwanted or mistimed. Unwanted pregnancies are those that occur due to method failure or those that occur to women who have an unmet need for limiting. Mistimed pregnancies are those that occur to women who have an unmet need for spacing. Wanted pregnancies are calculated as the total pregnancies minus those that are unwanted or mistimed. The selection of the goal for the family planning projections can have an impact on these indicators. Information about unmet need for spacing and limiting is available only for goal one (meeting unmet need). For all other goals, there will be no pregnancies that are designated as mistimed. Note that if unmet need is not taken into account, unwanted pregnancies may actually rise as prevalence increases, since more women will be exposed to the risk of contraceptive failure than when few women are using contraception.
- **Prevalence.** The percentage of married women of reproductive age using some form of contraception. Prevalence can be displayed for all methods, sources and needs (spacing or limiting) or for any combination of methods, sources and needs.
- **Revenue.** The total amount of revenue collected from fees for family planning services. Revenue can be displayed for all methods and sources or for any combinations of methods and sources.
- **Summary of inputs.** Displays or prints a summary of all the input assumptions.

- **Summary of outputs.** Displays or prints a summary of all the output indicators.
- **Total fertility rate.** The average number of children that would be born to a cohort of women who survive until age 50 and have births according to the prevailing age-specific birth rates.
- **Users.** The number of women who are using some form of contraception. Users can be displayed for all methods and sources or for any combinations of methods and sources.
- **WRA.** The number of women of reproductive age, 15-49.

V. Program Tutorial

This tutorial covers the key steps in installing and running Spectrum and the Module for Condom Requirements. It assumes that you have an IBM-compatible computer running Windows 95 or higher and that you are familiar with the basic operation of Windows programs and terminology.

A. Before You Get Started

First, you will need to run DemProj, part of the Spectrum system of policy models; please refer to its manual for more information. Then, you will need to collect data and make certain decisions before running the model. For example, you will need to decide the following at the very beginning:

- the types of contraceptives to include in the model. You may choose any or all of the following: condom, female sterilization, injectable, IUD, male sterilization, Norplant, pill, rhythm, traditional, vaginal barrier, vaginal tablets, withdrawal, or other.
- method sources: you may enter as many or as few as you wish.
- age group option: one age group of 15-49, including all women of reproductive age, or seven five-year age groups (15-19, 20-24, etc. until the final category of 45-49).
- whether to disaggregate unmet need by spacing or limiting births.
- which of these goals should be considered: reducing unmet need for contraception, achieving desired fertility, reaching a goal for contraceptive prevalence, reaching a goal for total fertility rate, or achieving specified expenditure levels.

The data you will need include:

- for the contraceptive methods you have chosen to include, the units of CYP (couple-years of protection) for the temporary methods, the average duration of use for the long-term methods, and the average age at sterilization for the permanent methods.
- the effectiveness rates for the methods you have chosen to include.

- the method mix (e.g., condom usage is x percent of the total contraceptives used).
- the sources of the various methods, by percentages.
- the cost per user of each method included in the model, by source.
- the fees per user of each method, by source.
- the proximate determinants, including the percentage of women ages 15-49 married or in union, the number of months of postpartum insusceptibility, the abortion rate, and sterility.

You will also need to make decisions about the model's goal options: what do you want to change? How quickly? These inputs are all described in Chapter III of this manual.

B. Installing the Spectrum Program

The Spectrum program is distributed on floppy diskettes; it is also available through the Internet at http://www.FuturesGroup.com. However, it must be installed on a hard disk before it can be used.[3] Spectrum will run on any computer running Windows 95 or higher. It requires about 3MB of hard disk space.

To install the Spectrum program, start by inserting the "Install" CD-ROM into your CD-ROM drive, or downloading the Spectrum install file from the internet at www.FuturesGroup.com. If you are installing from a CD-ROM, insert the CD-ROM into your CD-ROM drive and follow the instructions on the screen. If you are installing from a file you downloaded from the internet, simply double-click on the file and follow the instructions.

[3] To remove the Spectrum program from your hard disk, run the unwise.exe program located in the Spectrum directory.

C. Creating a New Projection

1. Starting the Spectrum Program

To start Spectrum:

a. Click the "Start" button on the task bar.

b. Select "Programs" from the pop-up menu.

c. Select "Spectrum" from the program menu. Alternatively, you can use Windows Explorer to locate the directory c:\spectrum" and double click on the file named spectrum.exe."

2. Opening a Demographic Projection

Before using FamPlan, you should use DemProj to prepare a demographic projection. DemProj is part of the Spectrum system of policy models; for more information, consult its manual.

FamPlan in Spectrum requires a demographic projection prepared with DemProj; the two modules work together in iterative fashion. That is, in a typical FamPlan application, the demographic projection provides the number of women of reproductive age to FamPlan. FamPlan calculates the total fertility rate and provides it to DemProj. DemProj can then project the population for another year and provide the number of women of reproductive age to FamPlan. Therefore, before using FamPlan you should prepare a demographic projection using DemProj. For more information consult *DemProj: A Computer Program for Making Population Projections.*

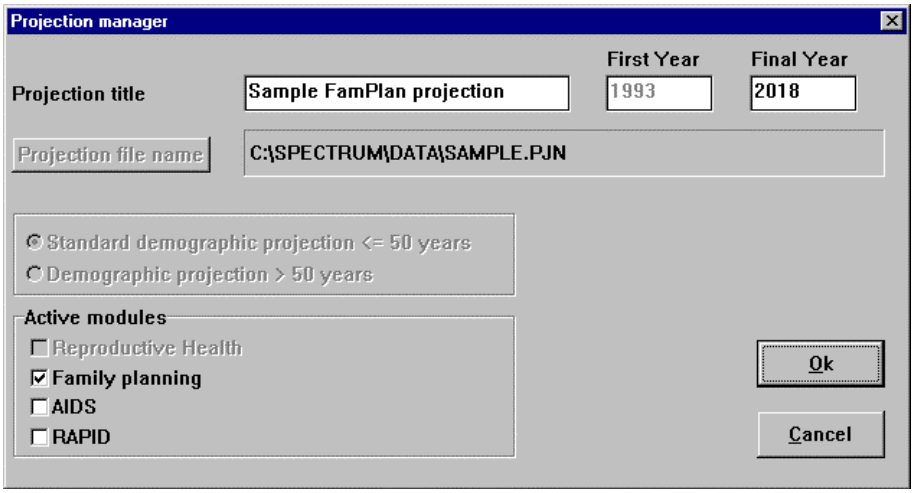
The first step in preparing the FamPlan projection is to open the demographic projection.

1. Select "File" from the menu bar.
2. From the pull-down menu that appears, select "Open projection."
3. Select the projection file from the "Open" dialogue box and press "Ok." All pre-existing projections that can be loaded will be listed here.

3. Adding the Family Planning Module to the Projection

Once the demographic projection is open, you need to change the configuration to indicate that the family planning module will be used as well. To do this, select "Edit" from the menu bar and "Projection" from the pull-down menu.

You will see the "Projection manager" dialogue box. It will look something like the display shown below.



The following information is displayed.

Projection title: This title will be printed at the top of all printed output and will be used to identify the projection if more than one projection is loaded at a time. You can change the title to reflect the projection you are about to prepare.

If you want to change the projection file name, the years, or the demographic projection interval, you will need to do so in DemProj. The options in the Projection manager were set when the demographic projection was created with DemProj.

Projection file name: This is the name that will be used to store all data files associated with this projection. You cannot change the file name here. You can change it if you select "File" and "Save projection as" to save the projection to a new name.

First year: This is the first year of the projection, determined in the DemProj projection.

Final year: This is the final year of the projection, determined in the DemProj projection.

Demography. The radio button labeled "Standard demographic projection <= 50 years" will be selected by default. You cannot change this selection here because the demography module is required to make a family planning projection.

Once all the information is entered for this dialogue box, click on the "Ok" button. You can always return to this screen and change some of the information by selecting "Edit" from the menu bar and then "Projection" from the pull-down menu.

Active modules. These radio buttons (or options) let you select other modules that will be used with the population projection. Initially none of them will be selected. You should select the "Family planning" module by clicking on the check box next to the name. This choice will allow you to include the family planning module in the projection. Once all the information is entered for this dialogue box, click on the "OK" button. You can always return to this screen and change some of the information by selecting "Edit" from the menu bar and "Projection" from the pull-down menu.

D. Entering the Projection Assumptions

1. About the Editors

Each editor in FamPlan is similar. At the very top of the screen, the variable name appears. At the bottom of the screen are the special edit keys. "Duplicate" allows you to copy information from one cell, column or row to another; "Interpolate" to enter a beginning and ending number and have the computer calculate numbers for the intervening intervals; "Multiply" to multiply a cell, column or row by a specific number; and "Source" to write notes indicating the source of the data for future reference.

To use the "Duplicate" button,

1. Highlight (select) the range (column, row, or cells to be affected). The first cell in the range should be the value you want to copy.
2. Extend the range to the last year by using the mouse (hold down the left button and drag the range) or the keyboard (hold down the shift key and use the arrow keys).
3. Click on the "Duplicate" key to copy the value at the beginning of the range to all the other cells in the range.

To use the "Interpolate" button,

1. Enter the beginning and ending values in the appropriate cells.
2. Highlight the entire range from beginning to end.
3. Click on the "Interpolate" key to have the values interpolated and entered into each of the empty cells.

To use the "Multiply" button,

1. Highlight the range (column, row, or cells to be affected).
2. Enter the multiplier in the dialogue box.
3. Click "Ok" to accept. The entire range will be multiplied by the designated number.

To use the "Source" button,

1. Click on the "Source" button to open a small word processor window.
2. Enter the source of the data and make any special comments about the assumptions.
3. Click on "Close" to return to the editor.

This feature allows you to keep a record of the data sources and assumptions as you make the projections. This source information will be maintained with the data file and printed whenever you print the projection summary. It is **strongly** recommended that you use this feature to avoid later confusion.

When you have finished entering all the necessary data for the component into the editor,

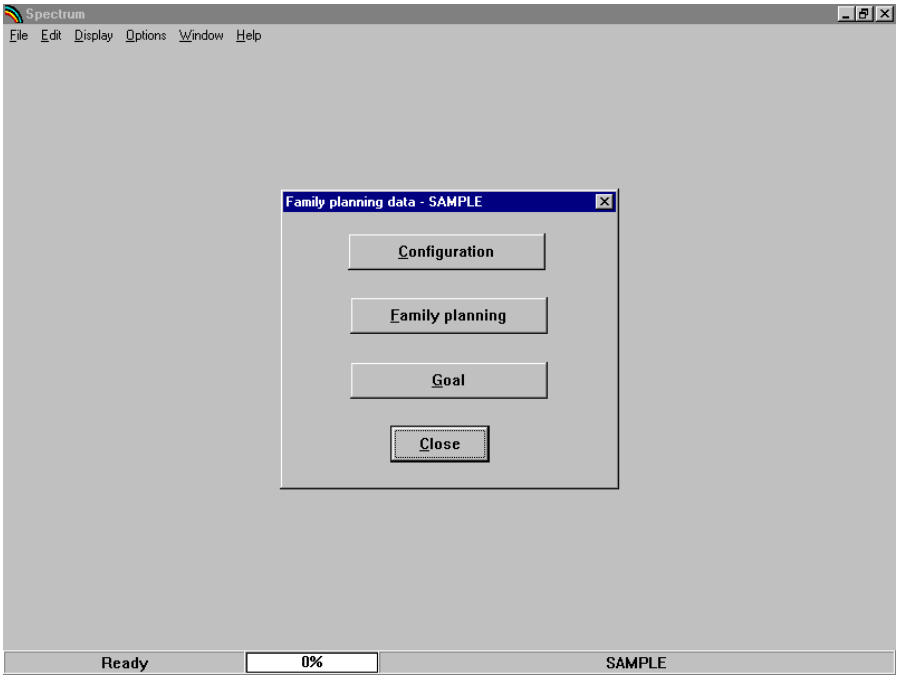
1. Click the "Ok" button to return to the "Family planning data" dialogue box.
2. Click the "Close" button to complete the editing process.

The "Cancel" button allows you to exit the editor without making any changes to the data.

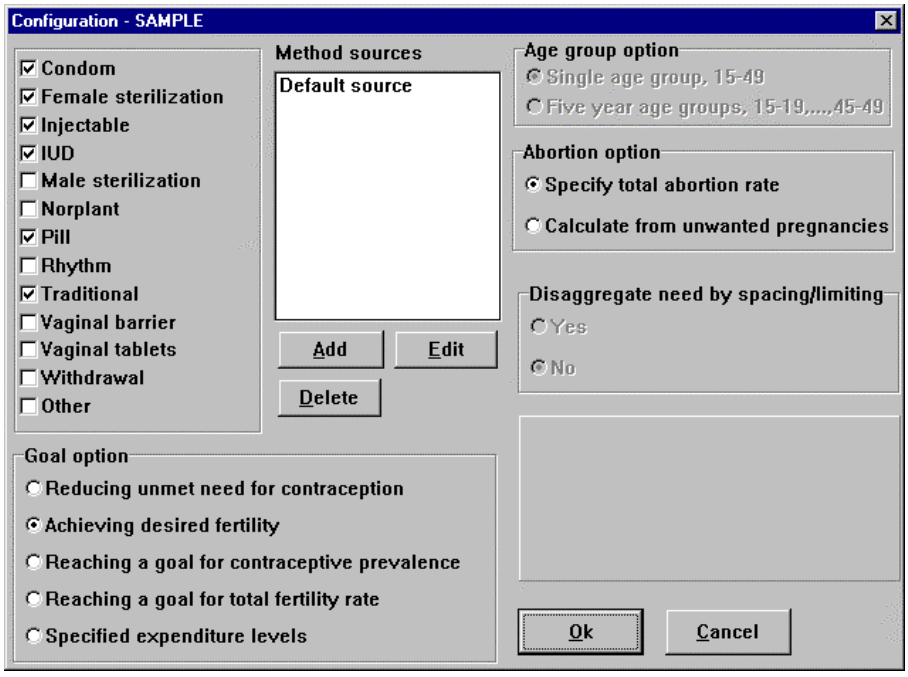
If you decide that you do not want to keep the changes you have just made, click the "Cancel" button in any editor. This will exit the editors and restore all inputs to their values before you entered the Family Planning editor. Any changes made during the editing session will be lost.

2. Specifying the Family Planning Projection Parameters

For readers who feel they need additional review or explanations of the terms found in this section, Chapter III and the glossary of this manual may be useful.
The assumptions for the family planning projection are entered by selecting "Edit" from the menu bar and "Family Planning (FamPlan)" from the pull-down menu. A dialogue box like the one shown below will appear.



Then click the button "Configuration." A family planning configuration dialogue box, like the one shown below, will appear.



From this Configuration dialogue box you can choose among the components you want to include in your projection. The components are as follows:

- **Age group option.** Two options are available for age groups. The projection can be made with one single age group including all women in the age group 15 to 49 (commonly considered the reproductive years), or the projection can be disaggregated by five-year age groups for the reproductive years. Using five-year age groups has the advantage of greater precision in the projection but requires seven times as much information to be entered for some inputs.
- **Abortion option.** The proximate determinants of fertility framework recognizes that induced abortion is a determinant of the total fertility rate. FamPlan provides two methods for specifying the number of abortions. In the first method, the total abortion rate is provided as an input. In the second method, the number of abortions is calculated from the number of unwanted pregnancies and an assumption about the proportion of unwanted pregnancies that are terminated by induced abortion.
- **Disaggregate need by spacing and limiting.** If you select a goal of achieving a particular level of contraceptive prevalence (see discussion below of the goals of reducing unmet need or contraceptive prevalence), the goal can be specified either in terms of total prevalence or in terms of spacing and limiting

prevalence, separately. Since the need for family planning for spacing and limiting may evolve quite differently over time, it is generally recommended that you select the "Yes" option. This selection is particularly important for method mix.

- **Methods to include.** Here you can select the family planning methods that you want to include in your projection. You can select as many methods as you want, but you must select at least one method by clicking on the check box next to the name.
- **Method sources.** You do not have to include any sources in the projection; if you do not, FamPlan will treat the projection as if all methods came from one source. However, in most cases, it will be useful to include sources. In this section, you can enter the names of as many sources as you wish to include. These might be category names such as "Public sector," "Private sector," or "NGO sector"; or specific source names such as "MOH clinics," "FPA," "Social marketing," "Profamilia," etc. To add a source, click on the "Add" button and type the name of the source. To delete a source from the list, first click on the name of source you wish to delete, then click on the "Delete" button. To edit the name of a source, first click on the name of the source and then click on the "Edit" button.
- **Goal option.** In this section you select the goal of the family planning projections. The goal selection will determine some of the inputs required to make the family planning projection. There are five choices:

    1. Reducing unmet need for contraception.
    2. Achieving desired fertility.
    3. Reaching a goal for contraceptive prevalence.
    4. Reaching a goal for total fertility rate.
    5. Specified expenditure levels.

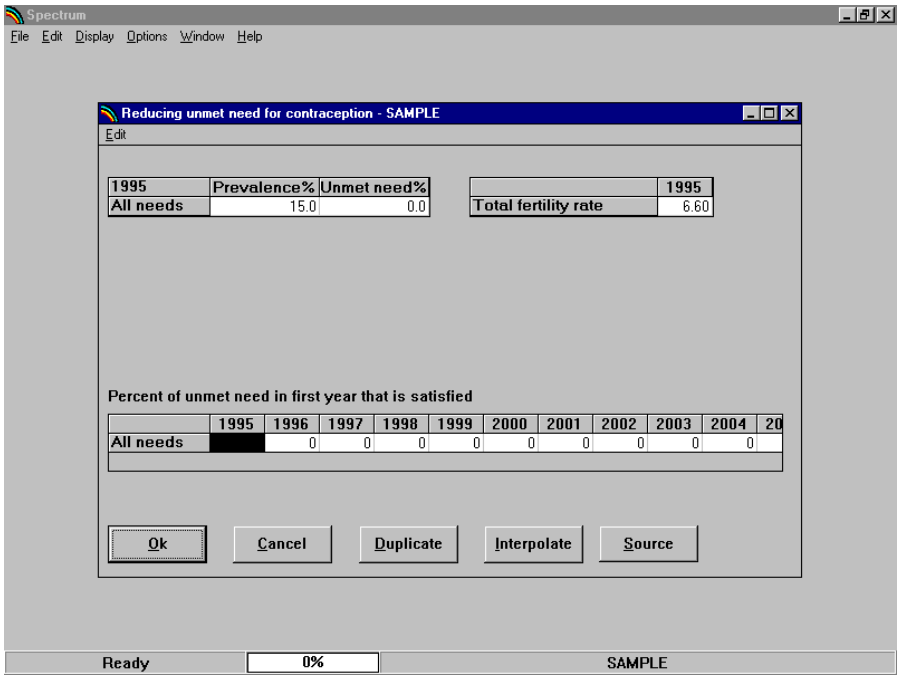
Once you have completed all the information in the configuration dialogue box, click the "Ok" button to close this dialogue box.

3. Specifying the Goal

In the "Family planning data" dialogue box (reached by selecting "Edit" from the menu bar and "Family planning" from the pull-down menu or, from the Configuration dialogue box, by simply selecting "Ok" and then "Family planning" from the dialogue box), select the button "Goal" to set the goal of the projection. The information required will depend on the goal selected in the "Configuration" dialogue box.

Reducing Unmet Need for Contraception

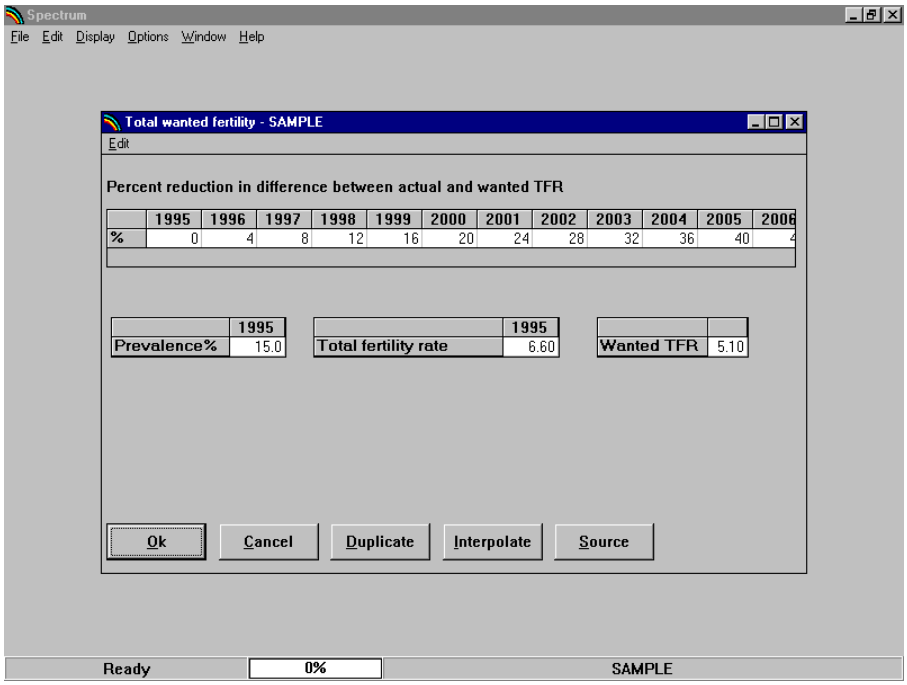
There are three types of information required for this goal, as shown in the next screen.



1. **Prevalence and unmet need in the base year.** In the first column of this section, enter the contraceptive prevalence in the base year. (Prevalence may be disaggregated by prevalence for spacing and prevalence for limiting if that option was selected under Configuration. This choice is not shown on this screen.) Information on contraceptive prevalence is usually available from fertility surveys. In the second column, enter the base year estimate of unmet need.
2. **The total fertility rate in the base year**. Enter the TFR in the base year in the edit box in middle of the screen.

3. **Percent of unmet need that is satisfied.** In the third portion of this dialogue box, enter the percent of unmet need that will be satisfied for each year of the projection. In many cases it will be sufficient to enter a goal for the final year of the projection and interpolate from zero in the first year.

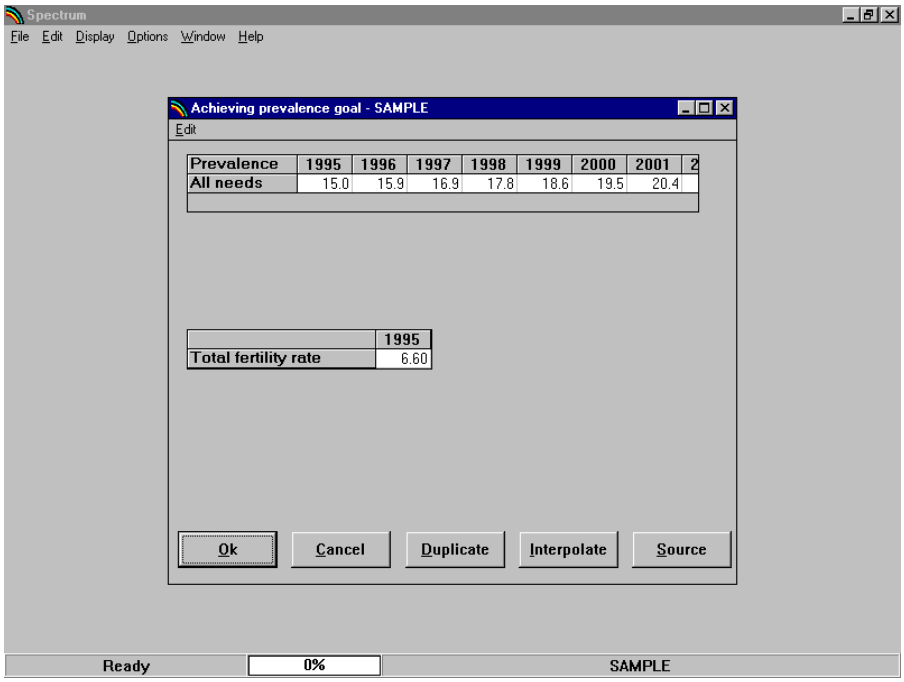
Total Wanted Fertility



There are three types of information required for this goal.

1. **Percent reduction between actual and desired TFR.** Enter the percent reduction in the base year difference between the actual TFR and the desired TFR for each year of the projection. If the difference is 100 percent in some year, then the TFR will equal the desired TFR in that year. In many cases it will be sufficient to enter a goal for the final year of the projection and interpolate from zero in the first year.
2. **Base year values for the contraceptive prevalence and TFR.** Enter the contraceptive prevalence rate and the total fertility rate in the base year.
3. **Wanted TFR.** Enter the wanted total fertility rate.

Reaching a Goal for Contraceptive Prevalence

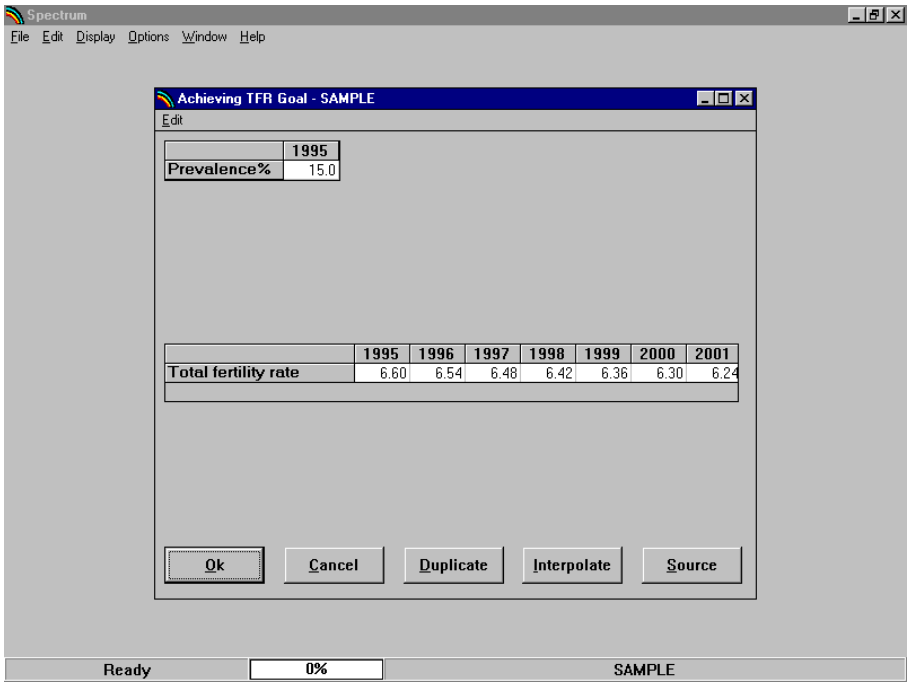


Two types of information are required for this goal.

Prevalence may be disaggregated by prevalence for spacing and prevalence for limiting if that option was selected under Configuration. This choice is not shown on this screen.

1. **Prevalence.** Enter the goal level of contraceptive prevalence. This series should start with the actual prevalence in the base year of the projection. In many cases, it will be sufficient to enter a goal for the final year of the projection and interpolate from the actual value in the first year.
2. **Total fertility rate.** Enter the TFR in the base year.

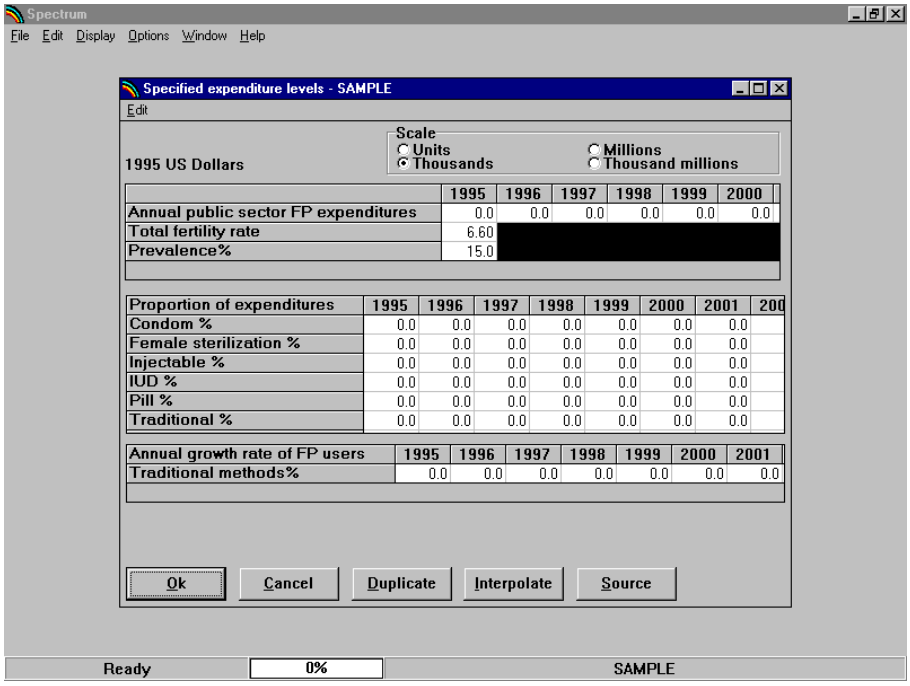
Reaching a Goal for the Total Fertility Rate



Two types of information are required for this goal.

1. **Prevalence.** Enter the contraceptive prevalence level in the base year.
2. **Total fertility rate.** Enter the actual TFR in the base year and the goal of the total fertility rate for all other years of the projection. In many cases it will be sufficient to enter a goal for the final year of the projection and interpolate from the first year.

Restricting Expenditures to a Specified Level



This is the most complicated input screen for the goals because five different types of information are required.

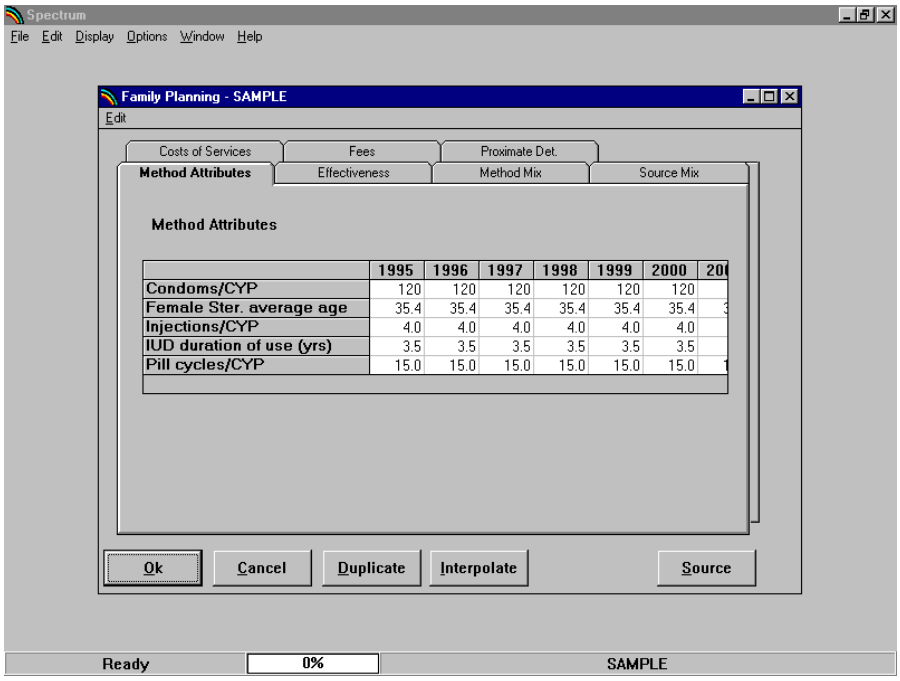
1. **Scale.** In the upper part of the dialogue box, click the appropriate radio button to indicate whether the expenditures figures will be entered as "units," "thousands," "millions" or "thousand millions."
2. **Annual public sector family planning (FP) expenditures.** For each year, enter the annual public sector expenditures for family planning. Later, the projection will calculate the number of users and acceptors and the TFR that can be achieved with this level of expenditure.
3. **Base year TFR and prevalence.** Enter the values of TFR and contraceptive prevalence in the base year.
4. **Proportion of expenditures.** Enter the proportion of expenditures *from public sources* that should be devoted to each method. These proportions should add to 1.0. These figures are required to ensure that all methods are represented in the method mix. Otherwise, the model will tend to allocate all expenditures to the least costly methods, creating an imbalance between the supply and demand for most family planning methods.

5. **Annual growth rate of FP users.** Enter the annual growth rate in the total number of users *for each method source other than the public source*Xif you entered any in the Configuration screen earlierXand for traditional methods. This information is required because private and traditional sources, for example, may require no public sector funding. Thus, it is necessary to specify separately the growth rates in these sectors in order to estimate the total family planning effect.

4. Entering the Family Planning Program Assumptions

To enter the data and family planning program assumptions:

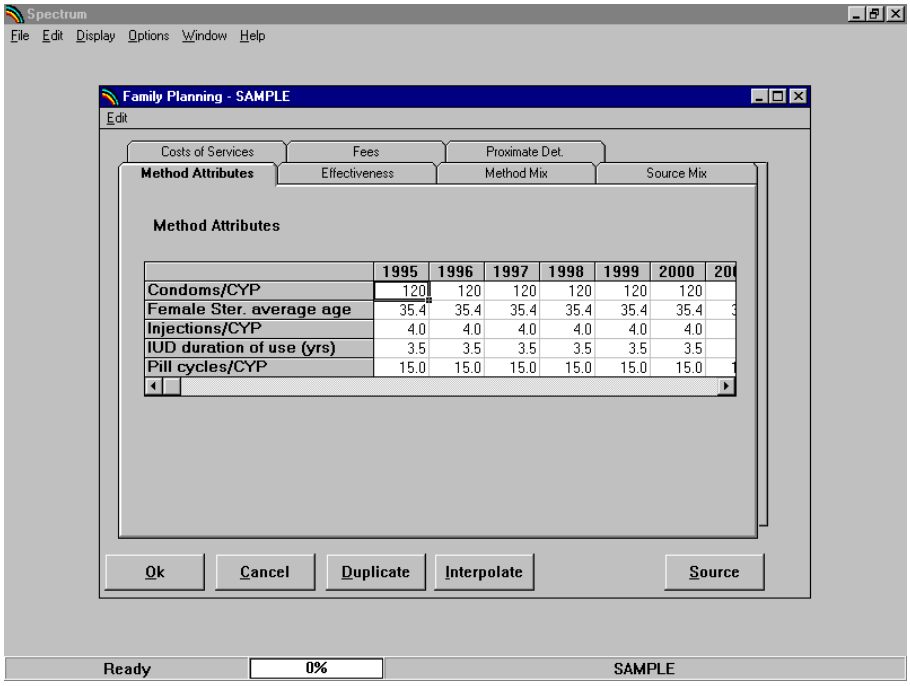
1. Choose "Edit" from the menu bar.
2. Choose "Family planning (FamPlan)" from the pull-down menu.
3. Choose "Family planning" from the "Family planning data" dialogue box. This step will display an editor like the one shown below.



For each of the inputs required for the projection, there is a tab near the top of the screen.

1. To enter data for any of these assumptions, click on the appropriate tab to display the editor for that variable.
2. Then click anywhere inside the editor to make it active.

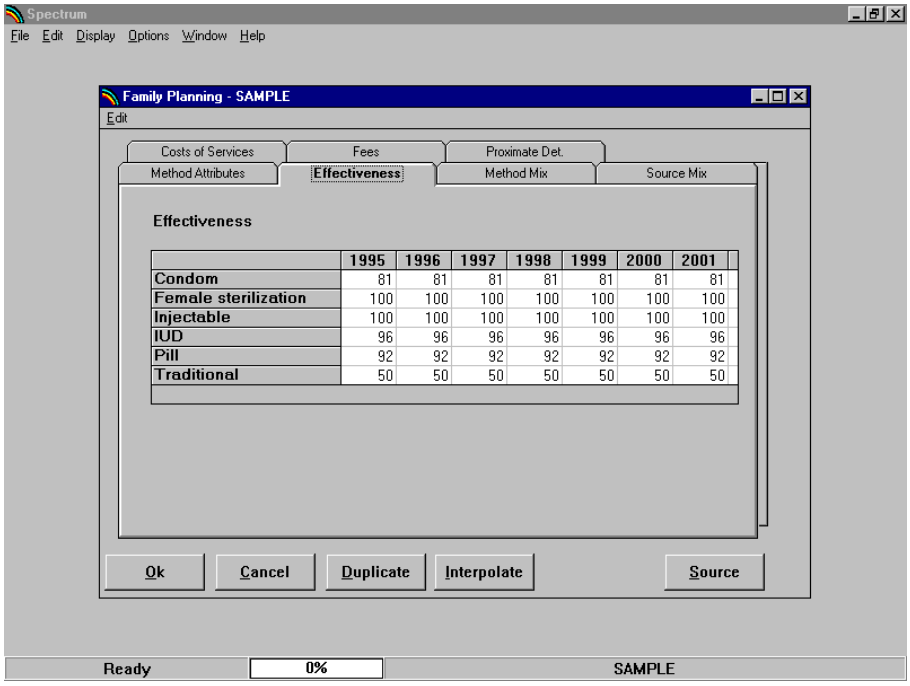
Method Attributes



1. Click somewhere inside the editor to make the scroll bar appear.
2. Scroll to the right or left to see all the years.
3. For each year of the projection, only those methods chosen in the Configuration screen will be shown. Enter the units per CYP for the temporary methods (Condoms, Injections, Pill cycles and Vaginal tablets), the average duration of use for the long-term methods (IUD and Norplant), and the average age at sterilization for the permanent methods (male and female sterilization). The model contains default values that can be used for most methods. However, the age at sterilization should be changed to reflect the actual program situation.

When you have entered the information on Method Attributes, click the "Effectiveness" tab to move to the next editor.

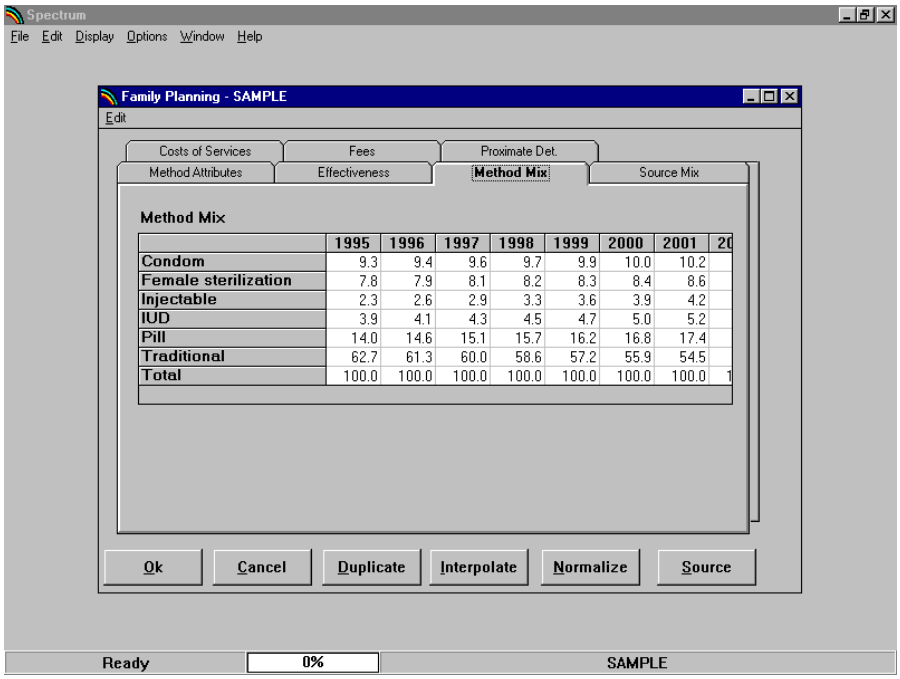
Effectiveness



1. Click somewhere inside the editor to make the scroll bar appear.
2. Scroll to the right or left to see all the years.
3. The model contains default values which are recommended for most projections; if these are not appropriate for this particular projection, make any changes necessary.

When you have entered the information on Effectiveness, click the "Method Mix" tab to move to the next editor.

Method Mix

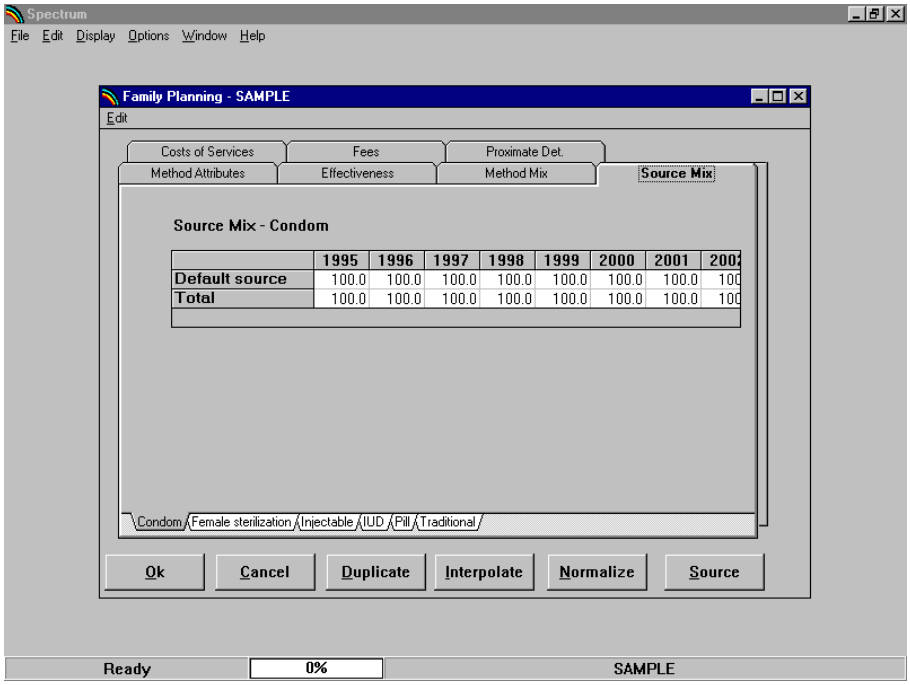


1. Click somewhere inside the editor to make the scroll bar appear.
2. Scroll to the right or left to see all the years.
3. Enter the method mix for the projection. The method mix is the percentage of all users of each method. Thus, the values for all of the methods should sum to 100. If the values for at least one year do not sum to 100, you will see an error message when you click the "Ok" button to leave the editor. This is a warning that you should return to the Method Mix editor and correct the inputs until all columns sum to 100. (It is just a warning. The program will not force you to make all the columns sum to 100. You can consider dual method use by allowing the method mix to sum to more than 100. If a column sums to 110, it indicates that 10 percent of users are using more than one method at a time. In this case, the prevalence and TFR calculations will be correct, while the commodity requirements will reflect the fact of dual method use by some portion of users.)
4. The Method Mix editor and the Source Mix editor both have an additional button labeled "Normalize." Clicking this button will force the entries to sum to 100 for each year by adjusting each entry up or down by the same proportion.

5. For some goals, you can specify the method mix separately for spacers and limiters. Select spacers or limiters by clicking on the appropriate button near the bottom of the editor (not shown).

When you have entered the information on method mix, click the "Source Mix" tab to move to the next editor.

Source Mix

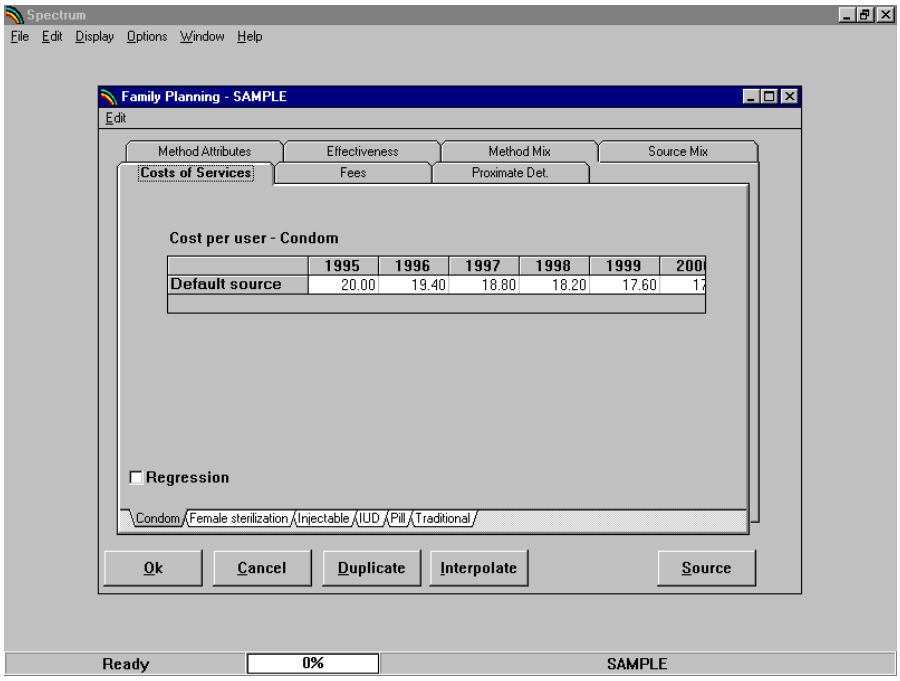


1. Click somewhere inside the editor to make the scroll bar appear.
2. Scroll to the right or left to see all the years.
3. Enter the source mix for the contraceptive methods in the projection. In the screen shown, the first contraceptive method is condom. The source mix is the percentage of all users or acceptors who get their services from each source. Note that it is not necessary to enter values for all sources for all methods. Some sources may be zero for some methods. However, the source mix should sum to 100 for each method and each year.

To enter source data for the other contraceptive methods in the projection, select a tab near the bottom of the screen. In the example screen shown, contraceptive methods include Condom, Female sterilization, Injectable, IUD, Pill, and Traditional.

When you have entered the information on source mix, click the "Costs of Services" tab to move to the next editor.

Costs of Services

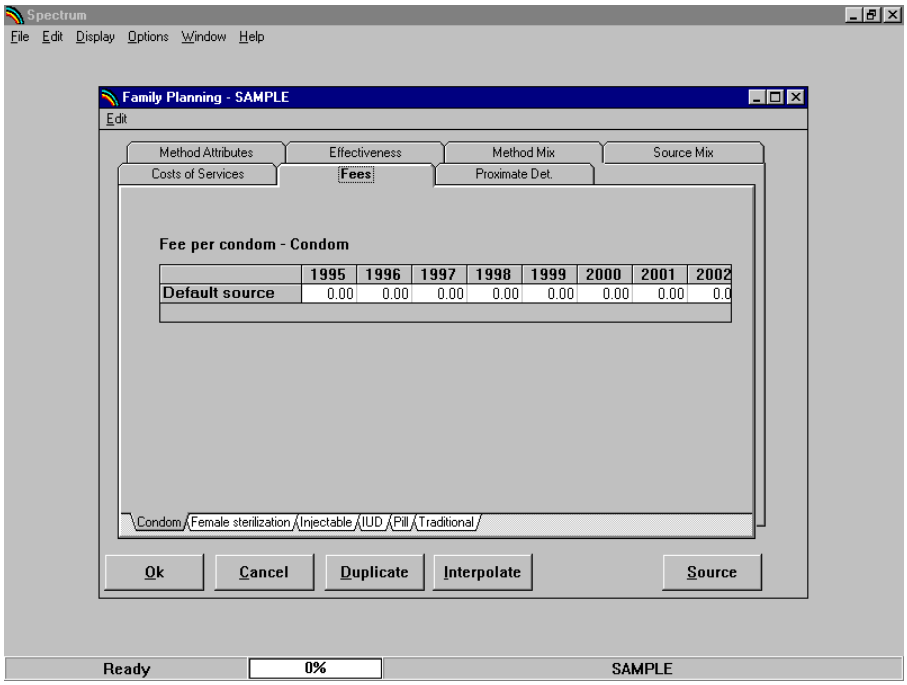


1. Click somewhere inside the editor to make the scroll bar appear.
2. Scroll to the right or left to see all the years.
3. Enter the total public sector costs per user or acceptor for each source and each method, for all years (unless you plan to use the "Regression" feature, described just below). Select the methods from the tabs near the bottom of the editor, just like in the "Source Mix" editor. If a particular source is not available for some method, the cost may be left at zero.

FamPlan can project future costs per user using the relationship shown earlier in **Figure 3**. To use this feature, click the check box marked "Regression" at the bottom of the edit screen for "Costs of Services" (just above the method tabs). Then enter the cost per user or acceptor for the first year for each method and source. The program will calculate the (eventual) declining cost per user or acceptor in the future as a function of increasing prevalence.

When you have entered the information on Costs of Services, click the "Fees" tab to move to the next editor.

Fees

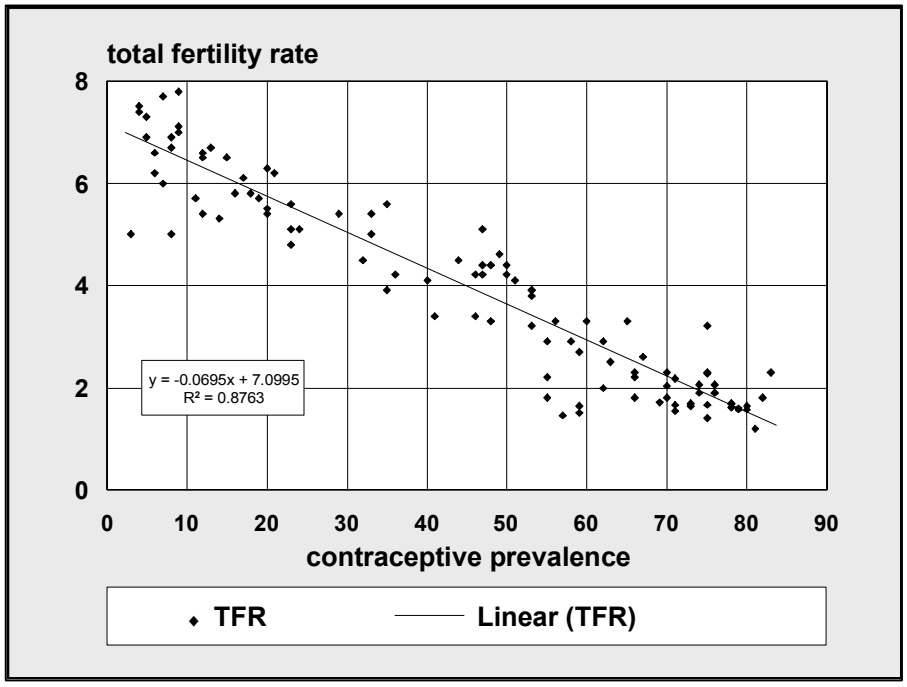


1. Click somewhere inside the editor to make the scroll bar appear.
2. Scroll to the right or left to see all the years.
3. Enter any fees associated with method-specific services by source. Note that the fee unit changes with each method. It is shown in the title just above the edit tables (e.g., Fee per condomXCondom, Fee per operationXFemale sterilization, Fee per injectionXInjectable, etc.).

Note that since most projections define the costs to be public sector costs, the fees should be those fees that accrue to the public sector. Thus, for condoms sold by pharmacies with no public sector subsidy, the costs and fees for condoms provided by pharmacies would generally be set to zero. However, for a community-based distribution (CBD) program that does receive public sector subsidies, the public sector costs and fees should be specified.

When you have entered the information on Fees, click the "Proximate Det." tab to move to the next editor.

Proximate Determinants



1. Click somewhere inside the editor to make the scroll bar appear.
2. Scroll to the right or left to see all the years.
3. Enter values for these proximate determinants of fertility for each year of the projection. In many cases it will be sufficient to enter a base year value and a value for the final year of the projection, and then to interpolate between these two years.

5. Leaving the Family Planning Data Editors

Once you have entered all the necessary information,

If you decide that you do not want to keep the changes you have just made, click the "Cancel" button in any editor. This will exit the editors and restore all inputs to their values before you entered the Family Planning editor. Any changes made during the editing session will be lost.

1. Leave the Family Planning editor by clicking the "Ok" button in any of the editors. When you click the "Ok" button, the program will record your changes and return to the "Family planning data" dialogue box.
2. Click the "Close" button to keep your work, and you will return to the main program.

6. Saving the Input Data

Once you have entered the projection assumptions, it is a good idea to save the data onto your hard disk. To do this, select "File" from the menu bar and "Save projection" from the pull-down menu. The data will be saved using the file name you specified earlier.

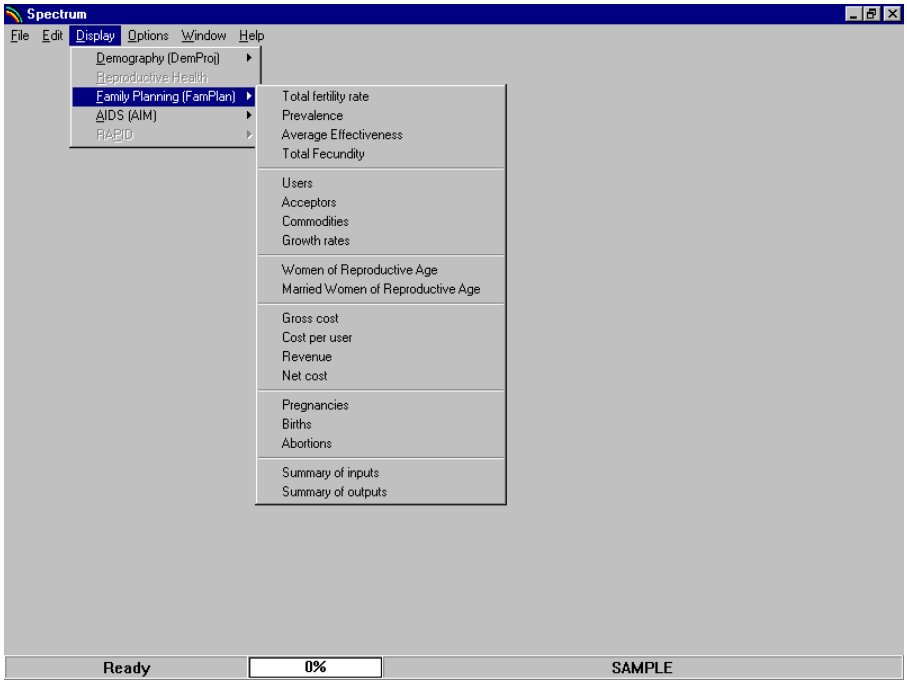
E. Making the Projection

Whenever you enter data for a new projection or edit the assumptions, FamPlan will note that the data have been changed. The next time you try to display an indicator it will inform you that the data may have changed and ask if you want to recalculate the projection. Normally, you should answer "Yes" to this question. FamPlan will then make the projection. This may take only a few seconds if you are making only a population and family planning projection, or could take somewhat longer if you are also making a projection including AIDS or the RAPID module (see *DemProj: A Computer Program for Making Population Projections;* and *RAPID: Computer Programs for Examining the Socioeconomic Impacts of Population Growth*). Once the projection is made you will not be asked if you want to do the projection again unless you edit the assumptions.

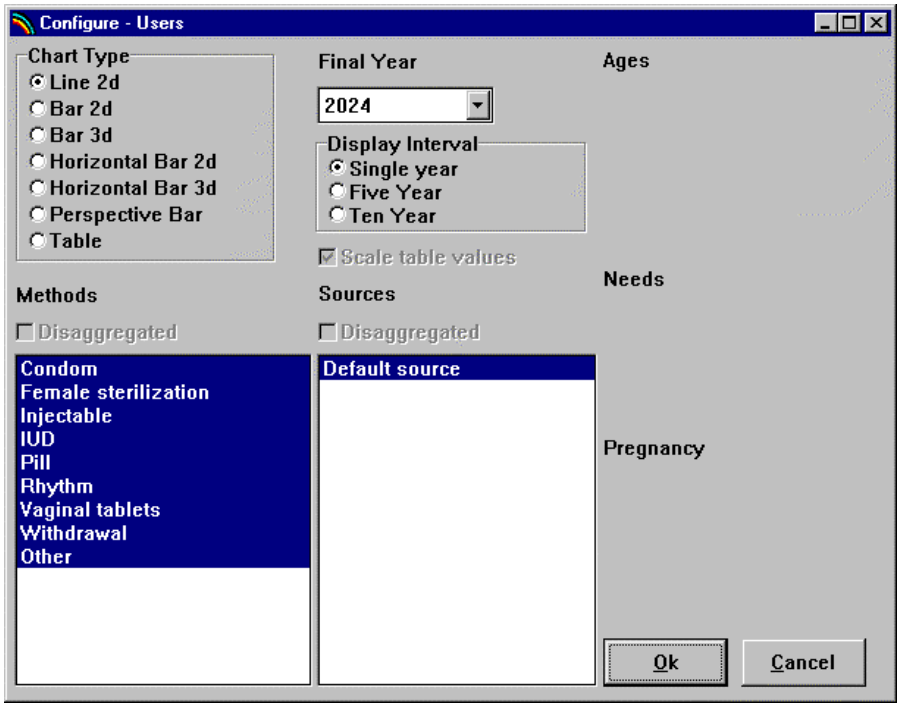
F. Examining the Output

To see the results of the projection, select "Display" from the menu bar. From the pull-down menu select "Family planning." You will then see another menu showing the indicators available:

- Total fertility rate
- Prevalence
- Average Effectiveness
- Total Fecundity
- Users
- Acceptors
- Commodities
- Growth rates
- Women of Reproductive Age
- Married Women of Reproductive Age
- Gross cost
- Cost per user
- Revenue
- Net Cost
- Pregnancies
- Births
- Abortions
- Summary of inputs
- Summary of outputs

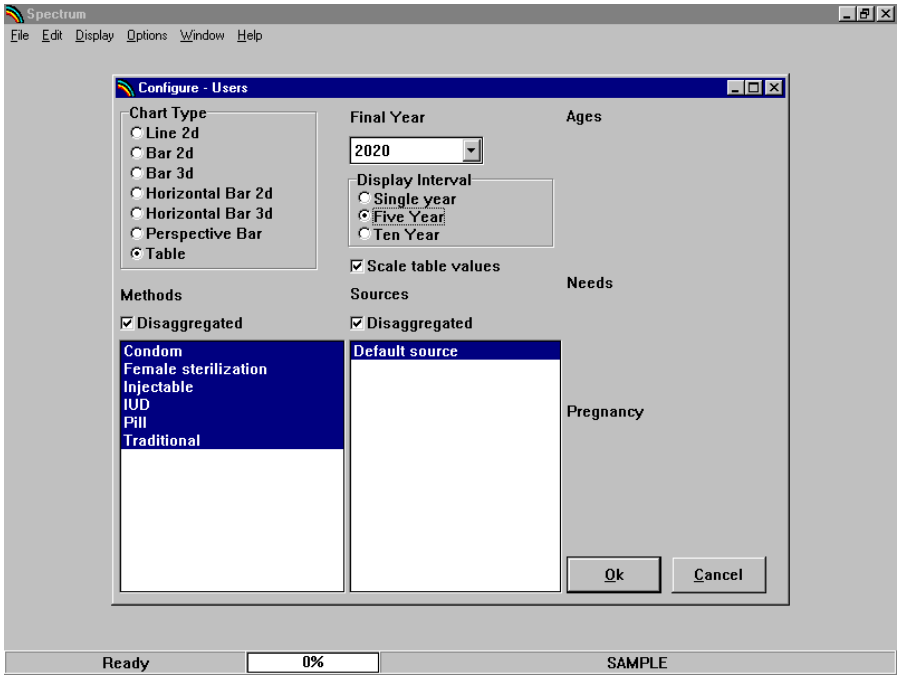


Choose one of these indicators. Then you will see the "Display" dialogue box. It will look something like the one shown below.



The exact choices available will depend on the indicator you have selected. For some indicators you can select certain methods and sources to be displayed. For some you can select the type of contraceptive need (spacing or

limiting) or the type of pregnancy (wanted, mistimed, or unwanted). When the dialogue box first appears, all the choices in each category will be selected. This means, for example, that the number of users of all methods will be shown. If you want to display just users of temporary methods, you can click on the methods Condom, Pill, Injectable, and Vaginal tablets. (To select several methods at once, hold down the Ctrl key while clicking on each method. To select a range of methods, hold down the Shift key and click on the first and last methods in the range.) These methods remain highlighted to indicate that they are included. When you see the display, the numbers will refer to just those methods selected. The selection process works in a similar manner for sources, needs, and pregnancy type.

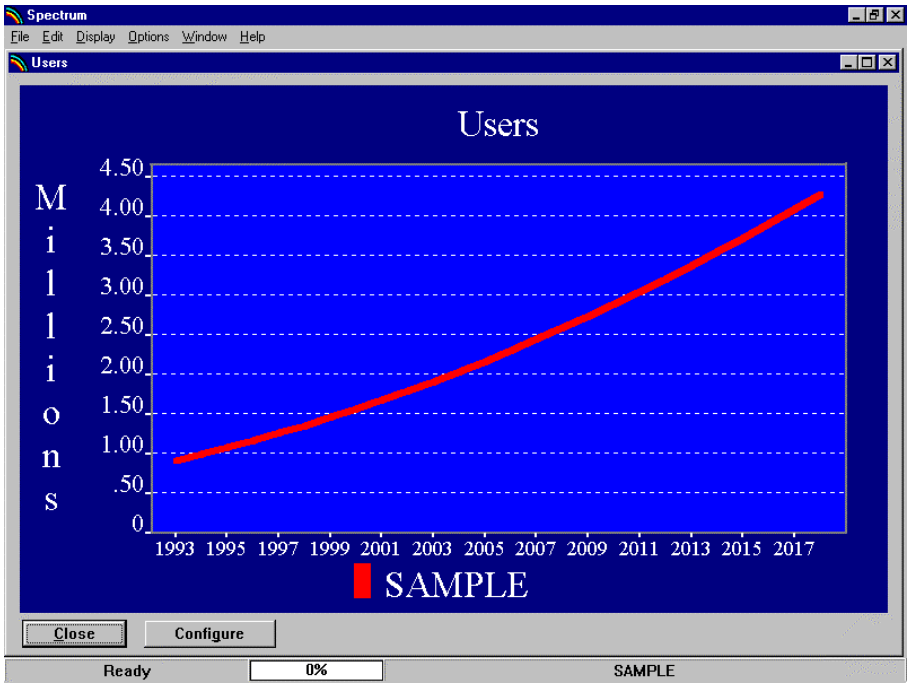


When the "Chart Type" is set to "Table," you may see a check box labeled "Disaggregated" above the selection list. This means that you can check that box to tell the program to display all the choices individually. For example, if you check the "Disaggregated" box for Sources, you will see a table showing each source in a separate column with a total column at the end.

The display will normally be in single years, but you can change it to display every five or ten years. The chart type is also set through this dialogue box. Click on the button next to the type of display you want. Normally the display will show all the years in the projection. However, if you want to see only part of the projection, you can change the final

year by selecting a new final display year from the "Final Year" list box.

Once you are satisfied with the type of display, click the "Ok" button, and the display will appear. It will look something like the display shown below.



All the projections that are currently in use will be displayed on the same graph.

You can change the configuration of the display by clicking the "Configure" button. You can also change the type of display by putting the mouse pointer anywhere inside the chart and clicking with the right mouse button.

To close the display, click on the "Close" button. You do not have to close the display immediately. You can choose to display another indicator, and it will appear on top of the first display. The first display will be covered but will still be there. You can return to any previous display that you have not closed by choosing "Window" from the menu bar and selecting the name of the display from the pull-down menu. From the "Window" selection you can also choose to tile or cascade all the existing display windows.

1. Graphs and Bar Charts

FamPlan will display a variety of graphs and bar charts including:

- Line charts
- Two- and three-dimensional bar charts (column charts)
- Two- and three-dimensional horizontal bar charts
- Two- and three-dimensional overlap bar charts (bars for multiple projections are shown on top of each other)
- Three-dimensional perspective bar charts.

To print the current (selected) chart, select "File" from the menu bar and "Print" from the pull-down menu.

2. Tables

FamPlan will also display data in the form of tables. In tables, each projection that is in use will be displayed in a separate column. You can scroll through the table to see all the years by using the PgUp and PgDn keys or by using the mouse.

To print a table, select "File" from the menu bar and "Print" from the pull-down menu.

G. Saving the Projection

It is always a good idea to save the projection whenever you make a change to any assumptions. To save the projection without changing the name, choose "File" from the menu bar and "Save projection" from the pull-down menu.

To save the projection with a different name, chose "File" from the menu bar and "Save projection as" from the pull-down menu. You will then have a chance to specify a new file name for the projection. Normally when you save the projection with a new name you should also change the projection title. This step will avoid confusion if you have both projections loaded at the same time.

H. Opening an Existing Projection

If you have already created a FamPlan projection or are using a projection provided by someone else, you can immediately load that projection.

1. Select "File" from the menu bar.
2. Select "Open projection" from the pull-down menu.
3. Select the file you wish to use and click the "Ok" button to open the projection.

You can open more than one projection at a time. Just repeat these steps to load a second or third projection. When you have more than one projection loaded, all projections will be displayed in the graphs and tables. The number of projections you can load at any one time is determined by the amount of available memory in your computer.

When you have more than one projection loaded, you will be asked to choose a projection when performing certain tasks, such as editing assumptions. The program will display a list of the projection names, and you choose the appropriate one from the list.

I. Closing a Projection

To remove a projection that has already been opened,

1. Choose "File" from the menu bar and
2. "Close projection" from the pull-down menu. If you have more than one projection loaded, you will be asked to select which projection should be closed.

Closing a projection just removes it from the computer's memory; it does not erase it from the hard disk. You can open that projection again at any time.

VI. Sample Application

This chapter describes a typical application of FamPlan. It uses a data file that is a composite of data for several countries with low levels of prevalence. This data file is provided on the program diskette under the name SAMPLE for those who wish to reproduce these results for themselves. We assume that a DHS is available for the sample country. We also assume that:

- most of the information regarding the proximate determinants of fertility is derived from the DHS report.
- The source of the initial method mix is also the DHS report.
- The projection of women of reproductive age is taken from a DemProj projection.
- Changes in method mix and other variables are estimated using general patterns described in this chapter.
- The default values in the model are used for method attributes, such as effectiveness and couple-years of protection.
- Cost per user estimates are derived from the average values presented in this chapter.

The basic model inputs for this example are shown in Tables 24 and 25.

These inputs assume a decline in the percentage of women of reproductive age who are in union as the country develops socially and economically. They also assume that the duration of postpartum infecundability decreases as a result of declines in breastfeeding. Also included are changes in the method mix that are typical for a country undergoing this type of fertility transition. The method mix changes from one dominated by traditional methods when prevalence is low to one where more effective methods are used by the majority of users. Costs per user are assumed to decline as the program matures.

In this example, the goal is to achieve desired fertility, based on the wanted total fertility rate reported in the DHS final report. We assume that desired fertility will be attained by 2020.

Table 24: Proximate Determinants and Method Mix for Sample Application

	1995	2020
Proximate Determinants		
Number of women of reproductive age	8,400,000	19,200,000
Percent in union	70%	63%
Duration of postpartum infecundability	16 months	13 months
Total abortion rate	0	0
Involuntary sterility	2.2%	2.2%
TFR	6.6	5.1
Contraceptive prevalence	15%	–
Method Mix		
Condom	9.3%	12.9%
Female sterilization	7.8%	11.0%
Injection	2.3%	10.4%
IUD	3.9%	9.2%
Orals	14.0%	28.0%
Traditional	62.7%	28.5%

Table 25: Method Attributes for Sample Application

Method	Effectiveness	Units per CYP	Average Age of Users	Cost per User/Acceptor
Condom	81%	120 units	–	$20/user/year
Female sterilization	100%	–	35.4	$100/acceptor
Injectables	100%	4 injections	–	$20/user/year
IUD	96%	3.5 years per insertion	–	$20/acceptor
Orals	92%	15 cycles	–	$15/user/year
Traditional	50%	–	–	$0

A. Contraceptive Prevalence

The prevalence level in 2020 that is required to achieve this fertility level is calculated by the model to be 34.4 percent, compared to 15 percent in the base year. The increase would have been even higher, except that the shift in method mix away from heavy reliance on traditional methods to more effective methods resulted in the average effectiveness increasing from 66 percent in 1995 to 81 percent by 2020.

B. The Effect of Changes in the Proximate Determinants of Fertility

In order to see the effect of a change in percent in union, postpartum insusceptibility, and method mix, we can compare the prevalence required in the base case with the prevalence requirement if there were no changes in these variables. **Table 26** compares the base case with projections, assuming changes in these variables.

Table 26: Effect on Required Prevalence of Holding Constant the Other Proximate Determinants

Change in Base Projection	Required Prevalence in 2020
Base Projection	34.4%
Constant percent WRA in union	42.4%
Constant postpartum infecundability	26.7%
Constant percent WRA in union and postpartum infecundability	35.5%
Constant method mix	42.3%
Constant method mix, percent WRA in union and postpartum infecundability	43.7%

If the percent in union remained constant while the other two factors changed, as in the base case, the required prevalence would increase to 42.4 percent. Thus, the expected drop in the percent in union, due largely to increasing age at first marriage, would reduce the prevalence required to achieve desired fertility by 19 percent.

If the duration of postpartum infecundability remained constant while the other two factors changed, as in the base case, the required prevalence would be 26.7 percent. This figure is 22 percent lower than the base projection. Clearly, if the expected decline in breastfeeding could be avoided, then the required prevalence would be much less. A program to promote breastfeeding in order to provide health benefits to infants would also have a positive impact on the family planning effort required to achieve desired fertility.

Holding constant both percent in union and postpartum infecundability would result in a required prevalence of 35.5 percent. This is only slightly more than the base case. In this example, changes in marriage patterns and breastfeeding roughly cancel each other out in terms of the effect on required contraceptive prevalence.

If the method mix remained as it was in 1995, then the required prevalence in 2020 would be 42.3 percent instead of 34.4 percent, as in the base case. This difference is due to the increase in the average effectiveness that results when the method mix reflects greater use of modern methods.

If we held all three factors constant, required prevalence would be 43.7 percent in 2020.

C. The Number of Users Required

Although the level of prevalence required would increase by 129 percent, the number of users would increase even more, by 365 percent. This is true because the number of women of reproductive age is also changing during this period, increasing by 125 percent from 1995 to 2020. Perhaps more pertinent to the family planning program is the increase in the number of modern method users. Modern method users represent 37 percent of all users in 1995 but increase to 72 percent by 2020. The **number** of modern method users increases by 800 percent. This is an annual increase of 9.2 percent per year. Thus, the combination of increasing prevalence, growth in the number of women of reproductive age, and the changing method mix results in rapid growth in required family planning services to meet desired fertility by 2020. Growth in the number of users of particular methods is also quite large, especially in the case of injectables.

At this point in the analysis it would be wise to review these results and begin to think about whether such a rapid increase in services is feasible. The following paragraphs investigate further some of the related indicators of family planning service requirements. If, after a review of these results, it appears that the rapid growth rates required do not seem feasible, it may be necessary to either adjust the fertility goal or extend the projection period to accomplish the original fertility goal.

D. The Number of New Acceptors Required

The annual number of new acceptors of female sterilization and IUDs increases from 31,700 in 1995 to 232,000 by 2020. While the share of the mix for both methods is fairly similar, fewer acceptors of sterilization are needed due to the longer-lasting nature of sterilization as compared to the IUD.

E. Total Costs of Family Planning

The total costs of providing these services increase from $5.67 million in 1995 to $18.62 million in 2020, using the cost per user assumptions shown in **Table 27**. The increase in costs averages approximately 9 percent for the first few years, but because the cost per user decreases over time due to the prevalence rise, the annual increase in total costs ranges from 0.5 percent to 1.0 percent by the end of the projection period.

Table 27: Comparison of Costs by Method, 1995 and 2020

Method	Cost/User, 1995 ($)	Cost/User, 2020 ($)
Condom	20.00	5.00
Female sterilization	100.00	50.00
Injections	20.00	10.00
IUD	20.00	15.00
Orals	15.00	5.00

F. Exploring Alternate Program Configurations

Once the initial analysis has been prepared, it can be used to explore the consequences of different program configurations for program goals. Several of the issues that might be investigated using FamPlan are discussed briefly below.

1. Programs to Promote Long-Lasting Methods

A program to promote the use of long-lasting methods could result in increased effectiveness and lower costs. Of course, such a program would only be successful in situations where there was significant demand for limiting births. Users can test the effects of this type of program with FamPlan by changing the method mix. Suppose, for example, that the method mix for 2020 in the sample application were changed to increase female sterilization from 11 to 20 percent and IUD from 10 to 20 percent, and to show a substantial drop in use of traditional methods. The result would be an increase in average effectiveness in 2020 from 81 percent to 90 percent due to increased use of more effective methods. The required prevalence would decrease slightly from 34.4 percent to 30.7 percent.

2. Introduction of New Technology

The next decade may see the introduction of a number of new contraceptive technologies. FamPlan can be used to examine the effects of these new technologies on acceptors and total costs. Suppose, for example, that a new method such as Norplant was introduced in the sample country and that it was expected to provide 10 percent of modern method use by 2020 (substituting equally for the other modern methods). If Norplant were assumed to have a cost per acceptor of $60 by 2020, then the total costs for modern methods in 2020 would be 40 percent greater. The number of Norplant users would rise to 406,000 by 2020.

3. Multiple Method Use

The method mix describes the distribution of users by the main method they use. Generally, the figures for method mix sum to 100 percent, indicating that all users are using one main method. But some users may use multiple methods. Although the prevalence of multiple method use is probably small in most societies, it may increase in the future, particularly as programs are expanded to promote condom use for protection against sexually transmitted

diseases, especially AIDS. Although the use of condoms to protect against HIV transmission may not provide much protection against pregnancy, it could be useful to consider the costs of additional condom programs in relation to the family planning program. Users may make this comparison with FamPlan by increasing the percentage of people using condoms without offsetting this increase by decreases in other methods. The method mix will sum to more than 100 percent to reflect the fact that there is considerable multiple method use.

In the sample application used here, the percent using condoms in 2020 could be increased from 13 percent to 23 percent. The result would be a much greater increase in the number of condom users. For example, the total number of users would be 62 percent greater in 2020. This result has many implications for a condoms logistics system.

4. Programs to Promote Breastfeeding

Programs to promote the practice of breastfeeding can have beneficial effects on child survival. They can also affect the requirements for family planning since increased breastfeeding lengthens the period of postpartum infecundability. Users can replicate this effect in FamPlan by lengthening the period of postpartum insusceptibility or by slowing the decrease that might otherwise be expected to take place as the society develops. The result will be a lower level of required prevalence and fewer required users and costs. For example, if the period of postpartum insusceptibility were to remain constant in the sample application, then the required prevalence would rise to only 27 percent instead of 34 percent. This would mean 22 percent fewer modern method users and a 22 percent reduction in costs in the year 2020.

5. Programs to Reduce Sterility

In some countries, high levels of sexually transmitted diseases lead to problems of subfertility and infertility. Programs to detect and treat these diseases can reduce the incidence of pathological sterility in the population. To examine this effect, users may reduce the estimate of sterility. In the sample application, a reduction in the prevalence of sterility from 2 percent to 0.5 percent by 2020 would result in an increase of 6 percent in the required number of users, raising prevalence from 34 percent to 36 percent to attain desired fertility.

6. Programs to Reduce the Incidence of Abortion

Although the sample application used here assumes no abortion, in some countries abortion does have a significant affect on the TFR. FamPlan can be used to examine this relationship by way of a change in the assumed abortion rate. For example, the model can be used to determine what amount of additional contraceptive prevalence would be required to achieve the same TFR, if abortions could be eliminated.

7. Programs to Improve the Quality of Family Planning Services

Although the quality of services is not easy to measure, there are several indicators in FamPlan that are related to quality of service. The average effectiveness of temporary methods is affected by the degree to which family planning providers ensure that clients understand how to use the method correctly and that the method is appropriate for that client. Model users could at least partially examine the effects of a program to improve quality by increasing effectiveness rates in the model, or by increasing the average duration of use for IUDs or Norplant. For example, an increase in effectiveness for orals and condoms in the sample application would result in a 3 percent reduction in the number of users and a 4 percent reduction in costs by 2020.

8. Cost Recovery

Although not considered in this sample application, FamPlan can also be used to examine cost recovery. Initiating or increasing user fees might be one way to improve cost recovery. The model can be used to examine the change in net costs and percentage of costs recovered that result from different levels of user fees. It should be noted, however, that the model does not consider the fact that higher user fees might result in some decline in the demand for family planning services. The relationships between demand and cost need to be considered when FamPlan is being used to examine the impact of cost-recovery programs.

9. Changes in Source Mix

Although not examined in this sample application, FamPlan can also be used to investigate the effects of a changing source mix. This change might occur through the introduction of new programs, such as a social marketing program, or through activities to encourage the commercial or NGO sector to expand services. FamPlan could be used to examine the effects of this changing source mix on the number of users and acceptors who would require service from each source. The results might be used to plan for public sector service expansion or to check the feasibility of expanding the private sector rapidly enough to achieve the program goals.

VII. Methodology

The following section describes the equations used in FamPlan. The equations differ depending on which of the family planning goals is chosen. The equations are explained first for goal 3 (achieving a specified level of contraceptive prevalence). Then the equations that change when other goals are chosen are explained. The main calculations in FamPlan are based on the proximate determinants of fertility framework developed by John Bongaarts (Bongaarts and Potter, 1983). This framework has been implemented and explained in Bongaarts (1978) and Bongaarts and Stover (1986).

A. Proximate Determinants of Fertility

The relationship between the contraceptive prevalence rate and the total fertility rate is based on the proximate determinants of fertility framework developed by John Bongaarts. This framework describes the factors that determine the observed TFR. These factors are:

- Proportion of women of reproductive age in union
- Contraception
- Postpartum infecundability
- Induced abortion
- Sterility
- Frequency of intercourse
- Spontaneous abortion
- Total fecundity rate.

The total fecundity rate is the fertility rate that would be achieved in the absence of any fertility-limiting effect of the proportion in union, contraception, induced abortion, or postpartum infecundability. The other factors all act to produce an observed TFR that is lower than the total fecundity rate.

Applications of this framework generally focus on only the first five of these factors and the total fecundity rate. Variations in the frequency of intercourse are assumed to have a minor effect on TFR, except in cases of spousal

separation (where these women can be classified as not in union). Spontaneous abortion is not easily measured. Therefore, in practice, frequency of intercourse and spontaneous abortion are often ignored or combined with the total fecundity rate to produce a single measure.

These modifications to the proximate determinants framework allow us to specify the total fertility rate as a function of six factors: proportion in union, contraception, postpartum infecundability, induced abortion, sterility and the total fecundity rate. Bongaarts developed indices to measure each of these factors.

1. Single Age Group, 15-49

In the aggregate, the use of these six indices yields the following equation:

$$[1]\ TFR_t = Cm_t \bullet Ci_t \bullet Ca_t \bullet Cs_t \bullet Cc_t \bullet TF \ ,$$

where:

TFR_t	=	total fertility rate
Cm_t	=	marriage index
Ci_t	=	insusceptibility index
Ca_t	=	abortion index
Cs_t	=	sterility index
Cc_t	=	contraception index
TF	=	total fecundity
t	=	time index.

The index of marriage is simply the percentage of women in the age group who are married or in union:

$$[2]\ Cm_t = \textit{Percent of women 15-49 in union}_t \ .$$

The index of postpartum infecundability is calculated as the ratio of the average birth interval with and without breastfeeding:

$$[3]\ Ci_t = 20.0 \ / \ (18.5 + \textit{Period of postpartum insusceptibility}_t) \ .$$

The index of induced abortion is calculated as a function of the total abortion rate, the total fertility rate and the contraceptive prevalence rate:

$$[4]\ Ca_t = TFR_{t-1} / \{TFR_{t-1} + [0.4 \bullet (1 + prev_{t-1}) \bullet TAR_t]\} \ ,$$

where:

$prev_t$ = contraceptive prevalence

TAR_t = total abortion rate.

The index of sterility is calculated from the percentage of women in union who remain childless at the end of their reproductive years:

$$[5]\ Cs_t = (7.63 - 0.11 \bullet Percent\ sterile_t) / 7.3 \ ,$$

where:

Percent $sterile_t$ = Percentage of women 15-49 who are sterile.

The index for contraception (equation 6) is calculated as a function of the proportion of women using contraception and the effectiveness of the contraception.

$$[6]\ Cc = 1 - 1.08 \bullet prev_t \bullet effectiveness_t \ ,$$

where:

$prev_t$ = prevalence of contraception at time *t*

$effectiveness_t$ = average effectiveness of all methods at time *t*.

The average effectiveness is a weighted average of the effectiveness of each method and the proportion of users using that method:

$$[7]\ effectiveness_t = \left(\sum_m prev_{m,t} \bullet effectiveness_{m,t} \right) / prev_t \ ,$$

where:

$effectiveness_{m,t}$ = use effectiveness of method *m*.

2. Five-Year Age Groups, 15-19, ..., 45-49

For five-year age groups, the calculations are similar, but age-specific equations are used to calculate TFR, the contraceptive index and the average effectiveness of contraception (equations 8 through 15). The TFR is a result of the age-specific fertility rates, which were themselves generated by the six age-specific indices.

$$[8]\ TFR_t = 5 \bullet \sum_a ASFR_{a,t} \ / \ 1000 \ ,$$

where:

TFR_t	=	total fertility rate
t	=	time index
a	=	age index from 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49
$ASFR_{a,t}$	=	age-specific fertility rate.

$$[9]\ ASFR_{a,t} = Cm_{a,t} \bullet Ci_{a,t} \bullet Ca_{a,t} \bullet Cs_{a,t} \bullet Cc_{a,t} \bullet TF_a \ ,$$

where:

$Cm_{a,t}$	=	marriage index
$Ci_{a,t}$	=	insusceptibility index
$Ca_{a,t}$	=	abortion index
$Cs_{a,t}$	=	sterility index
$Cc_{a,t}$	=	contraception index
TF_a	=	total fecundity.

$$[10]\ Cm_{a,t} = \text{Percent of women in age group a in union}_t \ .$$

[11] $Ci_{a,t} = 20.0 / (18.5 + \text{Period of postpartum insusceptibility}_{a,t})$.

[12] $Ca_{a,t} = ASFR_{a,t-1} / \{ASFR_{a,t-1} + [0.4 \bullet (1 + prev_{a,t-1}) \bullet ASAR_{a,t}]\}$,

where:

$prev_{a,t}$ = contraceptive prevalence
$ASAR_{a,t}$ = age-specific abortion rate.

[13] $Cs_{a,t} = (7.63 - 0.11 \bullet \text{Percent sterile}_{a,t}) / 7.3$,

where:

Percent $\text{sterile}_{a,t}$ = percent of women in age group *a* who are sterile.

[14] $Cc_{a,t} = 1 - IC_a \bullet prev_{a,t} \bullet effectiveness_{a,t}$,

where:

IC_a = infecundability coefficient

a = 15-19, IC = 1.02
a = 20-24, IC = 1.02
a = 25-29, IC = 1.03
a = 30-34, IC = 1.04
a = 35-39, IC = 1.12
a = 40-44, IC = 1.13
a = 45-49, IC = 2.08

$effectiveness_{a,t}$ = average contraceptive effectiveness.

[15] $effectiveness_{a,t} = (\sum_m prev_{a,m,t} \bullet effectiveness_{m,t}) / prev_{a,t}$,

where:

$effectiveness_{m,t}$ = use effectiveness of method *m*.

B. Method Prevalence

The contraceptive prevalence for each method is calculated by multiplying the method mix for each method by the total prevalence for all methods:

[16] $prev_{a,p,t} = MethodMix_{a,m,t} \bullet prev_{a,t}$,

where:

$prev_{a,t}$ = contraceptive prevalence

$MethodMix_{a,m,t}$ = method mix (percent of all users using method *m*).

C. Contraceptive Users

For users, by methods
The number of users of each method is calculated by multiplying the method prevalence by the number of women of reproductive age who are in union:

[17] $users_{a,m,t} = prev_{a,m,t} \bullet MWRA_{a,t}$,

[18] $MWRA_{a,t} = WRA_{a,t} \bullet percent\ married_{a,t}$,

where:

$users_{a,m,t}$ = number of users of method *m*

$MWRA_{a,t}$ = number of women of reproductive age who are in union

$WRA_{a,t}$ = number of women in age group *a*.

For users, by source

Users by source are calculated by multiplying the number of users of each method by the proportion of those users who receive their services from a particular source:

[19] $users_{a,m,s,t} = users_{a,m,t} \bullet SourceMix_{m,s,t}$,

where:

s = source of services

$SourceMix_{m,s,t}$ = proportion of users receiving their services from source s.

D. Contraceptive Acceptors

The number of new acceptors of contraceptive methods (equation 20) is determined only for the long-term methods: sterilization, IUD and Norplant. Acceptors are the number of new users that must be added during a year to achieve the required number of users by the beginning of the next year. Acceptors are calculated as the number of new users required to achieve the specified growth in total users (users next year minus users this year) plus the number of new users required to replace those that discontinue use, age out of the age group, or die, minus the number of current users aging into the age group.[4]

$$[20]\ acceptors_{a,m,t} = users_{a,m,t+1} - users_{a,m,t} + discontinuers_{a,m,t} + AgingOut_{a,m,t} + deaths_{a,m,t} - AgingIn_{a,m,t} ,$$

where:

$acceptors_{a,m,t}$ = new acceptors

$discontinuers_{a,m,t}$ = number of people discontinuing use of method *m*

$AgingOut_{a,m,t}$ = number of current users of method *m* aging out of age group *a*

$AgingIn_{a,m,t}$ = number of current users of method *m* aging into age group *a*.

The number of people discontinuing use of a method (equation 21) is calculated as the number of users at the beginning of the year multiplied by the discontinuation rate (to determine the number of users at the beginning of the year who discontinue) plus the number of new acceptors during the year multiplied by one-half the discontinuation rate (since new acceptors are assumed to be subject to

[4] Note: Acceptors and discontinuers are used in both equation 20 and equation 21. The calculating equation for acceptors is actually:

$$[20]\ acceptors_{a,m,t} = (users_{a,m,t+1} - users_{a,m,t} + users_{a,m,t} \bullet DiscontinuationRate_{m,t} + AgingOut_{a,m,t} + deaths_{a,m,t} - AgingIn_{a,m,t}) / (1 - DiscontinuationRate_{m,t} / 2) .$$

discontinuation as well, but for only half a year since, on average, they will be users for only half a year). The discontinuation rate is approximated by the reciprocal of the average duration of use (equation 22). Discontinuation is calculated only for the IUD and Norplant since sterilization is considered permanent.

$$[21]\ discontinuers_{a,m,t} = users_{a,m,t} \bullet DiscontinuationRate_{m,t} + acceptors_{a,m,t} \bullet DiscontinuationRate_{m,t} / 2\ ,$$

$$[22]\ DiscontinuationRate_{m,t} = 1 / duration_{m,t}\ ,$$

where:

$DiscontinuationRate_{m,t}$ = percentage of users of method *m* stopping use during the year

$duration_{m,t}$ = the average duration of use, measured in years.

The number of users who die each year (equation 23) is calculated as the number of users multiplied by the female annual death rate. This calculation assumes that contraceptive users experience the same mortality as all women of the same age. This assumption slightly overstates the mortality rate since users are less likely to experience a death due to birth complications, but the overall effect is minor. For the single age group projection, this assumption will slightly understate the actual mortality since contraceptive users will be somewhat older than all women in the 15-49 age group.

$$[23]\ deaths_{a,m,t} = users_{a,m,t} \bullet FemaleMortalityRate_{a,t}\ ,$$

where:

$FemaleMortalityRate_{a,t}$ = proportion of females in age group *a* who die each year.

The number of users who age out of the age group each year (equation 24) is simply the number in the last age in the age group (e.g., those aged 29 are in the last year of the 25-29 age group) in the previous year. This figure is approximated by the average number of people in the age

group of interest and the next older age group. This arrangement assumes that the progression is roughly linear from the youngest single age in the age group of interest to the oldest single age in the next older age group.

$$[24]\ AgingOut_{a,m,t} = (users_{a,m,t} + users_{a+1,m,t}) / 10 \ .$$

The number of users aging into the age group is simply the number aging out of the next younger age group, except for the youngest age group, which has no users aging in:

$$[25]\ AgingIn_{a,m,t} = AgingOut_{a-1,m,t} \ .$$

When the single age group option is being used, a different approach is required. In this case we assume that the number of users aging past 49 is negligible for the IUD and Norplant. For sterilization, we employ a regression equation that uses the average age at the time of sterilization to estimate the percentage of all sterilization users who are 49 (equations 26 and 27).

$$[26]\ AgingOut_{m,t} = users_{m,t} \bullet Percent49_{m,t}$$

$$[27]\ Percent49_{m,t} = e^{0.1577 \bullet AverageAge_{m,t} - 3.1831} \ .$$

The number of acceptors by source is calculated by multiplying the number of acceptors by the proportion of users receiving their services from each source:

$$[28]\ acceptors_{a,m,s,t} = acceptors_{a,m,t} \bullet SourceMix_{m,s,t} \ .$$

E. Commodities Required

For long-term methods

For the long-term methods (sterilization, IUD, Norplant), the commodities required are equal to the number of acceptors:

$$[29]\ Commodities_{m,s,t} = acceptors_{m,s,t} \ .$$

For short-term methods

For the temporary methods, commodities are calculated by multiplying the number of users by the number of units per users:

[30] $Commodities_{m,s,t} = users_{m,s,t} \bullet UnitsPerUser_{m,s,t}$,

where:

$Commodities_{m,s,t}$ = number of commodities required

$UnitsPerUser_{m,s,t}$ = commodity units per user.

F. Expenditure Required

The gross expenditure required is calculated by multiplying the number of users or acceptors of each method and source by the cost per user or acceptor for that source.

For temporary methods: Expenditure

Expenditure required for the temporary methods (condom, injectable, pill, vaginal barrier, vaginal tablets, other) is based on the number of users:

[31] $GrossExpenditure_{m,s,t} = users_{m,s,t} \bullet CostPerUser_{m,s,t}$.

For long-term methods: Expenditure

The expenditure required for long-term methods (sterilization, IUD, Norplant) is based on the number of acceptors:

[32] $GrossExpenditure_{m,s,t} = acceptors_{m,s,t} \bullet CostPerAcceptor_{m,s,t}$,

where:

$GrossExpenditure_{m,s,t}$ = gross expenditure required

$CostPerUser_{m,s,t}$ = cost per user

$CostPerAcceptor_{m,s,t}$ = cost per acceptor.

Net expenditure is calculated by subtracting recovered costs from the gross expenditures:

$$[33]\ NetExpenditure_{m,s,t} = GrossExpenditure_{m,s,t} - CostsRecovered_{m,s,t} \ ,$$

where:

$NetExpenditure_{m,s,t}$ = net expenditure for family planning services

$CostsRecovered_{m,s,t}$ = revenue from service fees.

For long-term methods: Revenue

For long-term methods, the revenue from services is calculated by multiplying the number of acceptors by the fee per acceptor:

$$[34]\ CostsRecovered_{m,s,t} = acceptors_{m,s,t} \bullet FeePerAcceptor_{m,s,t} \ ,$$

where:

$FeePerAcceptor_{m,s,t}$ = fee charged per acceptor.

For temporary methods: Revenue

For the temporary methods, the revenue from services is calculated by multiplying the commodities required by the fee per unit:

$$[35]\ CostsRecovered_{ms,t,} = Commodities_{m,s,t} \bullet FeePerUnit_{m,s,t} \ ,$$

where:

$UnitsPerUser_{m,t}$ = number of commodity units per user

$FeePerUnit_{m,s,t}$ = fee charged per unit.

G. Pregnancies

For total pregnancies

The total fertility rate is used in the demographic module to calculate the total number of live births. The number of pregnancies is estimated as the number of live births plus the number of spontaneous and induced abortions. Spontaneous abortions are assumed to average 13 percent of pregnancies. Therefore, total pregnancies are calculated as births plus induced abortions divided by 1 - 0.13:

$$[36]\ pregnancies_{a,t} = (births_{a,t} + InducedAbortions_{a,t}) / (1 - 0.13) ,$$

where:

$pregnancies_{a,t}$	=	number of pregnancies
$births_{a,t}$	=	number of live births
$InducedAbortions_{a,t}$	=	number of induced abortions.

For unwanted pregnancies

Pregnancies can be either wanted or unwanted. In goal 3 of FamPlan, we are interested only in unwanted pregnancies that occur because of method failure ($UnwantedPregnancies_{a,t}$). Pregnancies as a result of method failure are calculated by multiplying the number of women using contraception by the average failure rate:

$$[37]\ UnwantedPregnancies_{a,t} = (prev_{a,t} \bullet MWRA_{a,t}) \bullet (1 - effectiveness_{a,t})$$

H. Abortion

There are two options to determine abortions. If the total abortion rate is entered, then induced abortions are calculated directly.

For single age group

[38] $InducedAbortions_t = TAR_t \bullet WRA_t / 35$.

For five-year age groups

[39] $InducedAbortions_{a,t} = ASAR_{a,t} \bullet WRA_{a,t} / 1000$,

where:

$ASAR_{a,t}$ = age-specific abortion rate.

The second option is to calculate abortions as a percentage of the number of unwanted pregnancies.

[40] $InducedAbortions_{a,t} = UnwantedPregnancies_{a,t} \bullet PercentTerminated_{a,t}$,

where:

$PercentTerminated_{a,t}$ = percentage of unwanted pregnancies terminated by abortion.

I. Goal 1 - Reducing Unmet Need for Contraception

Additional inputs required for goal 1 are:

1. Prevalence in the base year by spacing and limiting
2. Unmet need in the base year by spacing and limiting
3. The proportion of unmet need that is meet by spacing and limiting by year
4. Method mix by spacing and limiting.

When the goal is reducing unmet need, then the prevalence goal and the method mix are specified by spacing and limiting purposes. In this case, the method prevalence equation is modified. The method prevalence becomes the weighted average of the spacing and limiting method prevalence:

$$[41]\ prev_{a,p,t} = \left(\sum_{p} MethodMix_{a,p,m,t} \bullet prev_{a,p,t} \right) / prev_{a,t} \ ,$$

where:

$prev_{a,p,t}$	=	prevalence for purpose *p*
p	=	purpose of contraception: *s* = spacing; *l* = limiting
$MethodMix_{a,p,m,t}$	=	method mix (percentage of all users using method *m*).

The calculation of pregnancies is also modified for this option. In this case, pregnancies can be either wanted, unwanted, or mistimed. Unwanted or mistimed pregnancies are those that occur because of method failure or that occur to women with an unmet need for contraception. Pregnancies due to method failure are considered to be unwanted if they occur to women who are limiters, or are considered to be mistimed if they occur to women who are spacers. Similarly, pregnancies to women with an unmet need for limiting are considered to be unwanted and those occurring to women with an unmet need for spacing are assumed to be mistimed.

Pregnancies as a result of method failure are calculated by multiplying the number of women using spacing or limiting methods by the average failure rate (equations 42 and 43).

$$[42]\ UnwantedPregnancies_{failure,a,t} =$$

$$\left(prev_{limiting,a,t} \bullet MWRA_{a,t} \right) \bullet \left(1 - effectiveness_{limiting,a,t} \right) ,$$

$$[43]\ MistimedPregnancies_{failure,a,t} = \left(prev_{spacing,a,t} \bullet MWRA_{a,t} \right) \bullet \left(1 - effectiveness_{spacing,a,t} \right) ,$$

where:

$UnwantedPregnancies_{failure,a,t}$	=	unwanted pregnancies due to method failure
$MistimedPregnancies_{failure,a,t}$	=	mistimed pregnancies due to method failure.

Pregnancies occurring to women with an unmet need are also assumed to be unwanted or mistimed. The number of these pregnancies is calculated as the difference between the actual number of pregnancies and the number of pregnancies there would be if prevalence were increased to current prevalence plus unmet need. The first step is to calculate prevalence:

$$[44]\ NeededPrev_{a,t} = prev_{a,t} + UnmetNeed_{a,t}\ ,$$

where:

$NeededPrev_t$ = prevalence needed to eliminate unmet need

$UnmetNeed_{a,t}$ = proportion of women in union with an unmet need.

Next, the proximate determinants equation is used to calculate the difference in fertility. This is illustrated in equation 45 for the case of a single age group. This equation accomodates changes in the population's underlying susceptability to a pregnancy.

$$[45]\ TFR_t - TFRwithNoUnmetNeed_t =$$

$$Cm_t \bullet Ci_t \bullet Ca_t \bullet Cs_t \bullet TF \bullet (1\text{-}1.08 \bullet prev_t \bullet effectiveness_t) -$$

$$Cm_t \bullet Ci_t \bullet Ca_t \bullet Cs_t \bullet TF \bullet (1\text{-}1.08 \bullet NeededPrev_t \bullet effectiveness_t)\ ,$$

where:

$TFRwithNoUnmetNeed_t$ = TFR if there were no unmet need.

Next, pregnancies due to unmet need ($Pregnancies_{UnmetNeed,t}$) are calculated from the difference in TFR:

$$[46]\ Pregnancies_{UnmetNeed,t} = (\ TFR_t - TFRwithNoUnmetNeed_t) \bullet WRA_t / 35$$

This approach is used to calculate pregnancies due to unmet need for limiting (unwanted pregnancies) and those due to unmet need for spacing (mistimed pregnancies).

J. Goal 2 - Achieving Desired Fertility

If goal 2 is selected, users will be required to enter the current TFR, the desired TFR, and the percent reduction in the difference between the actual and desired TFR to be achieved in each year. The first step in the calculations is to determine the TFR goal for each year:

$$[47]\ TFR\_goal_t = TFR_{t=1} - (TFR_{t=1} - DesiredTFR) \bullet PercentReduction_t \ ,$$

where:

TFR_goal_t	=	TFR goal for year t
DesiredTFR	=	desired TFR
$PercentReduction_t$	=	percentage reduction in gap between actual and desired TFR.

Once the TFR goal is known, the required contraceptive prevalence is calculated from the proximate determinants of fertility. Equation 1 is rearranged to solve for prevalence rather than TFR:

$$[48]\ prev_t = (1 - TFR\_goal_t / (Cm_t \bullet Ci_t \bullet Ca_t \bullet Cs_t \bullet TF)) / (1.08 \bullet effectiveness_t)$$

K. Goal 4 - Achieving a Total Fertility Rate Goal

The calculations for this goal are the same as for goal 2 (achieving desired fertility) except that the total fertility rate is already given and does not need to be calculated from the desired fertility rate.

L. Goal 5 - Restricting Services to a Specified Level of Expenditure

With this option, users will enter the annual local government expenditure for family planning, the distribution of this expenditure by method, the annual growth rate of modern method users for each of the sources that are not funded by local government expenditure, and the annual growth rate of traditional method users. The number of users and acceptors in the public sector will be constrained by the expenditure available.

The number of users of temporary methods funded by the local government sector is calculated from the expenditures available multiplied by the proportion used for each method and divided by the net cost of one user (equation 49). The net cost per user is the gross cost per user minus any fees collected. Fees collected are the number of commodity units per user multiplied by the fee per commodity unit.

$$[49]\ users_{m,public,t} = PublicExp_t \bullet PropExp_{m,t} \,/\, (CostPerUser_{m,public,t} - FeePerUnit_{m,public,t} \bullet UnitsPerUser_{m,t})\ ,$$

where:

$PublicExp_t$ = public expenditure available for family planning

$PropExp_{m,t}$ = proportion of expenditure for method *m*.

The number of acceptors of long-term methods is calculated in a similar manner:

$$[50]\ acceptors_{m,public,t} = PublicExp_t \bullet PropExp_{m,t} \,/\, (CostPerAcceptor_{m,public,t} - FeePerAcceptor_{m,public,t})\ .$$

Users of long-term methods are calculated from users in the previous years plus acceptors minus those who discontinue, age out, or die:

$$[51]\ users_{m,t} = users_{a,m,t-1} + acceptors_{m,t} - discontinuers_{m,t} - AgingOut_{m,t} - deaths_{m,t}\ .$$

Modern method users for the other sectors are calculated using the assumed growth rate from the previous year.

$$[52]\ users_{m,s,t} = users_{m,s,t-1} \bullet (1 + GrowthRate_{s,t} / 100)\ .$$

Users of traditional methods are calculated in a similar manner:

$$[53]\ users_{traditional,s,t} = users_{traditional,s,t} \bullet (1 + GrowthRate_{traditional,t} / 100)\ ,$$

where:

GrowthRate = annual growth rate in users

VIII. Post-Abortion Care

FamPlan includes a module for post-abortion care, which is described in this chapter. This module can be used to estimate the effects of family planning programs on the number of abortions and the effects of changing numbers of abortions and treatment programs on maternal mortality.

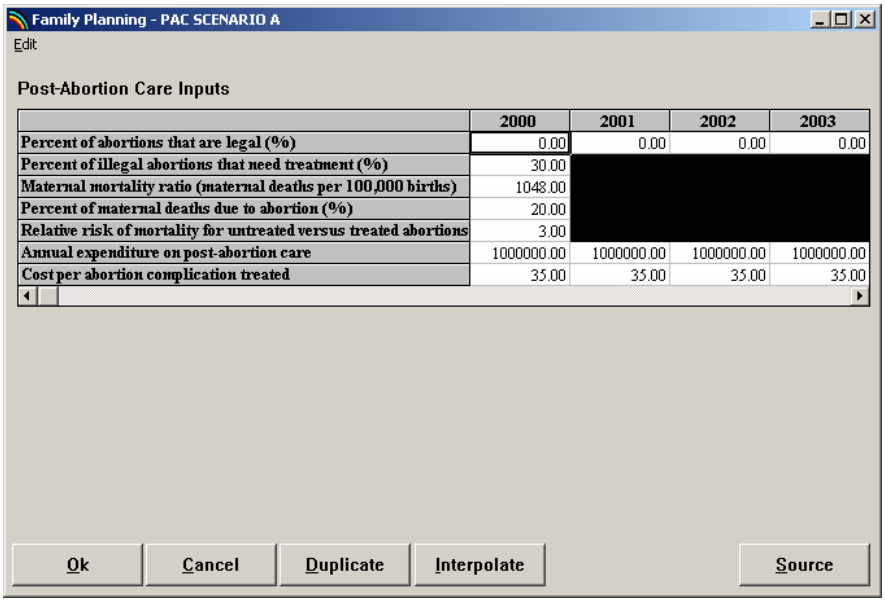
A. Introduction

What is the Post-Abortion Care Module (PAC)? The PAC Module can be used to analyze how family planning programs and programs to treat abortion complications affect maternal deaths. It estimates the number of maternal deaths due to wanted births, unwanted births, and abortions, and shows how the allocation of expenditures can increase abortion treatments and reduce deaths.

Why Make Projections for Post-Abortion Care? "PAC" is important because unsafe abortions are responsible for a substantial share of maternal deaths, and because treatment for abortion-related difficulties focuses upon a clearly identifiable clinical episode. The number of abortions is related to the number of unwanted pregnancies. Family planning programs and changes in the other proximate determinants of fertility can affect the number of unwanted pregnancies and, therefore, the number of abortions. The PAC module helps planners understand these interactions.

This chapter explains how to add the PAC to an existing FamPlan application.

To start, click on "Open Projection" on the menu bar at the top of the screen and open the file that you have already created for DemProj and FamPlan. Then click on "Edit" in the menu bar and then on "Family Planning (FamPlan)" and then on "Post-Abortion Care." That will open the following screen for the special inputs that will be required.



All inputs require values for the first year. If future year are blacked out, as in rows two to five in the editor above, then values are only required for the first year. Otherwise values are required for all years in the projection.

B. Inputs for the PAC Module

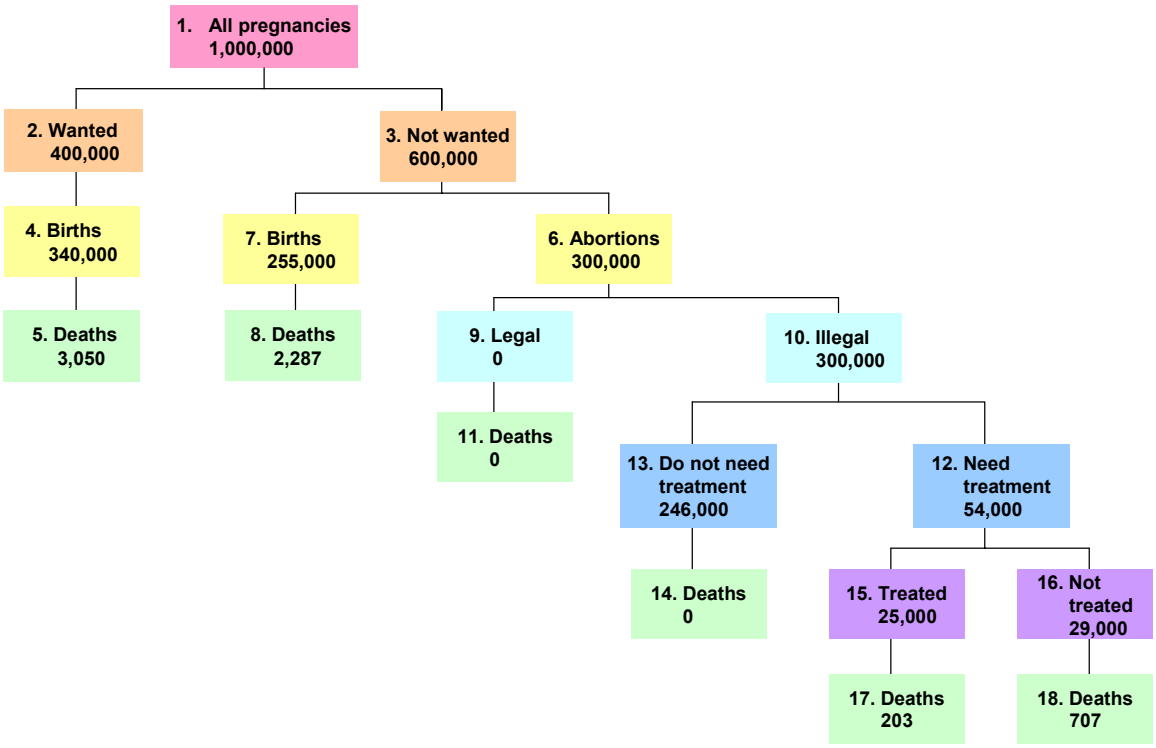
In FamPlan, under "Configuration," you must choose the goal of reducing unmet need. Also under "Configuration," you must select the abortion option, "calculated from unwanted pregnancies." Then the following inputs are required.

1. The percent of unwanted pregnancies that terminate in abortion (an input in FamPlan under Proximate Determinants)
2. The percent of abortions that are legal
3. The percent of illegal abortions needing treatment
4. The maternal mortality ratio (MMR)
5. The percent of all maternal deaths due to abortions
6. The relative risk of mortality for untreated vs. treated abortions
7. The annual expenditure on post-abortion care

8. The average cost per abortion complication treated.

For each input, here are suggestions for ways to obtain reasonable values. Illustrative numbers are shown in the **Figure 7** diagram. The number of pregnancies is calculated by FamPlan based on the total fertility rate. The number of unwanted pregnancies is calculated from two sources: pregnancies due to contracpeptive method failure and pregnancies that occur to women with an unmet need for family planning.

Figure 7. Diagram for the Post-Abortion Care Model Illustrative Values for the First (Baseline) Year



The proportion of unwanted pregnancies that are aborted is a direct input in FamPlan. This is assumed to be half in **Figure 7**, producing 300,000 abortions. The other 300,000 unwanted pregnancies are discounted by the 15 percent of miscarriages, producing 255,000 births. These births are subjected to the same mortality risk as before, resulting in 2,287 deaths.

In practice you must decide the proportion of unwanted pregnancies that are aborted from available data or local studies. A preliminary calculation can be made from the number of births, the numbers of abortions, an allowance for miscarriages as 15 percent of all pregnancies, and the proportion of births that are unwanted. The numerator is all abortions. The denominator, unwanted pregnancies, is the sum of all abortions, unwanted births, and perhaps half of all miscarriages. Alternative values can be tried and the final results examined to see whether small changes matter.

Table 28 provides estimates of unwanted births from DHS surveys.
Table 29 provides estimates for numbers of all abortions, and unsafe abortions
Table 30 provides estimates for numbers of maternal deaths and births.

Table 28: Percentage of Births Not Wanted or Wanted Later in the Five Years Preceding the Survey (including current pregnancy)

	Time wanted birth (or current pregnancy)				
	Wanted Then	Wanted Later	Not Wanted	Missing	Total
Sub-Saharan Africa					
Benin 1996	73.6	19.3	5.7	1.4	100.0
Benin 2001	77.2	17.5	4.9	0.4	100.0
Burkina Faso 1992/93	74.6	21.0	3.2	1.2	100.0
Burkina Faso 1998/99	78.8	17.5	3.0	0.7	100.0
Cameroon 1991	79.0	16.0	4.8	0.1	100.0
Cameroon 1998	70.9	20.4	6.1	2.6	100.0
CAR 1994/95	75.7	16.0	7.0	1.3	100.0
Chad 1996/97	90.0	7.9	0.9	1.3	100.0
Comoros 1996	42.5	41.3	14.4	1.8	100.0
Cote d'Ivoire 1994	65.0	20.1	7.9	0.8	93.8
Cote d'Ivoire 1998/99	70.7	23.8	4.9	0.6	100.0
Eritrea 1995	80.8	13.5	4.9	0.7	100.0
Ethiopia 2000	63.0	19.6	17.3	0.1	100.0
Gabon 2000	54.9	37.6	6.8	0.7	100.0
Ghana 1993	56.6	33.4	9.0	1.0	100.0
Ghana 1998	62.9	27.5	8.9	0.8	100.0
Guinea 1999	79.9	13.5	3.9	2.7	100.0
Kenya 1993	47.7	34.2	16.7	1.4	100.0
Kenya 1998	51.4	37.2	11.1	0.3	100.0
Madagascar 1992	66.5	9.4	14.0	1.0	90.9
Madagascar 1997	73.5	13.8	12.0	0.8	100.0
Malawi 1992	58.8	26.6	14.0	0.6	100.0
Malawi 2000	59.6	18.3	21.7	0.3	100.0
Mali 1995/96	76.8	18.2	3.8	1.3	100.0
Mali 2001	79.2	16.6	3.2	1.0	100.0
Mauritania 2000/01	71.2	22.1	6.3	0.4	100.0
Mozambique 1997	74.2	20.1	3.7	1.9	100.0
Namibia 1992	65.0	21.4	12.3	1.3	100.0
Niger 1992	86.0	11.1	2.0	0.9	100.0
Niger 1998	86.7	11.0	1.0	1.3	100.0
Nigeria 1990	88.4	8.2	2.4	1.0	100.0
Nigeria 1999	77.8	15.8	3.1	3.2	100.0
Rwanda 1992	49.0	24.1	25.5	1.4	100.0
Rwanda 2000	64.3	22.8	12.5	0.5	100.0
Senegal 1992/93	70.2	23.4	4.6	1.8	100.0
Senegal 1997	64.1	27.2	6.8	1.9	100.0
South Africa 1998	45.7	35.5	17.3	1.4	100.0

Table 28, continued

	Time wanted birth (or current pregnancy)				
	Wanted Then	Wanted Later	Not Wanted	Missing	Total
Tanzania 1992	75.5	15.2	8.1	1.2	100.0
Tanzania 1996	74.5	15.3	9.2	1.0	100.0
Tanzania 1999	77.5	11.4	11.0	0.2	100.0
Togo 1998	57.1	33.3	8.1	1.4	100.0
Uganda 1995	69.8	21.9	7.9	0.3	100.0
Uganda 2000/01	60.3	24.8	14.6	0.3	100.0
Zambia 1992	65.7	26.0	7.4	0.9	100.0
Zambia 1996	62.7	29.2	6.5	1.6	100.0
Zambia 2001/02	59.4	21.4	18.9	0.3	100.0
Zimbabwe 1994	56.4	33.7	9.7	0.2	100.0
Zimbabwe 1999	62.4	30.2	7.2	0.2	100.0
North Africa/West Asia/Europe					
Armenia 2000	83.2	9.2	7.5	0.1	100.0
Egypt 1992	65.0	9.0	25.9	-	100.0
Egypt 1995	69.0	10.5	20.2	0.3	100.0
Egypt 2000	81.5	5.0	13.4	0.1	100.0
Jordan 1990	67.9	11.4	20.6	-	100.0
Jordan 1997	62.7	20.4	16.9	-	100.0
Morocco 1992	65.2	15.2	19.3	0.3	100.0
Turkey 1993	67.5	12.0	20.4	0.1	100.0
Turkey 1998	69.2	11.2	18.8	0.7	100.0
Yemen 1997	54.6	23.0	21.8	0.6	100.0
Central Asia					
Kazakhstan 1995	83.9	8.4	7.7	-	100.0
Kazakhstan 1999	82.4	8.3	8.9	0.3	100.0
Kyrgyz Republic 1997	86.4	7.6	5.4	0.6	100.0
Turkmenistan 2000	94.3	2.2	1.2	2.2	100.0
Uzbekistan 1996	94.7	2.4	1.9	0.9	100.0
South & Southeast Asia					
Bangladesh 1993/94	66.5	20.3	12.9	0.3	100.0
Bangladesh 1996/97	68.9	19.7	11.2	0.3	100.0
Bangladesh 1999/2000	66.9	19.3	13.5	0.3	100.0
Cambodia 2000	66.7	8.9	23.5	0.9	100.0
India 1992/93	76.9	13.8	8.8	0.5	100.0
India 1998/99	78.4	11.9	9.4	0.3	100.0
Indonesia 1991	77.4	15.8	6.5	0.3	100.0
Indonesia 1994	82.1	9.5	8.2	0.3	100.0
Indonesia 1997	83.0	8.7	8.3	-	100.0
Nepal 1996	61.9	19.2	18.1	0.8	100.0
Nepal 2001	64.1	13.8	21.6	0.4	100.0
Pakistan 1990/91	76.4	8.4	13.0	2.3	100.0
Philippines 1993	55.7	28.0	15.9	0.4	100.0
Philippines 1998	54.2	26.9	18.2	0.7	100.0
Vietnam 1997	73.3	14.9	11.9	-	100.0

Table 28, continued

	Time wanted birth (or current pregnancy)				
	Wanted Then	Wanted Later	Not Wanted	Missing	Total
Latin America & Caribbean					
Bolivia 1994	45.2	18.7	35.3	0.7	100.0
Bolivia 1998	47.6	20.2	31.7	0.5	100.0
Brazil 1991 (1)	54.7	20.8	24.3	0.2	100.0
Brazil 1996	50.6	26.1	22.3	1.0	100.0
Colombia 1990	63.6	16.2	19.9	0.3	100.0
Colombia 1995	54.4	24.4	21.1	0.1	100.0
Colombia 2000	47.6	29.2	23.1	0.1	100.0
Dominican Republic 1991	60.2	23.9	15.6	0.4	100.0
Dominican Republic 1996	63.0	27.4	9.4	0.1	100.0
Dominican Republic 1999	53.4	32.5	13.7	0.5	100.0
Guatemala 1995	70.1	17.8	11.5	0.7	100.0
Guatemala 1998/99	69.7	18.0	11.8	0.5	100.0
Haiti 1994/95	45.5	20.6	33.7	0.2	100.0
Haiti 2000	43.9	26.0	29.8	0.2	100.0
Nicaragua 1997/98	65.6	15.9	17.3	1.2	100.0
Paraguay 1990	76.1	16.9	6.7	0.3	100.0
Peru 1992	43.2	23.3	33.2	0.3	100.0
Peru 1996	41.7	23.2	34.8	0.3	100.0
Peru 2000	43.8	25.3	30.7	0.2	100.0

1) Northeast region
Source: ORC Macro, 2004. MEASURE DHS+ STATcompiler.
http://www.measuredhs.com, July 1 2004.

Table 29: Estimates of abortion numbers, rates, ratios, and mortality (annual averages for 1995-2000)

	Total Abortions (000)	Legal Abortions (000)	Illegal (unsafe) abortions (000)	Rate: Unsafe abortions per 1000 women aged 15-49	Ratio: Unsafe abortions per 100 births	No. of deaths due to unsafe abortions	Deaths due to unsafe abortions per 100,000 births	Percent of all maternal deaths due to unsafe abortions
WORLD TOTAL	**45.5**	**25.6**	**19.9**	**13**	**15**	**78,000**	**57**	**13**
DEVELOPED REGIONS	**10**	**9.1**	**0.9**	**3**	**7**	**500**	**4**	**13**
Excluding Eastern Europe	3.8	3.7	0.1					
DEVELOPING REGIONS	**35.5**	**16.5**	**19.0**	**16**	**16**	**77,500**	**63**	**13**
Excluding China	24.9	5.9	19.0					
AFRICA	**5.0**	**b**	**5.0**	**27**	**16**	**34,000**	**110**	**13**
Eastern Africa	1.9	b	1.9	36	19	16,000	153	14
Middle Africa	0.6	b	0.6	28	14	4,000	98	10
Northern Africa	0.6	b	0.6	15	13	1,200	24	7
Southern Africa	0.2	b	0.2	16	13	800	49	19
Western Africa	1.6	b	1.6	31	16	12,000	121	12
ASIA[a]	**26.8**	**16.9**	**9.9**	**11**	**13**	**38,500**	**48**	**12**
Eastern Asia	12.5	12.5	b	**	**	**	**	**
South-central Asia	8.4	1.9	6.5	19	17	29,000	72	13
South-eastern Asia	4.7	1.9	2.8	21	23	8,100	66	15
Western Asia	1.2	0.7	0.5	12	11	1,100	20	6
EUROPE	**7.7**	**6.8**	**0.9**	**5**	**12**	**500**	**6**	**17**
Eastern Europe	6.2	5.4	0.8	10	25	500	15	24
Northern Europe	0.4	0.3	<0.03	1	2	<20	0.2	2
Southern Europe	0.8	0.7	<0.09	2	6	<20	1	10
Western Europe	0.4	0.4	b	**	**	**	**	**
LATIN AMERICA	**4.2**	**0.2**	**4.0**	**30**	**36**	**5,000**	**41**	**21**
Caribbean	0.4	0.2	0.2	17	21	600	71	18
Central America	0.9	b	0.9	26	26	700	20	14
South America	3.0	b	3.0	34	42	3,500	47	24
NORTHERN AMERICA	**1.5**	**1.5**	**b**	**	**	**	**	**
OCEANIA[a]	**0.1**	**0.1**	**b**	**15**	**12**	**150**	**51**	**8**

Figures may not add to totals due to rounding.

[a] Japan, Australia and New Zealand have been excluded from the regional estimates, but are included in the total for developed countries.

[b] Fewer than 50,000.

** For regions where the incidence is negligible, no estimates are shown.

Sources: "*Unsafe Abortion: Global and Regional Estimates of Incidence of and Mortality Due to Unsafe Abortion with a Listing of Available Country Data*." Third Edition. Geneva: WHO Division of Reproductive Health (Technical Support) 1998. Also: S.K. Henshaw, S. Singh, and T. Haas. "The Incidence of Abortion Worldwide." *International Family Planning Perspectives*, vol. 25, Supplement, Table 1, Jan. 1999.

Table 30: Estimates for 2000 of Maternal Deaths, MMRs, and Implied Number of Births

	No. of maternal deaths	MMR	Implied no. of births
ASIA/PACIFIC			
Afghanistan	20,000	1,900	1,052,632
Bangladesh	16,000	380	4,210,526
Bhutan	310	420	73,810
Brunei Darussalam	2	37	5,405
Cambodia	2,100	450	466,667
China	11,000	56	19,642,857
Fiji	15	75	20,000
India	136,000	540	25,185,185
Indonesia	10,000	230	4,347,826
Iran	1,200	76	1,578,947
Korea, DR	260	67	388,060
Korea, Rep.	120	20	600,000
Laos	1,300	650	200,000
Malaysia	220	41	536,585
Maldives	10	110	9,091
Mongolia	65	110	59,091
Myanmar	4,300	360	1,194,444
Nepal	6,000	740	810,811
Pakistan	26,000	500	5,200,000
Papua New Guinea	470	300	156,667
Philippines	4,100	200	2,050,000
Singapore	15	30	50,000
Solomon Islands	25	130	19,231
Sri Lanka	300	92	326,087
Thailand	520	44	1,181,818
Timor-Leste	140	660	21,212
Vanuatu***	10	130	7,692
Vietnam	2,000	130	1,538,462
LATIN AMERICA			
Argentina	590	82	719,512
Bahamas	4	60	6,667
Barbados	3	95	3,158
Belize	10	140	7,143
Bolivia	1,100	420	261,905
Brazil	8,700	260	3,346,154
Chile	90	31	290,323
Colombia	1,300	130	1,000,000
Costa Rica	40	43	93,023
Cuba	45	33	136,364
Dominican Republic	300	150	200,000
Ecuador	400	130	307,692
El Salvador	250	150	166,667
Guatemala	970	240	404,167
Guyana	30	170	17,647
Haiti	1,700	680	250,000
Honduras	220	110	200,000
Jamaica	45	87	51,724
Mexico	1,900	83	2,289,157
Netherlands Antilles***	1	20	5,000

Table 30, continued

	No. of maternal deaths	MMR	Implied no. of births
Nicaragua	400	230	173,913
Panama	100	160	62,500
Paraguay	280	170	164,706
Peru	2,500	410	609,756
Puerto Rico	15	25	60,000
Suriname	10	110	9,091
Trinidad and Tobago	30	160	18,750
Uruguay	15	27	55,556
Venezuela	550	96	572,917
MIDDLE EAST/N. AFRICA			
Algeria	1,000	140	714,286
Bahrain	3	28	10,714
Cyprus	5	47	10,638
Egypt	1,400	84	1,666,667
Iraq	2,000	250	800,000
Jordan	70	41	170,732
Kuwait	2	5	40,000
Lebanon	100	150	66,667
Libya	140	97	144,330
Malta***	1	21	4,762
Morocco	1,700	220	772,727
Occupied Palestinian Terr.	130	100	130,000
Oman	80	87	91,954
Qatar	1	7	14,286
Saudi Arabia	160	23	695,652
Sudan	6,400	590	1,084,746
Syria	780	160	487,500
Tunisia	210	120	175,000
Turkey	1,000	70	1,428,571
United Arab Emirates	20	54	37,037
Yemen	5,300	570	929,825
SUB-SAHARA AFRICA			
Angola	11,000	1,700	647,059
Benin	2,200	850	258,824
Botswana	50	100	50,000
Burkina Faso	5,400	1,000	540,000
Burundi	2,800	1,000	280,000
Cameroon	4,000	730	547,945
Cape Verde	20	150	13,333
Central African Republic	1,600	1,100	145,455
Chad	4,200	1,100	381,818
Comoros	130	480	27,083
Congo	690	510	135,294
Congo, Dem. Rep.	24,000	990	2,424,242
Cote d'Ivoire	3,900	690	565,217
Djibouti	180	730	24,658
Equatorial Guinea	180	880	20,455
Eritrea	930	630	147,619
Ethiopia	24,000	850	2,823,529
Gabon	200	420	47,619
Gambia	270	540	50,000
Ghana	3,500	540	648,148

Table 30, continued

	No. of maternal deaths	MMR	Implied no. of births
Guinea	2,700	740	364,865
Guinea-Bissau	590	1,100	53,636
Kenya	11,000	1,000	1,100,000
Lesotho	380	550	69,091
Liberia	1,200	760	157,895
Madagascar	3,800	550	690,909
Malawi	9,300	1,800	516,667
Mali	6,800	1,200	566,667
Mauritania	1,200	1,000	120,000
Mauritius	5	24	20,833
Mozambique	7,900	1,000	790,000
Namibia	190	300	63,333
Niger	9,700	1,600	606,250
Nigeria	37,000	800	4,625,000
Reunion	5	41	12,195
Rwanda	4,200	1,400	300,000
Senegal	2,500	690	362,319
Somalia	5,100	1,100	463,636
Sierra Leone	4,500	2,000	225,000
South Africa	2,600	230	1,130,435
Swaziland	120	370	32,432
Tanzania	21,000	1,500	1,400,000
Togo	1,000	570	175,439
Uganda	10,000	880	1,136,364
Western Sahara***	70	850	8,235
Zambia	3,300	750	440,000
Zimbabwe	5,000	1,100	454,545
CENTRAL ASIAN REP.			
Kazakhstan	560	210	266,667
Kyrgyzstan	110	110	100,000
Tajikistan	160	100	160,000
Turkmenistan	40	31	129,032
Uzbekistan	130	24	541,667
CAUCASUS			
Armenia	20	55	36,364
Azerbaijan	100	94	106,383
Georgia	20	32	62,500
EASTERN EUROPE			
Albania	35	55	63,636
Belarus	30	35	85,714
Bosnia-Herzegovina	10	31	32,258
Bulgaria	20	32	62,500
Croatia	4	8	50,000
Czech Republic	10	9	111,111
Estonia	5	63	7,937
Hungary	15	16	93,750
Latvia	10	42	23,810
Lithuania	4	13	30,769
Macedonia, former Yugo. Rep.	5	23	21,739
Moldova	20	36	55,556
Romania	110	49	224,490
Russian Federation	830	67	1,238,806

Table 30, continued

	No. of maternal deaths	MMR	Implied no. of births
Serbia and Montenegro	15	11	136,364
Slovakia	2	3	66,667
Slovenia	3	17	17,647
Ukraine	140	35	400,000

***For countries with less than 300,000 population or no data, estimates from the 1995 report were used.

Sources: Carla Abou-Zahr and Tessa Wardlaw, "Maternal Mortality in 2000: Estimates Developed by WHO, UNICEF, and UNFPA" http://www.childinfo.org/maternal_mortality_in 2000.pdf accessed March 17, 2004.
For 1995 estimates see Kenneth Hill, Carla AbouZahr, and Tessa Wardlaw. "Estimates of Maternal Mortality for 1995." *Bulletin of the World Health Organization*, 2001, 79(3).

4. The percentage of all abortions that are legal, assumed to be zero in **Figure 7**. This is highly dependent on the country situation; it can vary from nearly zero to nearly one hundred. Also, the laws may say that only some abortions are legal depending upon the specific justification. The compilation in **Table 29** provides estimates, which may be applicable to your country, or you may have more recent information that you prefer to use. In **Figure 7** essentially no abortions are legal, so zero is used as the input.

5. The percentage of illegal abortions needing treatment, assumed to be 18 percent in **Figure 7**, yielding 54,000. Among illegal abortions, some will not require any treatment whereas others will need attention. This varies by country: in some places many or most illegal abortions are performed in safe settings and rather few have side effects requiring treatment. A rough indicator for the percentage of abortions needing treatment is in **Table 31**, which has estimates of the percent of the population with ready access to safe abortion. When this percentage is very low, more abortions will be unsafe and will require special post-abortion care. However a high figure does not guarantee that few post-treatments will be needed, since actual use of a safe service normally falls well below the percent making actual use of it. In many countries a substantial percentage of abortions are quite unsafe, and many require subsequent clinical treatment. After you input the percentage needing treatment, the model calculates the percentage not needing treatment (246,000) all of which are presumed to be relatively safe. The 54,000 needing treatment are divided into those receiving it (25,000) and those not (29,000). As

explained below, the total expenditure divided by the cost per case treated produces the number that can be treated. Then separate mortality risks are applied to those treated (lower risk) and those not (higher risk). The **Figure 7** result is 203 deaths and 707 deaths for the two groups respectively.

Table 31: Estimates of the Percentage of the Population Having Ready and Easy Access to Safe Abortion Services, 1999

ASIA	
Bangladesh	66
Myanmar	39
China	100
Hong Kong	100
India	42
Indonesia	25
Cambodia	17
Korea, Rep	100
Laos	18
Malaysia	65
Mongolia	51
Nepal	14
Pakistan	16
Philippines	25
Sri Lanka	58
Taiwan	100
Thailand	44
Vietnam	96

LATIN AMERICA	
Argentina	37
Bolivia	63
Brazil	100
Chile	23
Colombia	19
Costa Rica	13
Dominican Republic	0
Ecuador	2
El Salvador	8
Guatemala	1
Guyana	23
Haiti	60
Honduras	36
Jamaica	59
Mexico	58
Nicaragua	6
Panama	16
Paraguay	100
Peru	96
Puerto Rico	94
Trinidad & Tobago	30
Uruguay	21
Venezuela	59

MIDDLE EAST/ NORTH AFRICA	
Algeria	62
Egypt	5
Iran	64
Jordan	57
Lebanon	55
Morocco	34
Oman	100
Syria	59
Tunisia	53
Turkey	89
Yemen	80

SUB-SAHARAN AFRICA	
Benin	25
Burkina Faso	12
Cameroon	15
Central African Rep	23
Chad	3
Congo	43
Cote d'Ivoire	52
Ethiopia	11
Gabon	35
Ghana	39
Guinea	34
Kenya	50
Lesotho	0
Madagascar	63
Malawi	4
Mali	0
Mauritania	0
Mauritius	35
Mozambique	3
Namibia	65
Niger	15
Nigeria	18
Rwanda	2
Senegal	0
South Africa	58
Sudan	0
Tanzania	47
Togo	21
Uganda	14
Zambia	28
Zimbabwe	20

CENTRAL ASIAN REP.	
Kazakhstan	100
Kyrgyzstan	91
Uzbekistan	100
Tajikistan	83
Turkmenistan	100

6. The maternal mortality ratio (MMR) is assumed here to be 1050 in the baseline year (stated per 100,000 births even though some deaths come from abortions, since births are easier to count as the denominator). Sources for the MMR include certain DHS and other surveys. Also, estimates for most countries for 2000 are given in **Table 30**.

All maternal deaths can be divided into those related to delivery and those related to abortions. Thus abortion deaths are a percentage of all maternal deaths, so the MMR can be divided between the portion related to deliveries and that related to abortions. The former may be termed the "Birth-MMR" (897 used in **Figure 7**) and the later "the Abortion-MMR" (153 used in **Figure 7**). The two are additive and sum to the MMR of 1050. (They use the same denominator of all births, but divide the numerator into the delivery-related deaths and the abortion-related deaths.) For the latter, values for around 1995-2000 are available by region from WHO;[5] these appear in **Table 29** (next to last column) and can be converted to the proportion of all maternal deaths due to abortion (last column). A value in this table may appear applicable to your country, or you may have a local estimate. Note that a local estimate may pertain to abortion deaths on the denominator of abortions, not births as in the Abortion-MMR; if so it would need to be adapted.

The MMR you enter, along with the input for the percent of deaths due to abortions, fix the baseline mortality risks. Another input below, the relative risk between treated and untreated abortions, is also important. All these together determine the base-year mortality risks for births, treated abortions, and untreated abortions. In later years the MMR varies, being dependent upon the number of abortions that are treated (as well as the changing number of births and unwanted pregnancies).

7. The percent of maternal deaths due to abortions: assumed to be 14.6 percent in the base year. This may come from local data based upon available surveys, hospital statistics, or other sources of death statistics (see **Table 29**, last column). If the figure is subject to considerable guesswork it can be varied in alternative runs to see if the final conclusions are very sensitive to this input. After the base year the percent of all deaths due to abortions varies, depending upon the number of abortions that are treated.

[5] "Unsafe Abortion: Global and Regional Estimates of Incidence of and Mortality Due to Unsafe Abortion with a Listing of Available Country Data." 3rd edition, 1998. WHO/RHT/MSM/97.16 WHO Division of Reproductive Health (Technical Support).

8. The relative risk of mortality for untreated versus treated abortions, assumed to be 3 to 1 in **Figure 7**. Abortions needing treatment are split between those that actually receive treatment and those that do not, and the risk of death will be quite different between them. If only the most desperate cases are seen clinically their death rate may be above that of the untreated group, but the reverse situation may prevail, in which serious cases unable to reach treatment in time die at high rates. In any case, to use the software it is best to assume a higher risk among untreated cases, so that program actions that treat more cases will lower the overall death rate rather than raise it. Therefore the relative risk should be set at a value above 1, to make the risk of untreated cases higher than that of treated cases.

Table 30 provides country estimates for maternal deaths, maternal mortality ratios, and by division, the implied number of births. It must be emphasized that the MMR estimates are subject to large errors; the original source cited gives a range of uncertainty for each one, with a lower and upper estimate. Also, the number of births, as of 2000, may differ in other sources. The United Nations provides estimates of births as averages for five-year periods[6] or you may have recent country figures.

Figure 7 assumes that the untreated group is made up of the more serious cases, so their death rate is three times the rate for the treated group. This ratio is combined with the baseline risk of death among all illegal abortions needing treatment to produce the actual risk assigned to each group, which turns out to be 0.81 percent for treated cases and 2.44 percent for untreated cases in a 1 to 3 ratio). As noted above, these baseline risks are then kept fixed over time, so that program interventions to treat more abortions move more cases to the lower risk group and so reduce total deaths.

9. The annual expenditure on post-abortion care is assumed to be $US 1,000,000 for calculating treated abortions in **Figure 7**. This would normally come from the national health budget and must be estimated from the available information, both for the baseline amount and the projected amounts. An alternative is that it might come from local studies in specific geographic areas that are reasonably representative and give results that can be enlarged proportionately to the whole population. Note that a precise figure is not necessary since the model is generally used to

[6] United Nations Population Division. *World Population Prospects: The 2002 Revision, Vol. 1: Comprehensive Tables*. New York: United Nations. 2003.

explore *changes* from a base plan to an alternative. The changes in outcomes may be about the same whether one starts from the precise annual expenditure or something close to it. All this allows for "what-if" explorations of how much maternal deaths might be reduced if funding could be increased, in combination with changes in various program inputs either in FamPlan or in the Post-Abortion Care module.

10. The average cost per abortion complication treated is assumed to be $US 40 in **Figure 7**. With Input 9 it determines how many abortions can be treated. This estimate too must come from the available budgetary information, together with knowledge of the prevailing clinical practices that determine personnel time and materials devoted to post-abortion care. For your country you may be able to access Ministry of Health records or use local studies that seem fairly representative. An alternative is to conduct a fresh study to gather current data. Trying alternative values for this input will show how sensitive to it the final conclusions are.

That completes the list of inputs. In **Figure 7** the boxes give the numbers of deaths; these are generated from the death rate applied to the group at risk just above each box. The six boxes for deaths sum to all maternal deaths in the entire population. After the first year the numbers of deaths can change depending upon changes in the program inputs.

C. Outputs

The outputs of the PAC include a considerable variety of items, all given for each year. Alternative program scenarios can easily be constructed by simply saving the original file under new names and then varying some of the inputs in each one.

Here is the list of outputs from the PAC itself. Additional ones can be obtained from FamPlan or from DemProj.

Maternal Deaths: Total
- From wanted births
- From unwanted births
- From treated illegal abortions
- From untreated illegal abortions

Abortions
- Illegal abortions: Total
  - Illegal abortions not needing treatment
  - Illegal abortions needing treatment
    - Illegal abortions treated
    - Illegal abortions untreated

Maternal Mortality Ratio (MMR)

Abortion deaths per 100,000 abortions

The output items are self-explanatory, and are discussed further under the following sections for "Sample Applications" and "Methodology."

Displaying the PAC Outputs

To examine the results of the projection, click on "Display" at the top menu, then on FamPlan, and then on Post-Abortion Care.

D. Sample Applications

Suppose you wish to use the PAC model for your country as of the year 2000. A key advantage of the model is that you can explore the effects of alternate scenarios, or intervention plans. You set up the baseline situation, for 2000, by assembling the information for all inputs. Here they pertain approximately to the situation in an East African country. Four variations are then introduced, each one illustrating a different way to strengthen post-abortion care. The results are compared for what they imply for maternal deaths and other results. This illustrates the way in which managers can compare alternative actions and costs.

A convenient way to produce alternative sets of inputs like these is to save the baseline set under a new name for each set. That preserves all of the numerous specifications that you entered for DemProj and for FamPlan, as well as for PAC, and you can then simply make the few modifications in each set that correspond to the alternative actions for it. Doing this repeatedly can create as many variations as you wish, and you can show up to four different plans on the screen simultaneously for convenient comparisons.

Here are the variations:

a. ***Baseline*** (the others below are exactly the same as the Baseline except for the change noted.)

b. ***Meet more unmet need.*** Unmet need in FamPlan in the baseline is 35 percent in 2000, and the percentage met increases linearly from 5 to 50 percent from 2001 to 2015. In the "B" run, the increase is to 80 percent in 2015 instead of 50 percent.

c. ***Improve the contraceptive method mix.*** In the baseline modern methods have only a constant 68.3 percent of

the total; the "C" run improves this linearly to 90 percent by 2015.

d. Increase the national budget. In the baseline this is a flat $1 million a year; in the "D" run this increases to $1.75 million by 2015.

e. All of the above, from B, C, and D.

The results are contrasted in **Table 32** below.

Comments:

Scenario E, which does everything, has the fewest number of total deaths (only 13,370 deaths in 2015) and on the sum of deaths from treated and untreated abortions (all abortions are treated in E, partly because fewer abortions occur in E and also because the increased budget in D is incorporated). However E has the most deaths from wanted births (8,307) but the fewest from unwanted births (4,255), since it incorporates B and C, with their better method mix and reduced unmet need, which together shift the ratio of wanted to unwanted pregnancies.

For total deaths the various scenarios reduce the baseline figure by 17 percent, 8 percent and 4 percent for B, C, and D respectively, but by a full 30 percent for all three in E. For total abortion deaths (sum of columns 4 and 5) however, the reductions from the baseline are more impressive: 34 percent, 22 percent, and 21 percent, for B, C, and D respectively, but by 78 percent for E. The strong effect in E reflects the interactive advantage of having fewer abortions and treating them all.

(In all projections the relative risk is set at 3; 30 percent of abortions need treatment; and 20 percent of maternal deaths are due to abortions. The first year MMR is 1048.)

Table 32: Comparative Results from Five Scenarios Post-Abortion Care (The 2000 Baseline figures apply to all scenarios.)

		No. abortions (all illegal)	Total Deaths	No. deaths from treated abortions	No. deaths from untreated abortions	No. deaths from wanted births	No. deaths from unwanted births
A. Baseline	2000	227,088	13,282	515	2,141	4,152	6,473
	2015	289,270	19,194	515	3,151	7,242	8,246
B. Unmet Need	2015	212,233	15,901	515	1,900	7,436	6,050
C. Method Mix	2015	239,533	17,602	515	2,343	7,915	6,828
D. Budget	2015	289,270	18,382	902	1,991	7,243	8,246
E. All above	2015	149,275	13,370	808	-	8,307	4,255
PERCENT REDUCTIONS FROM THE BASELINE 2015 FIGURES							
A. Baseline	2000	227,088	13,282	515	2,141	4,152	6,473
	2015	289,270	19,194	515	3,151	7,242	8,246
B. Unmet Need	2015	26.6	17.2	-	39.7	(2.7)	26.6
C. Method Mix	2015	17.2	8.3	-	25.6	(9.3)	17.2
D. Budget	2015	-	4.2	(75.1)	36.8	(0.0)	-
E. All above	2015	48.4	30.3	(56.9)	100.0	(14.7)	48.4

Table 33 gives the full detail of outputs for the five scenarios, and illustrates the time trends. (The software also provides for results by individual years.)

Table 33: Results from Five Scenarios for PAC Programs

	2000	2005	2010	2015
A. BASELINE SCENARIO				
Maternal Deaths: Total	13,282	15,132	17,068	19,154
From wanted births	4,152	5,043	6,002	7,242
From unwanted births	6,473	7,084	7,707	8,246
From treated illegal abortions	515	515	515	515
From untreated illegal abortions	2,141	2,489	2,844	3,151
Abortions	227,088	248,519	270,367	289,270
Illegal abortions: Total	227,088	248,519	270,367	289,270
Illegal abortions not needing treatment	158,962	173,964	189,257	202,489
Illegal abortions needing treatment	68,126	74,556	81,110	86,781
Illegal abortions treated	28,571	28,571	28,571	28,571
Illegal abortions untreated	39,555	45,984	52,539	58,209
MMR	1,048	1,046	1,044	1,037
Abortion deaths per 100,000 abortions	1,170	1,209	1,242	1,267
B. UNMET NEED SCENARIO				
Maternal Deaths: Total	13,282	14,374	15,255	15,901
From wanted births	4,152	5,047	6,060	7,436
From unwanted births	6,473	6,599	6,515	6,050
From treated illegal abortions	515	515	515	515
From untreated illegal abortions	2,141	2,212	2,165	1,900
Abortions	227,088	231,495	228,552	212,233
Illegal abortions: Total	227,088	231,495	228,552	212,233
Illegal abortions not needing treatment	158,962	162,047	159,986	148,563
Illegal abortions needing treatment	68,126	69,449	68,566	63,670
Illegal abortions treated	28,571	28,571	28,571	28,571
Illegal abortions untreated	39,555	40,877	39,994	35,098
MMR	1,048	1,035	1,017	989
Abortion deaths per 100,000 abortions	1,170	1,178	1,173	1,138
C. METHOD MIX SCENARIO				
Maternal Deaths: Total	13,282	14,765	16,264	17,602
From wanted births	4,152	5,138	6,302	7,915
From unwanted births	6,473	6,790	7,004	6,828
From treated illegal abortions	515	515	515	515
From untreated illegal abortions	2,141	2,321	2,443	2,343
Abortions	227,088	238,203	245,693	239,533
Illegal abortions: Total	227,088	238,203	245,693	239,533
Illegal abortions not needing treatment	158,962	166,742	171,985	167,673
Illegal abortions needing treatment	68,126	71,461	73,708	71,860
Illegal abortions treated	28,571	28,571	28,571	28,571
Illegal abortions untreated	39,555	42,890	45,136	43,288
MMR	1,048	1,038	1,025	1,001
Abortion deaths per 100,000 abortions	1,170	1,191	1,204	1,193

Table 33, continued

	2000	2005	2010	2015
D. BUDGET SCENARIO				
Maternal Deaths: Total	13,282	14,766	16,488	18,382
From wanted births	4,152	5,044	6,004	7,243
From unwanted births	6,473	7,015	7,664	8,246
From treated illegal abortions	515	644	773	902
From untreated illegal abortions	2,141	2,063	2,046	1,991
Abortions	227,088	246,087	268,874	289,270
Illegal abortions: Total	227,088	246,087	268,874	289,270
Illegal abortions not needing treatment	158,962	172,261	188,212	202,489
Illegal abortions needing treatment	68,126	73,826	80,662	86,781
Illegal abortions treated	28,571	35,714	42,857	50,000
Illegal abortions untreated	39,555	38,112	37,805	36,781
MMR	1,048	1,027	1,011	995
Abortion deaths per 100,000 abortions	1,170	1,100	1,049	1,000
E. EVERYTHING SCENARIO				
Maternal Deaths: Total	13,282	13,760	13,898	13,370
From wanted births	4,152	4,938	6,129	8,307
From unwanted births	6,473	6,408	5,902	4,255
From treated illegal abortions	515	619	747	808
From untreated illegal abortions	2,141	1,795	1,120	-
Abortions	227,088	224,802	207,046	149,275
Illegal abortions: Total	227,088	224,802	207,046	149,275
Illegal abortions not needing treatment	158,962	157,361	144,932	104,492
Illegal abortions needing treatment	68,126	67,441	62,114	44,782
Illegal abortions treated	28,571	34,286	41,429	44,782
Illegal abortions untreated	39,555	33,155	20,685	-
MMR	1,048	1,017	969	892
Abortion deaths per 100,000 abortions	1,170	1,073	902	541

E. Methodology

The methodology of the PAC is relatively straightforward. First the number of pregnancies is split between wanted and unwanted pregnancies. Then 85 percent of wanted pregnancies produce births; the other 15 percent is for miscarriages (not shown in **Figure 7**). Also, some unwanted pregnancies produce births, again after the 15 percent discount. The births then produce maternal deaths according to the specialized MMR value[7] that pertains to deaths associated just with births (not with abortions). It is important to note that the full MMR, for the entirety of all maternal deaths, is partitioned to those associated with births (the "Birth-MMR") and those associated with abortions (the "Abortion-MMR"). As noted elsewhere, the two are additive; they have the same denominator, and the two numerators can be summed to equal all maternal deaths.

To split unwanted pregnancies between abortions and births, the abortions are subtracted out first, then the remainder is multiplied by 85 percent to produce the number of births, thus allowing for miscarriages. The births are subjected to the "Birth-MMR" to produce deaths, as was done with the births from wanted pregnancies.

The abortions on the other hand are divided into legal and illegal abortions. Legal abortions are assumed for simplicity to be sufficiently safe to produce essentially no deaths.

Illegal abortions are then split between those that need treatment and those that do not. Those not needing treatment are again assumed for simplicity to be sufficiently safe to produce essentially no deaths.

Abortions needing treatment are of two types: those that actually receive treatment and those that do not. The model calculates the number receiving treatment by dividing the total expenditures by the cost per treated case.

The following equations follow **Figure 7**, taking each box in turn.

[7] As explained above, there are two mortality risks, one for abortions and one for births, which total to the MMR. An oddity in statistical practice is that the full MMR is calculated on the denominator of births, even though deaths come from both births and abortions. It is useful to separate deaths by the two causes, and one may be termed the "Abortion-MMR" and the other the "Birth-MMR," which add to the usual MMR.

A. Number of Pregnancies (Box 1) PREG

The number of pregnancies is a FamPlan output and is a complex result of numerous demographic and family planning inputs.

B. Number of Wanted Pregnancies (Box 2) PREGW

This uses the input for the percent of all pregnancies that are unwanted.

[2] PREGW = **PREG** X (1 – **%PREGNW**)

where:

PREGW = the number of pregnancies that are wanted

PREG = the number of all pregnancies

%PREGNW = the proportion of all pregnancies that are not wanted

Example: 1,000,000 X (1 - .60) = 400,000 wanted pregnancies.

C. Number of Unwanted Pregnancies (Box 3) PREGNW

[3] PREGNW = **PREG** X **%PREGNW**

where:

PREGNW = the number of pregnancies that are unwanted

PREG = the number of all pregnancies

%PREGNW = the proportion of all pregnancies that are not wanted

Example: 1,000,000 X (.60) = 600,000 unwanted pregnancies.

D. Number of Births from Wanted Pregnancies (Box 4) BW

[4] BW = PREGW X **0.85**

where

BW = the number of births from wanted pregnancies in Box 4

PREGW = the number of wanted pregnancies from above

0.85 = the proportion of all pregnancies not ending in miscarriages

Example: BW = 400,000 X **0.85** = 340,000 births

E. Number of Deaths Associated with Births from Wanted Pregnancies (Box 5) D1

[5] D1 = BW X Birth-MMR/100,000

where

D1 = the number of deaths in Box 5

BW = the number of births from wanted pregnancies in Box 4

Birth-MMR = **MMR** – **Abortion-MMR** = 1050 - 153

Example: D1 = 340,000 * 897/100,000 = 3050 deaths

F. Number of Abortions from Unwanted Pregnancies (Box 6) AB

This variable is based upon the separation of all unwanted pregnancies into those ending in births and those ending in pregnancies.

[6] AB = PREGNW X **%PREGAB**

where:

AB = the number of abortions from unwanted pregnancies

PREGNW = the number of unwanted pregnancies

%PREGAB = the proportion of unwanted pregnancies ending in abortions

Example: ANW = 600,000 X **0.50** = 300,000 abortions

G. Number of Births from Unwanted Pregnancies (Box 7) BNW

[7] BNW = (PREGNW – AB) X **0.85**

where:

BNW = the number of births from unwanted`pregnancies

PREGNW = the number of unwanted pregnancies`in Box 3

AB = the number of abortions from unwanted pregnancies

0.85 = the proportion of pregnancies not ending in miscarriages

Example: BNW = (600,000 - 300,000) X **0.85** = 255,000

H. Number of Deaths from Births from Unwanted Pregnancies (Box 8) D2

[8] D2 = BNW X (**MMR** - **Abortion-MMR**)/100,000

where:

D2 = the number of deaths associated with births from unwanted pregnancies

BNW = the number of births produced from unwanted pregnancies in Box 7

MMR = the maternal mortality ratio (all deaths over all births/100,000)

Abortion-MMR = the ratio of all abortion-deaths to all births/100,000)

Example: D2 = 255,000 X (**1050** – **153**)/100,000 = 2287

I. Number of Legal Abortions (Box 9) ABL

(In the **Figure 7** illustration all abortions are assumed to be illegal; none are legal. The proportion that are legal is an input and can vary from zero to 100%.)

[9] ABL = AB X **%ABL**

where

ABL = the number of legal abortions

AB = the number of all abortions in Box 6

%ABL = the proportion of all abortions that are legal

Example: ABL = 300,000 X ZERO = 300,000

J. Number of Illegal Abortions (Box 10) ABNL

[10] ABNL = AB – ABL

where:

ABNL = the number of illegal abortions

AB = the number of all abortions in Box 6

ABL = the number of legal abortions in Box 9

Example: ABNL = 300,000 - ZERO = 300,000

K. Number of Deaths from Legal Abortions (Box 11) D3

All legal abortions, for simplicity, are assumed to be sufficiently safe that no deaths result. D3 is assumed to be zero.

L. The Number of Illegal Abortions Needing Treatment (Box 12) ABNT

[11] ABNT = ABNL X **%ABNT**

where:

ABNT = the number of illegal abortions needing treatment

ABNL = the number of illegal abortions from Box 10

%ABNT = the proportion of illegal abortions needing treatment

Example: ABNT = 300,000 X **0.18** = 54,000 illegal abortions needing treatment

M. The Number of Illegal Abortions Not Needing Treatment (Box 13) ABNNT

[12] ABNNT = ABNL – ABNT

where:

ABNNT = the number of illegal abortions not needing treatment

ABNL = the number of illegal abortions from Box 10 (FIX)

ABNT = the number of illegal abortions that need treatment.

Example: ABNNT = 300,000 - 54,000 = 246,000 illegal abortions not needing treatment

N. Deaths from Illegal Abortions that Do Not Need Treatment (Box 14) D4

All such abortions, for simplicity, are assumed to be sufficiently safe that no deaths result.

D4 is assumed to be zero.

O. Number of Illegal Abortions Needing Treatment and Receive It (Box 15) ABNTT

The number of abortion cases that can be treated depends upon the total funding available and upon the cost for treating each case. Note that if enough funding were

available, the number of abortion cases that could be treated might exceed the total number needing it in Box 14. The software therefore includes a maximum limit, equal to the total number needing treatment.

[13] ABNTT = **TC/CPC**

where:

ABNTT = the number of illegal abortions that both need treatment and receive it.

TC = Total Expenditure

CPC = Cost per case treated

Example: ABNTT = $1,000,000/$40 = 25,000 cases treated

P. Number of Illegal Abortions That Need Treatment But Do Not Receive It (Box 16) ABNTUT

[14] ABNTUT = ABNT – ABNTTT

where:

ABNTUT= Number of illegal abortions needing treatment but are untreated

ABNT = the number of illegal abortions needing treatment

ABNTT = the number of illegal abortions that need treatment and do receive it.

Example: ABNTUT = 54,000 – 25,000 = 29,000 cases not treated

NOTE: Numbers of Deaths from Treated and Untreated Illegal Abortions (Boxes 17 and 18) D5 and D6.

The sum of deaths from treated and untreated abortions is made consistent with the overall risk of death from abortions in the baseline year. As inputted in this example that ratio is 153 abortions per 100,000 *births*, which is converted by the model to the ratio of 303 abortion deaths per 100,000 *abortions.* However of all abortions, those in Box 13 involve no deaths, so a ratio is needed for all abortion deaths among cases needing treatment, in Box 12, and that is much higher, at 1683 (in this example, it is the 303 ratio divided by 0.18, due to the input that 18 percent of all illegal abortions require treatment. Applying the 1683 ratio to the 54,000 cases in Box 12 produces 910 abortions, which must be allocated to Boxes 17 and 18.

Thus the death ratio, of 1683, governs the two ratios that apply to Boxes 15 and 16. In this illustration, the relative risk between the two boxes was inputted as 3 (i.e., the Box 16 risk is 3 times higher than the Box 15 risk). These levels, together with the number of cases in the two boxes, produce the numbers of deaths. The two equations follow.

Q. Numbers of Deaths from Treated Illegal Abortions (Box17) D5

[15] D5 = ABNTT X DEATH RATIO

where:

ABNTT = Treated cases in Box 15

DEATH RATIO: depends upon the following:

0.463 of the 54,000 cases in Box 12 fall into Box 15 (= 25,000)

0.537 of the 54,000 cases in Box 12 fall into Box 16 (= 29,000)

3 is the relative risk as inputted

Example: 25,000 X (303/.18)/((.463 + (3 X .537))/100,000

Simplified: 25,000 X 1683/2.074/100,000 = 203 deaths

R. Numbers of Deaths From Untreated Illegal Abortions (Box18) D6

[16] D6 = ABNTUT X DEATH RATIO

where:

ABNTUT = untreated cases in Box 16

DEATH RATIO : depends upon the following:

0.463 of the 54,000 cases in Box 12 fall into Box 15

0.537 of the 54,000 cases in Box 12 fall into Box 16

3 is the relative risk as inputted

Example: 29,000 X (303/.18)/(.463/3 + .537)/100,000

Simplified: 29,000 X 1683/.691/100,000 = 707 deaths

S. Cost of Treating Illegal Abortions That Need It (TC)

The model lets you vary the expenditures on post-abortion care in order to explore the outcomes above. It starts therefore with a budget figure that represents the current annual expenditure on post-abortion care. This is an input, and it is allocated entirely to treating abortions (Box 15). A cost per case is also inputted ($48 in this illustration). If the expenditure is large enough all abortions needing treatment receive it; otherwise only part of them will be treated.

TC = Inputted annual expenditure.

Where TC = total cost

Example: TC = US $872,197

T. Cost of Treating Abortions per Death Averted (CDA)

If you compare two or more scenarios you can calculate the cost per additional death averted. Suppose that you compare a baseline projection with an alternative projection. Then the number of deaths averted is the difference between the base application and the intervention application. (All the inputs can be varied to represent the intervention plan, including the annual expenditure.) The model then calculates the numbers of deaths under both the base and the intervention, takes the difference (deaths averted), and compares that to the addition in the annual expenditure. Thus the calculation compares two increments: the deaths avoided and the expenditure increase.

[17] CDA = (Intervention expenditure – Base expenditure)/(Base deaths – Intervention deaths)

where

CDA = Cost per death averted

Base and intervention expenditures are inputted

Base and intervention deaths come from Boxes 17 and 18

Example: CDA = (1,500,000 - 872,197/(911 – 720) = $3313

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X. Glossary of Terms

Some of the following terms were obtained from the Population Reference Bureau's *Population Handbook* (1989); others were adapted from the International Union for Scientific Study of Population's (IUSSP's) *Multilingual Demographic Dictionary* (Van de Walle and Henry, 1982); while still others are definitions employed by the Demographic and Health Surveys program executed by Macro International. These terms are defined in the context of their use within FamPlan.

Abortions. The number of induced abortions occurring during the year.

Acceptors. The number of new users of a particular method in a particular year. A woman is classified as an acceptor if she starts using a method during the year and was not using that method at the start of the year. Previously she may have been using nothing or she may have been using a different method.

Aggregation. A group of elements to be considered as a whole, such as women of reproductive age.

Appropriate method mix. The distribution of contraceptive methods which correspond to the individual fertility intentions and personal characteristics of a population of women.

Births. The number of live births occurring during a year.

Cohort. A group of persons who experience certain events within a specified period of time, such as those who are born or who are married in the same year.

Commodities. The amount of supplies required for different methods to provide a specified level of family planning services. Commodities are expressed in terms of numbers of condoms, sterilization kits, injectable vials, IUDs, Norplant implants, pill cycles and vaginal tablets.

Contraceptive prevalence. The percentage of women[8] of reproductive age using some form of contraception. Most commonly, prevalence is given for women in unions.

Cost per user. The public sector cost of providing family planning, per family planning user.

Couple-year of protection. The number of units of a contraceptive needed to provide protection from pregnancy for one couple for an entire year. For example, 13 units of oral contraceptives are needed to provide one couple with a full year of protection.

Desired fertility rate.[9] The desired fertility rate is an indicator similar to the total fertility rate. It indicates the average number of children that a woman would have *if her expressed fertility desires were achieved*.

Dialogue box. A box (shown on the computer screen) permitting users to choose among a limited number of options. The box is accompanied by text elaborating on those options.

Disaggregation. A group of elements broken down into subsets, such as a population broken down into single-age categories (ages 1, 2, 3, etc.)

Effectiveness. Effectiveness is the extent by which a contraceptive method lowers the chances to become pregnant in a given month. This measure depends both on the ability of women to conceive and on the method's failure rate.

Fecundity. The calculated total fecundity rate. Total fecundity is the average number of children that would be born to women if none of the proximate determinants was acting to reduce fertility from its biological maximum. In the model, fecundity is calculated for the base year only. It remains constant in all other years.

Gross cost. The total public sector cost of providing family planning services.

[8] Although some methods are male-specific (i.e., condoms and vasectomy), it is conventional to refer to contraceptive users as women or couples because fertility is generally female-specific rather than male-specific.

[9] The terms "wanted fertility" and "desired fertility" are used interchangeably in this manual. The model uses the term "desired fertility," but users may be more familiar with the "wanted" terminology.

Growth rates. The increment in total number of contraceptive users from year to year. These are net figures, consisting of new users and the continuing users who remain after previous users either have discontinued or have "aged out."

Interpolation. Given two numbers that serve as boundary points, the estimation of values that lie at intervals between the two points. For example, if the total fertility rate for a country or region was actually measured only in 1980 and in 1995, by assigning a relationship between the values from year to year, it is possible to estimate a TFR for each intervening year. (Spectrum uses a linear form of interpolation so that the difference between each annual value is the same. Other nonlinear forms of interpolation also are possible, but are not used in Spectrum.)

MWRA. The number of women of reproductive age who are married or in union.

Method mix. The distribution of contraceptive users by contraceptive method.

Mistimed pregnancy. Pregnancies which were wanted to occur, but at a time other than the time of their conception.

Model. Computer system designed to demonstrate the probable effect of two or more variables that might be brought to bear on an outcome. Such models can reduce the effort required to manipuate these factors and present the results in an accessible format.

Module. Synonym for "model."

Net cost. The net public sector cost of family planning services. This figure is equal to gross cost minus revenue collected.

Normalization. The transformation of a series of data points into a percent distribution summing to 100 percent.

Pop-up menu. A menu (shown on the computer screen) from which users can select items or actions. Pop-up menus can appear anywhere on the screen.

Postpartum insusceptibility. The period after a birth during which a woman is not exposed to the risk of pregnancy either because of postpartum amenorrhea or because of postpartum abstinence.

Pregnancies. The number of pregnancies occurring during a year. Pregnancies can be wanted, wanted later, or not wanted.

Proximate determinants. Variables which directly impinge on fertility outcomes; these variables include the proportion of women in sexual union, the duration of the period of inability to conceive following a birth, and the level and quality of contraceptive practiceXand to a lesser degree, the underlying capability to conceive, the level of induced abortion, and the prevalence of pathological sterility.

Pull-down menu. A menu (shown on the computer screen) opened by clicking on key words at the top edge of the screen. Pull-down menus allow users to select operations.

Radio button. These buttons (shown on the computer screen) emulate raised buttons on early radios, which were punched to select radio stations. The graphically portrayed raised "radio buttons" on interfaces permit users to select among at least three alternatives.

Revenue. The total amount of revenue collected from fees for family planning services.

Total abortion rate. The average number of induced abortions a woman would have if she survived to age 49 and had abortions at the prevailing age-specific rates. Thus, in concept, it is similar to the total fertility rate.

Total fertility rate. The average number of children that would be born alive to a woman (or a group of women) during her lifetime if she were to pass through all her childbearing years conforming to the age-specific fertility rates of a given year.

Unmet need. Refers to couples who presumably should be using contraception based on their fertility desires and susceptibility to a pregnancy, but are not using contraception.

Unwanted pregnancy. Either a pregnancy that occurs due to method failure, or simply one that occurs to a woman who did not want to become pregnant at the time she conceived.

Users. The number of women who are using some form of contraception.

Wanted pregnancies. Calculated as the total pregnancies which were wanted at the time of conception or were wanted to occur at a later time.

Wanted total fertility rate. An indicator similar to the total fertility rate. The wanted total fertility rate is calculated as the level of fertility that would have prevailed during the past few years if all unwanted births had been prevented. (See also desired fertility rate.)

WRA. The number of women of reproductive age, 15-49.

XI. Acronyms and Abbreviations

CBD	community-based distribution
CDC	U.S. Centers for Disease Control and Prevention
CPS	Contraceptive Prevalence Survey
CYP	couple-year of protection
DHS	Demographic and Health Survey
GDP	gross domestic product
ICPD	International Conference on Population and Development, Cairo, 1994
IUD	intrauterine device
MWRA	married women of reproductive age
NGO	nongovernmental organization
PPI	postpartum insusceptibility
TFR	total fertility rate
UN	United Nations
USAID	United States Agency for International Development
VFT	vaginal foaming tablet
WFS	World Fertility Survey
WRA	women of reproductive age

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