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TARGET-COST

A MODEL FOR PROJECTING THE FAMILY PLANNING SERVICE REQUIREMENTS AND COSTS TO ACHIEVE DEMOGRAPHIC GOALS

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I. INTRODUCTION

In the last several decades, more and more governments have become conscious of the importance of population as a key factor in social and economic development. Most developing countries now have population policies and programs and consider population in their national development plans. According to a recent survey by the United Nations (1989), 70 countries have established demographic targets, mostly concerning fertility, population growth rate and population size. As countries use these targets in development planning and implement family planning programs to achieve these targets, it becomes increasingly important to (1) ensure that the adopted targets are feasible and (2) determine the requirements for achieving the targets.

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) target given estimates of changes in the other proximate determinants of fertility. That model has been widely used by researchers and family planning program managers. It has been implemented in two computer programs and has been produced in English, French and Spanish versions.

During the last several years, users of the Target-Setting Model have suggested additions and enhancements that would make the model more relevant to their work. The most often mentioned request was the addition of a way to calculate the costs of the family planning programs to meet the TFR target. Users have resorted to a variety of simple and complex methods to convert the information from the Target-Setting Model to cost projections.

In response to this need, the Target-Cost Model has been produced by The Futures Group under the OPTIONS project of the U.S. Agency for International Development. This model updates the earlier Target-Setting Model by adding a costing component and a number of additional features suggested by users. Since the issue of costing can be quite complex, every attempt has been made to provide a model that can be utilized in a wide variety of situations. This includes countries where a considerable amount of cost data is available as well as those countries where programs are just beginning and cost data are not available. For this reason, the Target-Cost Model provides several different approaches to costing.

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; as well as adequate funds. Although the Target-Cost Model 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.

The following chapters of this manual describe the model in more detail and the method of using it. Chapter II, Methodology, describes the equations used in the model. Chapter III, Data Sources for Model Inputs, describes the data sources available for preparing the inputs to the model. This chapter provides a number of tables that can be used to estimate values when good country-specific sources do not exist. It also describes the most useful sources of data for each of the required inputs. Chapter IV, Developing Cost Estimates from Country-Specific Data, covers the

collection of cost data from national sources and describes how to convert this information to the form required by the Target-Cost Model. Chapter V, A Sample Application of the Target-Cost Model, describes a typical application of the model. It indicates the types of program variables that might be examined in a typical application and describes the variety of program components of lessons that can be examined. Chapter VI, User's Guide to the Target-Cost Program, describes the operation of the computer program that implements the Target-Cost Model. Chapter VII, Tutorial, presents a brief tutorial on the use of the program. Finally, Chapter VIII, Definitions of Input and Output Variables Used in the Target-Cost Computer Program, provides a glossary of terms used in this manual and the computer program.

REFERENCES TO CHAPTER I

Bongaarts, J., and J. Stover (1986). The Population Council Target-Setting Model: A User's Manual. New York: The Population Council.

United Nations (1989). Review of Recent National Demographic Target Setting. Department of Economic and Social Affairs, New York: United Nations.

II. METHODOLOGY

This chapter describes the concepts and equations used to calculate each of the indicators produced by the Target-Cost Model.

Contraceptive Prevalence

In order to determine the number of users required to reach a target level of TFR, it is first necessary to determine the prevalence rate of contraception that will produce the desired TFR. The calculation of the required prevalence rate is based on the proximate determinants of fertility framework developed by John Bongaarts (Bongaarts 1978, Bongaarts and Potter 1983). 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 and 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. The use of these indices yields the following equation:

(1) Total fertility rate

$$TFR = Cm \cdot Cc \cdot Ci \cdot Ca \cdot Cs \cdot TF$$

where:

TFR	=	the total fertility rate
Cm	=	the proportion of women 15-49 in union
Cc	=	the index of contraception
Ci	=	the index of postpartum infecundability
Ca	=	the index of induced abortion
Cs	=	the index of sterility
TF	=	total fecundity

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

(2) Index of contraception

$$Cc = 1 - 1.08 \cdot u \cdot e$$

where:

u	=	the contraceptive prevalence rate
e	=	the average effectiveness of contraception

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

$$e_{All\ methods} = \sum_m e_m \cdot MethodMix_m$$

where:

MethodMix(m) = the proportion of all users using method m

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

(3) Index of postpartum infecundability

$$Ci = \frac{20}{18.5 + i}$$

where:

i = the average duration (in months) of infecundability from birth to the first postpartum ovulation

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) Index of induced abortion

$$Ca = \frac{TFR}{TFR + 0.4 \cdot (1 + u) \cdot TA}$$

where:

TA = the total abortion rate (the average number of induced abortions a woman would have at the end of her reproductive period if she had abortions at the prevailing age-specific rates)

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

(5) Index of sterility

$$Cs = (7.63 - 0.11 \cdot s)/7.3$$

where:

s = the percentage of women in union who remain childless at the end of the reproductive years

These equations provide a relationship between TFR and prevalence. Thus, they can be used to provide an equation to determine the required prevalence in some future year to achieve a target figure of TFR (Bongaarts and Stover 1986).

(6) Required prevalence

$$u_t = \frac{1 - \frac{TFR_t}{TFR_0} \cdot k \cdot (1 - 1.08 \cdot u_0 \cdot e_0)}{1.08 \cdot e_t}$$

where k is the ratio of the indices of the other proximate determinants in the base year to the current year,

$$k = \frac{Cm_0 \cdot Ci_0 \cdot Ca_0 \cdot Cs_0 \cdot TF_0}{Cm_t \cdot Ci_t \cdot Ca_t \cdot Cs_t \cdot TF_t}$$

The required prevalence by method and source is easily found by multiplying the total required prevalence by the percentage of users using each method and the percentage of users of each method obtaining services from each source.

(7) Required prevalence by method and source

$$u_{m,s} = u_{All\ methods,\ All\ sources} \cdot MethodMix_m \cdot SourceMix_{m,s}$$

where:

MethodMix(m)	=	the percentage of all users of contraception who use method m
SourceMix(m)	=	the percentage of all users of method m who obtain their services from source s

The preceding equations are used to calculate the contraceptive prevalence required to achieve the target level of TFR. It also is possible to perform these calculations in an age-specific manner. The aggregate version, used here, will yield results that are very similar to those obtained from the age-specific equations. Therefore, the Target-Cost Model uses the aggregate approach in order to simplify the collection and entry of the necessary data.

The Number of Family Planning Users

The number of users is calculated as the prevalence rate multiplied by the number of women in union. This calculation can be made for all users or by method and source.

(8) Number of family planning users

$$U_{m,s} = u_{m,s} \cdot WRA \cdot Cm$$

where:

U = the number of users of contraception
WRA = the number of women of reproductive age
Cm = the proportion of women of reproductive age who are in union

Defined in this way, the number of users represents the number of full-time users of contraception that are required to reach the TFR target. It is the number of users at any point in time and, therefore, is smaller than the total number of people who use contraception at any time during the year.

The Number of New Acceptors

The number of new acceptors is the number of new users of each method that is needed to achieve the required total number of users. There are three components that contribute to the need for acceptors. They are:

- growth in the total number of users
- replacement for users who discontinue contraceptive use
- replacement for users who become older than age 49

(9) Number of acceptors

$$A_{m,s,t} = (U_{m,s,t+1} - U_{m,s,t}) + U_{m,s,t} \cdot r_m + U_{m,s,t} \cdot ag_{m,t}$$

where:

A(m,s,t) = the number of new acceptors of method m from source s in year t
U(m,s,t) = the number of users of method m from source s in year t
r(m) = the proportion of users of method m who will discontinue use during year t
ag(m,t) = the proportion of users of method m who will age out of the reproductive years during year t

Equation (9) is used to calculate the number of new acceptors by method and source. Calculated in this way, a new acceptor is any person who starts using a particular method at a particular source. Thus, new acceptors of pills from a CBD program would include:

- women who did not use any method in the previous year
- women who did not use the pill in the previous year but did use another method
- women who did not obtain their pills from the CBD program in the previous year but did use pills from another source

Because this definition of new acceptors is method and source specific, these acceptors are called **New Method and Source Acceptors**. If source switching is ignored, then new acceptors would be just those people who did not use any method in the previous year or who used a different method. These acceptors are called **New Method Acceptors**. Since the Target-Cost Model does not contain any information on source discontinuation, it treats Method and Source Acceptors as equivalent to Method Acceptors.

If method and source switching are ignored, then new acceptors would be only those acceptors who did not use any method in the previous year. These acceptors are called **New Program Acceptors**. The Target-Cost Model does not calculate Program Acceptors. To do so would require an estimate of the proportion of method discontinuation that is due to switching methods and the proportion that stops using any method of family planning. Since this figure is often unknown, we have chosen to treat only Method Acceptors.

The only exceptions to these definitions are for IUDs and implants. New insertions of IUDs and implants are always considered new acceptors even for those women who used the same method in the previous year. Thus, a woman who has Norplant removed and replaced, because the effective period of the first implant had expired, would still be considered a new acceptor, even though she used Norplant in the previous year. The reason for this is that, even though she may not need to be recruited to continue using Norplant, the service requirements and costs associated with the new insertion are likely to be almost the same as for a completely new acceptor.

The proportion of users who age out of their reproductive years is determined as a function of the average age of the users. We have used regression analysis to determine the relationship between the percentage of users of a particular method who are aged 45-49 as a function of the average age of the users. Data were collected from 19 DHS surveys. The resulting equations are shown below. In practice, the equations for male and female sterilization are the most significant since aging out of the reproductive years is the major way that users discontinue these methods (some very small fraction die during their reproductive years). For the other methods, the discontinuation rates are so much larger than the aging rates that these rates only provide minor modifications to the calculated number of new acceptors.

(10) For orals, IUD, female sterilization, injectables, male sterilization and other

$$\% \ 45\text{-}49 = e^{(m \cdot AverageAge + b)}$$

(11) For condoms, withdrawal, and periodic abstinence

$$\% \ 45\text{-}49 = m \cdot AverageAge + b$$

where:

% 45-49	=	the percentage of users who are aged 45 to 49
AverageAge	=	the average age of all users of a particular method

Method	m	b	r2
Orals	0.3090	-8.2340	0.659
IUD	0.1690	-3.8110	0.294
Female Sterilization	0.1577	-3.1831	0.842
Injectables	0.2543	-6.6309	0.763
Male Sterilization	0.1976	-0.1976	0.956
Other	0.2565	-6.5202	0.891
Condom	0.5713	-12.524	0.332
Withdrawal	1.4628	-39.051	0.365
Abstinence	1.3501	-36.657	0.443

The Target-Cost Model also will use actual data on percentage of users aged 45-49 for female sterilization if it is available.

Contraceptive Commodities Consumed

Once the number of users by method and source are known commodity consumption can also be calculated. For the renewable methods (orals, condoms, VFTs, injectables) consumption is calculated by multiplying the number of users by the annual commodity consumption per user.

(12) Commodities consumed (renewable methods)

$$c_{m,s,t} = U_{m,s,t} \cdot con_m$$

where:

c(m,s,t) = the number of units required of method m from source s at time t
con(m) = the number of units consumed per year by one continuous user of method m

For the long-term methods (sterilization, IUD, Norplant) the amount of commodities consumed will depend on the number of acceptors of operations or insertions.

(13) Commodities consumed (long-term methods)

$$c_{m,s,t} = A_{m,s,t} \cdot con_m$$

It is important to realize that the calculation of commodity consumption provided by Target-Cost is not the same as the amount of commodities that should be ordered by a USAID mission or a family planning program. Commodity orders need to take into account a number of factors in addition to consumption, such as stock on hand, shipping delays, wastage and desired inventory levels. Consumption estimates represent only part of the inputs to the determination of necessary procurements.

Births Due to Contraceptive Failure

Each of the methods in the method mix has a level of effectiveness associated with it. This means that there are a number of births that occur on account of contraceptive failure. Some of these births will be due to the failure of the method and some to improper use. The equations presented above can be used to calculate the number and percentage of births that are due to contraceptive failure.

The number of births can be determined from the fertility rate and the number of women in union of reproductive age.

(14) Number of births

$$b_t = \frac{TFR_t \cdot WRA_t \cdot Cm_t}{30}$$

where:

b(t) = the number of births in year t

By substituting equation (1) for TFR, we can express the number of births as a function of contraceptive effectiveness.

(15) Number of births

$$b_t = TFR_0 \cdot k \cdot \frac{1 - 1.08 \cdot u_t \cdot e_t}{1 - 1.08 \cdot u_0 \cdot e_0} \cdot \frac{MWRA_t}{30}$$

where:

MWRA = the number of women of reproductive age in union

Equation (15) determines the number of births given the estimated effectiveness of the various contraceptive methods. A second equation can be written to determine the number of births that would occur if effectiveness were perfect (i.e., 100 percent).

(16) Number of births with perfect effectiveness

$$\acute{b}_t = TFR_0 \cdot k \cdot \frac{1 - 1.08 \cdot u_t \cdot \acute{e}_t}{1 - 1.08 \cdot u_0 \cdot e_0} \cdot \frac{MWRA_t}{30}$$

where:

$\acute{b}$ (t) = the number of births with perfect contraception
$\acute{e}$ (t) = the effectiveness when contraception is perfect

In order to determine the number of births that would occur when all contraception is perfect the variable é would be equal to 1. However, this equation can also be used to calculate the number of births that would occur if one or more specific methods had perfect effectiveness. In this case é(t) would be higher than e(t) but still less than one.

The number of births due to contraceptive failure is the difference of the two calculations.

(17) Number of births due to contraceptive failure

$$f_t = b_t - \acute{b}_t$$

where:

f(t) = the number of births due to contraceptive failure in year t

This equation can be expanded to yield the following calculating equation.

(18) Number of births due to contraceptive failure

$$f_t = \frac{(\acute{e}_t - e_t) \cdot k \cdot TFR_0 \cdot MWRA_t}{(1 - 1.08 \cdot u_0 \cdot e_0) \cdot 30}$$

The Total Fertility Rate

Although the Target-Cost Model is normally used to calculate the prevalence required to reach a specific fertility target, it can also be used to determine the TFR that would result from a given level of prevalence. This equation is a rearrangement of equation (6).

(19) The total fertility rate

$$TFR_t = \frac{TFR_0 \cdot (1 - 1.08 \cdot u_t \cdot e_t)}{k \cdot (1 - 1.08 \cdot u_0 \cdot e_0)}$$

Couple-Years of Protection

One measure of the scope of the family planning program is the number of users in any year. This figure represents the number of people who are using contraception at any moment in time. One disadvantage of this indicator as a measure of program performance is that the number of users in a year is not directly related to services provided in that year. The number of users is a mixture of users who were provided services in previous years (e.g., sterilization) as well as in the present year. It ignores any protection in future years that will result from services provided in the reference year. An alternative indicator that attempts to address this problem is the number of couple-years of protection (CYP). For a discussion of the strengths and weaknesses of CYP, see Shelton (1991).

The number of CYP indicates the total family planning protection provided by services delivered during a particular time period. For temporary methods the number of CYP is the same as the number of users. For long-term methods the number of CYP is the number of new acceptors of the method multiplied by the number of years of protection provided. For IUDs and implants the number of years of protection is calculated from the annual discontinuation rate and the maximum recommended period of use.

(20) Number of CYP: IUD and implants

$$CYP_{m,t} = A_{m,t} \cdot \sum_{y=0}^{My_m} (1 - r_m)^{(y + 0.5)}$$

where:

CYP(m,t) = the number of CYP provided by method m at time t
My(m) = the recommended maximum number of years of use for method m
r(m) = the annual discontinuation rate for method m

For sterilization, the number of years of protection is the difference between the end of the reproductive years and the average age of new acceptors of sterilizations.

Standardized Couple-Years of Protection

The disadvantage of CYP as a measure of program performance is that it counts a full year of protection at any age as being equivalent. This is a serious limitation since a woman's fecundity varies considerably with age. In other words, the fertility impact of protecting a woman aged 22 is higher than the fertility impact of protecting a woman aged 45. The standardized couple-year of protection (SCYP) is a modified version of CYP that corrects for the age of the user. Various methods have been proposed for calculating SCYP. For a full discussion, see Gorosh (1979). The method used here is simplified considerably from the method proposed by Gorosh and Wolfers in order to reduce data requirements.

The calculation of the number of SCYP used here is similar to the calculation of CYP except that it is corrected for the age pattern of waning fertility. One approximation to this pattern of waning of fertility is the pattern of age-specific fertility rates. At high levels of fertility (a TFR equal to 7 or above) we can assume that contraception is not affecting fertility much. This pattern is captured in the model patterns of age-specific fertility rates calculated by the UN Population Division. The figures for Asia (which is not much different from Africa or Sub-Saharan Africa at high levels of fertility) are shown in Table 1.

Table 1

DISTRIBUTION OF FERTILITY BY AGE OF WOMAN

Age	Percent of Total Fertility	Discount Factor (Ratio to 20-24)
15-19	11.8	1.00
20-24	24.1	1.00
25-29	24.1	1.00
30-34	19.5	0.81
35-39	13.0	0.54
40-44	6.3	0.26
45-49	1.3	0.05
TOTAL	100.0	

The factors in the last column of Table 1 are used to discount the value of protection according to the age of the user. These factors are used to discount both present and future CYP for all methods. For temporary methods there are no future CYPs associated with use in the current year. Therefore, the number of SCYPs is simply equal to the number of users of the method multiplied by the discount factor corresponding to the average age of users of that method. Therefore, a condom user at age 25 produces 1.0 SCYP, while a condom user at age 45 produces 0.05 SCYP.

Note that in Table 1 the discount factor for ages 15-19 is set to 1.00 rather than to 0.49. This is due to the fact that the number of births to the 15-19 age group is low primarily because many women in this age group are not sexually active. Any women in this age group who would use contraception would be sexually active and would experience births at a rate closer to that of the 20-24 age group if they did not use contraception. In practice this distinction makes little difference, since it is unlikely that the average age of users for any method will be below 20.

(21) SCYP for temporary methods

$$SCYP_{tm,t} = Users_{tm,t} \cdot DF_{tm,t}$$

$$DF_{tm,t} = f(AverageAge_{m,t})$$

where:

SCYP(tm,t)	=	the number of standardized CYP provided by temporary method m in year t
DF(tm,t)	=	the discount factor for temporary method m in year t
AverageAge(m,t)	=	the average age of users of method m in year t

For long-term methods the discount factors are used to discount both the present and future CYP provided according to the age of the user. Thus, a woman who is sterilized at age 30 would produce 8.3 SCYPs (five years at 0.81, five years at 0.54, five years at 0.26 and five years at 0.05).

(22) SCYP for long-term methods

$$SCYP_{lm,t} = \sum_{a=AA_{lm}}^{FA} A_{lm,t} \cdot DF_{lm,a} \cdot (1 - r_{m,t})^{a-AA+0.5}$$

where:

SCYP(lm,t)	=	the number of standardized couple-years of protection provided by long-term method m at time t
AA(lm,t)	=	average age of acceptance for long-term method m at time t
FA	=	49 for sterilization AverageAge + 5 for Norplant and IUD
r(m,t)	=	annual discontinuation rate for method m at time t

The final factor in equation (22) accounts for the fact that there could be some discontinuation among implant and IUD users. The factor (1 - r) raised to the power a-AA+0.5 yields the average proportion of acceptors at age a who are still users at age a-AA.

Total Costs of Family Planning

The typical approach to determining the costs of family planning programs involves multiplying the number of users by an estimate of the average cost per user to obtain an estimate of the total program cost. The Target-Cost Model can be used to make cost estimates based on this method, referred to here as the Cost per User Method. The Target-Cost Model also contains a second approach called the Cost per Visit Method. Both methods are described below.

Cost per User

This method determines the total costs by multiplying the number of users or new acceptors by the assumed cost per user or new acceptor. Calculations are performed for each method and, if desired, for each source. For temporary methods the cost calculations are based on the number of users. For long-term methods the calculations are based not on users, but rather on the number of new acceptors, since costs are more closely associated with new acceptors than with continuing users.

(23) Costs by method and source

For temporary methods:

$$Costs_{m,s,t} = Users_{m,s,t} \cdot Cost/User_{m,s,t}$$

For long-term methods:

$$Costs_{m,s,t} = A_{m,s,t} \cdot Cost/Acceptor_{m,s,t}$$

where:

Costs(m,s,t)	=	Costs of providing family planning services for method m from source s at time t
Cost/User(m,s,t)	=	The per user cost of providing method m from source s in year t
Cost/Acceptor(m,s,t)	=	The cost per new acceptor of providing method m from source s in year t

Total family planning costs are the sum of costs by method and source.

(24) Total costs

$$TotalCosts_t = \sum_m \sum_s Costs_{m,s,t}$$

The advantage of this approach is that it is clearly the simplest approach to family planning costing. It requires only an estimate of costs per user or new acceptor by method. The quality of the cost projection will be as good as the quality of the cost per user data used to make the projection. See Chapters III and IV for a discussion of how to prepare these cost estimates.

Another advantage of this approach is that much of the international data available on family planning costs is either in the form of cost per user or can be most readily converted to that form. For example, the tables in Chapter III that report cost data from previous studies are mostly in the form of cost per user.

The disadvantage to this approach is that it does not relate the costs directly to program activities such as initial consultations, IUD insertions and implant removals. Costs for these activities are all combined in a single measure of cost per user or new acceptor.

Cost per Visit

The second methodology available in Target-Cost is the Cost per Visit Method. This approach was suggested during preparation of the Target-Cost Model by Dorothy Nortman, Amy Tsui and Barbara Janowitz. It has the advantage of relating costs to the services actually provided. This method recognizes that for most methods and sources the costs vary considerably by the type of service provided. Thus costs are high for visits involving a sterilization but are much lower when the

only action involved is resupply of condoms. In this approach, costs are specified for each type of visit associated with each method and source. Costs are determined by multiplying these costs by the number of visits of each type, method and source.

In the simplest application of this approach each method might have only one type of visit defined. For temporary methods it could be single or multiple resupply visits. For long-term methods the visit would be the acceptance visit. The costs would be described as cost per sterilization, insertion or implantation. In this case the costs would be very similar to those used in the cost per user approach. This approach also can be used in a more complete fashion, if desired, to describe all the visits associated with each method, including initial screening visits, follow-up visits and removal visits. This comes the closest to relating costs to the full service provided.

There are two categories of visit types: one-time visits and recurring visits. Recurring visits are those that repeat on a regular basis, such as resupply visits for users of condoms or oral contraceptives. One-time visits are activities that occur only once, such as initial screening, IUD insertions, Norplant implants and sterilization operations. Also included in this category are specific follow-up visits.

For recurring visits it is necessary to specify the cost per visit and the number of visits that occur each year. For example, a pill user might make four resupply visits a year if she receives a three-month supply at each visit. Total costs for recurring visits are simply the number of such visits multiplied by the average cost per visit.

(25) Costs for recurring visits

$$CostRecVis_{m,s,t} = NumRecVis_{m,s,t} \cdot CostPerRecVis_{m,s,t}$$

where:

CostRecVis(m,s,t)	=	total cost for all recurring visits for method m and source s at time t
NumRecVis(m,s,t)	=	the number of recurring visits
CostPerRecVis(m,s,t)	=	the cost per recurring visit

The number of recurring visits is the number of users multiplied by the number of recurring visits per year minus the number of new acceptors (to remove the initial visit which is not recurring).

(26) Number of recurring visits

$$NumRecVis_{m,s,t} = Users_{m,s,t} \cdot Freq_{m,s} - A_{m,s,t}$$

where:

Users(m,s,t)	=	the number of users of method m from source s at time t
Freq(m,s)	=	the number of recurring visits per year for method m from source s

For one-time visits it is necessary to specify the year in which the visit takes place and the percentage of users who actually make the visit. The year in which the visit takes place is specified in relation to the year of acceptance (which is year 1). The percentage of users who actually make the visit is the percentage compliance. This accounts for the fact that some users may not make all recommended visits. For example, the recommended visit schedule for Norplant may be an initial visit, an implant visit, a follow-up visit one month later, a follow-up visit two months later and a removal visit after five years. The first four visits all take place in the first year. Although compliance for the implant visit will be 100 percent (by definition to become a user of Norplant you must have Norplant inserted), some users may not return for the follow-up visits. Compliance is the percentage of users who do make the visit.

The total costs for one-time visits are the number of visits times the cost per visit. The number of visits is equal to the number of acceptors who are still users at the time of the visit multiplied by the percentage compliance.

(27) Costs for one-time visits

$$CostOTvis_{m,s,t} = NumOTvis_{m,s,t} \cdot Cost/OTvis_{m,s,t}$$

where:

CostOTvis(m,s,t)	= cost of one-time visits for method m, source s, at time t
NumOTvis(m,s,t)	= number of one-time visits for method m, source s, at time t
Cost/OTvis(m,s,t)	= cost per one-time visit for method m, source s, at time t

(28) Number of one-time visits

$$NumOTvis_{m,s,t} = \sum_{v} A_{m,s,t-lag} \cdot comp_{m,v} \cdot (1 - r_m)^{(t - lag + 0.5)}$$

where:

A(m,s,t-lag)	=	number of acceptors of method m from source s at time t-lag
lag	=	the number of years after acceptance that visit v takes place
comp(v)	=	the proportion of users that make visit v
r(m)	=	the annual discontinuation rate

The total costs for any method will be the sum of costs for one-time visits and recurring visits.

The Cost per Visit approach may be more useful than the Cost per User approach when it is important to examine such program factors as compliance or to focus on personnel time requirements for different types of activities. This approach is most useful for examining costs for providers such as public clinics. However, it can also be used for social marketing, CBD and commercial services as long as the number of visits per year and costs per visit are consistent. For example, in a social marketing program that supplies oral contraceptives through pharmacies, it does

not matter whether the number of resupply visits is specified as four or thirteen, as long as the cost of the visit is set appropriately to account for the number of cycles provided.

Projections of Cost per User or per Visit

The Target-Cost Model adds a refinement to these methods that recognizes the fact that marginal costs are likely to be less than average costs and that, as a result, average costs will decline as prevalence increases. Economic theory provides several possible reasons why average costs might be expected to decline as programs expand, including:

Economies of scale. The basic idea, that larger capacity producers are potentially lower cost producers is probably not too important for family planning services (i.e., the technology is such that minimum optimum scale is very low). It is nevertheless possible that larger programs face lower pecuniary costs because of the larger volume of users they service. An example might be economies of scale in procuring contraceptives on the world market. (Although, strictly speaking, this would be a pecuniary economy obtained by having greater bargaining power in the international contraceptive market and would only be available to very large programs.)

Fixed costs. There may be certain fixed costs that need to be incurred before service can be provided but that do not increase proportionately with the level of services provided. Examples might be: (1) the construction of a clinic, (2) staff training, (3) IE&C campaigns, and (4) administrative capacity.

Indivisible costs. Certain inputs (e.g., labor) may not be purchased in limited quantities. A given clinic, for example, may need to have at least one full-time staff member, regardless of the number of clients served. Where labor is underutilized, additional clients can then be served at little additional cost.

The learning curve. As workers and managers may learn to do their jobs better through experience, their output of services per hour tends to increase (as well as possibly the quality of services provided).

Against the above reasoning, it is sometimes argued that average program cost will tend to rise as programs are extended to include less easily serviced populations (e.g., rural populations living in remote areas, the illiterate).

We have examined available data on cost per user and have found there is a significant inverse relationship between cost per user and prevalence. (For more details, see Chapter IV and Knowles 1991). This relationship holds even when method mix considerations are taken into account. The best-fitting equation describes cost per user as a function of the inverse of prevalence.

(29) Expenditure per user as a function of prevalence

$$Exp/User_t = 3.419 + 1.652 \cdot \frac{1}{u_t}$$

where:

Exp/User = expenditure per user
u = prevalence

There are a number of problems with the data sets that were used to develop this equation. Among them are (1) the data set uses expenditures rather than costs; (2) for-profit providers of family planning services are excluded from the expenditure data but are included in the number of users; (3) in several cases the data refer to budget allocations rather than actual expenditures; (4) there is no uniformity in the definitions applied.

In spite of the problems associated with analyzing this relationship, it is probable that an inverse relationship does exist and that projections of future costs will be too high if this is not taken into account. Therefore, the Target-Cost Model allows the user to apply this relationship, if desired. This adjustment is not automatic. It must be requested by the user at the time of data entry.

If cost estimates are not available for the base year, then the model will supply figures based on equation (29). However, it is strongly recommended that the user provide a cost estimate for the base year. In this case, the model assumes that the base year costs are accurate. It then adjusts costs for future years according to the change in total prevalence. An adjustment factor is calculated based on equation (29) and applied to the estimated costs in the base year.

(30) Prevalence adjustment factor

$$AdjFactor_t = \frac{3.419 + \frac{1.652}{u_t}}{3.419 + \frac{1.652}{u_1}}$$

(31) Cost per user adjusted for prevalence

$$AdjCost/User_t = Cost/User_1 \cdot AdjFactor_t$$

where:

AdjFactor(t) = an adjustment factor representing the ratio of the costs per user at the base year prevalence to the costs per user at the prevalence in time t
Cost/User(1) = cost per user in the base year
u = total prevalence

Net Costs

The discussion of family planning costs to this point has not considered any revenues that might be generated through fees. The Target-Cost Model allows fees to be associated with any user or visit by method and source. These figures are used to calculate revenues, net costs and the percentage of cost recovery.

(32) Total revenues

$$Revenue_{m,s,v,t} = NumOfVis_{m,s,v,t} \cdot Fee_{m,s,v,t}$$

or

$$Revenue_{m,s,t} = Users_{m,s,t} \cdot Fee_{m,s,t}$$

(33) Net costs

$$NetCosts_{m,s,v,t} = GrossCosts_{m,s,v,t} - Revenue_{m,s,v,t}$$

(34) Percentage of costs recovered

$$PercCostRec_t = 100 \cdot \frac{Revenue_t}{GrossCosts_t}$$

where:

Revenue(m,s,v,t)	=	the revenue received from fees for method m, visit type v, source s at time t
Fee(m,s,v,t)	=	the fee charged for visit v, method m, source s at time t
GrossCosts	=	total costs
NetCosts	=	net costs
PercCostRev	=	the percentage of total costs that are recovered through fees

Commodity Costs

Commodity costs are calculated as the product of the commodities required for a particular method and the cost of the commodity per unit.

Cost per User

The Target-Cost Model will calculate the cost per user for each year and any combination of methods and sources. This calculation is simply the total costs divided by the number of users. These figures can be used to compare the cost-effectiveness of program components. These figures may also be used to assess the overall cost-effectiveness of the program.

(35) Total cost per user

$$Cost/User_{m,s,t} = \frac{TotalCost_{m,s,t}}{Users_{m,s,t}}$$

where:

Cost/User(m,s,t)	=	the cost per user of method m from source s at time t
TotalCost(m,s,t)	=	the total cost of method m from source s at time t
Users(m,s,t)	=	the number of users of method m from source s at time t

The major problem with this indicator is that costs and users in year t are not necessarily directly related. For example, if a woman is sterilized in 1990, the costs of the operation would be recorded as costs in 1990. However, the woman would be counted as a user in future years as well as in 1990. Thus, in 1995, there would be no costs associated with this user. The result is that the cost per user calculation for 1990 would overstate the real costs while in all future years it would understate the real costs.

Cost per CYP

An alternative to cost per user is the cost per CYP. This indicator has the advantage of relating costs in one year to the full protection provided by the services delivered in that year.

(36) Cost per CYP

$$Cost/CYP_{m,s,t} = \frac{TotalCost_{m,s,t}}{CYP_{m,s,t}}$$

where:

Cost/CYP(m,s,t)	=	the cost per CYP for method m from source s at time t

Cost per SCYP

The cost per SCYP is calculated by dividing total costs in a particular year by the number of SCYP produced by family planning activities in that year. This approach is similar to cost per CYP in that it relates costs in one year to the protection produced by activities in that year. It is superior to the cost per CYP measure since it adjusts the contribution of each method to the total amount of protection provided by considering the age of the user.

REFERENCES TO CHAPTER II

Bongaarts, J. (1978). "A Framework for Analyzing the Proximate Determinants of Fertility." Population and Development Review 4, No. 1, pp. 105-132.

_____ and R. G. Potter (1983). Fertility, Biology, and Behavior: An Analysis of the Proximate Determinants. New York: Academic Press.

_____ and J. Stover (1986). The Population Council Target-Setting Model: A User's Manual. New York: The Population Council.

Gorosh, Martin, and David Wolfers (1979). "Standard Couple-Years of Protection." Manual IX, The Methodology of Measuring the Impact of Family Planning Programmes on Fertility. New York: United Nations.

Knowles, James C., and Anne E. Wagman (1991). "The Relationship between Family Planning Costs and Contraceptive Prevalence." Presented at the Annual Meeting of the Population Association of America, March 21-23, 1991, Washington, DC.

Shelton, James (1991). "What's Wrong with CYP?" Studies in Family Planning 22 (5): 308-311.

III. DATA SOURCES FOR ESTIMATING MODEL INPUTS

The use of the Target-Cost Model requires data describing the use of family planning in the country or region being studied and data about the use, effectiveness and costs of the different contraceptive methods and services. Some of these data (e.g., number of women of reproductive age) must be specific for the area being studied and some of the data (e.g., method of 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.

Number of Women of Reproductive Age

The number of women of reproductive age (WRA) usually refers to the number of women aged 15-49. This input is required for each year of the projection period. Although WRA is dependent on the total fertility rate (TFR), the Target-Cost Model requires this number to be supplied exogenously. This actually simplifies data input by not requiring the user to enter data on the size of each five-year age cohort in the population and the age-specific fertility, mortality and migration rates. In practice, this simplification does not reduce the accuracy of the calculations significantly since the number of WRA is not affected by changes in TFR until 15 years later. The number of married women of reproductive age (MWRA) is affected even less since marriage rates are typically low for the 15-19 age group. Thus, in a typical 15- or 20-year projection there is little effect on WRA from future variations in TFR.

Projections of WRA are available from a variety of sources. One good source may be official population projections made by the government of the country where the model is being applied. Alternatively, custom projections may be prepared using a demographic projection program such as the DemProj program prepared by The Futures Group (Stover 1990) or the ABACUS program of the United Nations. The best published source of projections is probably the projections published by the Population Division of the United Nations. These projections are published every two years. The latest publication is World Population Prospects, 1990, Department of International Economic and Social Affairs, United Nations, New York, 1991 (ST/ESA/SER.A/106).

Percentage in Union

In order to determine the number of women of reproductive age who are in union, the Target-Cost Model requires an estimate of the percentage of WRA who are in union. The best sources for this figure will usually be a national census or national survey such as the Demographic and Health Survey (DHS), World Fertility Survey (WFS) or Contraceptive Prevalence Survey (CPS).

If a good country source is unavailable, the estimates presented in Table 2 may be useful. These figures are calculated from estimates of the number of married women of reproductive age prepared by the Center for International Research, U.S. Census Bureau, and published in Family

Planning and Child Survival, 100 Developing Countries, John A. Ross, Marjorie Rich, Janet P. Molzan and Michael Pensak, Center for Population and Family Health, Columbia University, 1988.

Table 2

PERCENTAGE OF WOMEN OF REPRODUCTIVE AGE WHO ARE IN UNION, 1985

Country	Percent In Union	Country	Percent In Union
Sub-Saharan Africa		**Latin America**	
Angola	56.5%	Argentina	53.7%
Benin	77.1%	Bolivia	53.8%
Botswana	34.8%	Brazil	53.3%
Burundi	61.8%	Chile	48.8%
Cameroon	66.1%	Colombia	52.6%
Chad	72.6%	Costa Rica	53.7%
Cote d'Ivoire	71.7%	Cuba	58.7%
Ghana	63.4%	Dominican Republic	60.2%
Guinea	92.4%	Ecuador	54.2%
Kenya	65.2%	El Salvador	48.3%
Lesotho	60.8%	Guatemala	63.8%
Liberia	69.4%	Guyana	35.4%
Madagascar	59.5%	Honduras	59.0%
Malawi	66.8%	Jamaica	50.3%
Mali	72.4%	Mexico	57.3%
Mauritius	49.8%	Nicaragua	53.9%
Mozambique	61.6%	Panama	52.5%
Nigeria	89.0%	Paraguay	55.4%
Rwanda	61.6%	Peru	51.7%
Senegal	70.5%	Uruguay	51.1%
Sudan	69.8%	Venezuela	49.9%
Togo	62.6%	AVERAGE	54.1%
Uganda	64.5%		
Tanzania	66.2%		
Zaire	73.6%	**Asia**	
Zimbabwe	61.3%	Afghanistan	60.7%
AVERAGE	73.2%	Bangladesh	80.2%
		Burma	65.4%
		Hong Kong	53.2%
Middle East		India	74.6%
Egypt	60.9%	Indonesia	67.1%
Iran	69.4%	Korea, Rep	54.0%
Iraq	59.2%	Malaysia	59.8%
Jordan	43.9%	Nepal	79.0%
Kuwait	69.2%	Pakistan	64.1%
Lebanon	57.6%	Philippines	58.5%
Morocco	57.0%	Singapore	50.1%
Syria	61.0%	Sri Lanka	52.6%
Tunisia	49.9%	Thailand	57.4%
Yemen	60.9%	Turkey	65.7%
AVERAGE	61.8%	AVERAGE	70.1%

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 WRA in union declines. Figure 1 shows the pattern of percentage in union versus TFR. This pattern should be considered when estimating future values of the percentage of WRA in union.

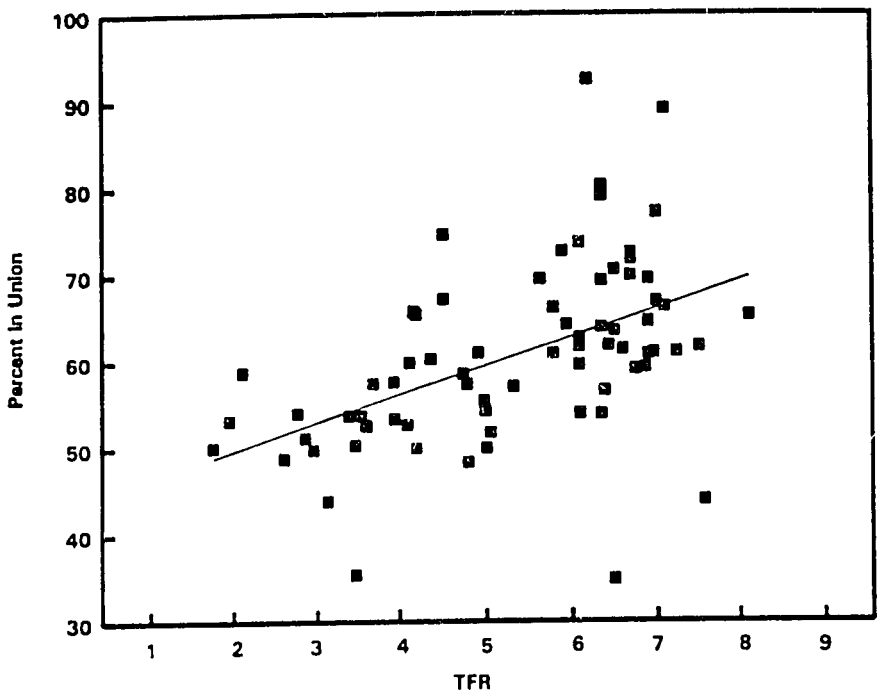

Figure 1. Percentage Married versus TFR

Duration of Postpartum Infecundability

Postpartum infecundability is the period after a birth during which a woman is not exposed to the risk of pregnancy either due to postpartum amenorrhoea. This variable should be 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 3.

Table 3

POSTPARTUM INFECUNDABILITY FROM DHS SURVEYS

Country	Year	Duration of PPI (Months)
Sub-Saharan Africa		
Burundi	1987	19.9
Ghana	1988	18.1
Kenya	1989	12.6
Liberia	1986	13.2
Mali	1987	16.8
Nigeria (Ondo State)	1986	24.1
Togo	1988	22.6
North Africa and Middle East		
Egypt	1988	9.2
Tunisia	1988	7.8
Latin America		
Bolivia	1989	13.4
Brazil	1986	5.6
Colombia	1986	8.5
Ecuador	1987	9.5
El Salvador	1985	9.9
Mexico	1987	7.5
Trinidad and Tobago	1987	4.8
Asia		
Indonesia	1987	12.5
Sri Lanka	1987	10.2
Thailand	1988	8.7

Postpartum infecundability usually declines as a country develops due to reductions in the prevalence and duration of breastfeeding. The relationship between postpartum infecundability and TFR is shown in Figure 2.

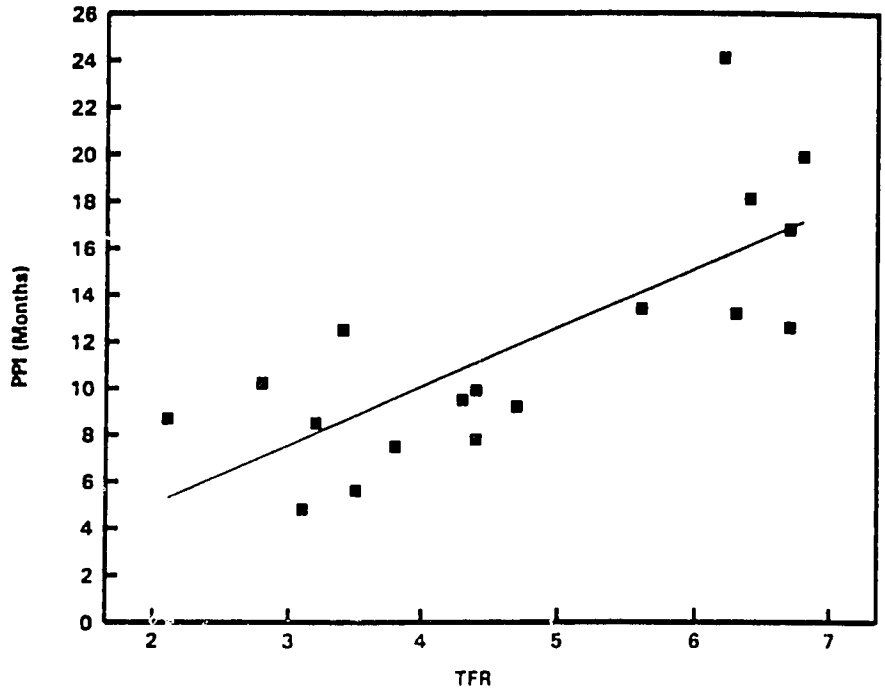

Figure 2. Postpartum Infecundability versus TFR

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. Most of the information that is available is for developed countries and much of this is of dubious quality. Table 4 presents data compiled by Henshaw (1987) on total abortion rates for a number of countries, mostly in the developed world.

Table 4

TOTAL ABORTION RATES IN SELECTED COUNTRIES

Country	Year	Total Abortion Rate
Australia	1984	0.454*
Bangladesh	1984-85	0.039*
Bulgaria	1984	1.175*
Canada	1984	0.288
	1982	0.422*
China	1983	1.053*
Cuba	1984	1.121*
Czechoslovakia	1984	1.005
Denmark	1984	0.554
England and Wales	1984	0.367
Finland	1983	0.362
France	1984	0.463*
Germany, DR	1984	0.708
Germany, FR	1984	0.354*
Greenland	1983	0.907*
Hong Kong	1984	0.388*
Hungary	1984	1.044
Iceland	1983	0.344*
India	1983-84	0.054*
Israel	1984	0.395*
Italy	1984	0.685*
Japan	1983	0.666*
	1975	1.336*
Netherlands	1984	0.161
New Zealand	1984	0.272
Norway	1984	0.465
Poland	1984	0.393*
Romania	1983	1.385*
Scotland	1984	0.236
Singapore	1983	0.792
South Africa	1982	0.005*
Sweden	1984	0.534
Tunisia	1985	0.617
USSR	1982	1.660*
U.S.	1983	0.790
Vietnam	1980	0.200*
Yugoslavia	1984	1.192*

*Total abortion rate was estimated from the reported abortion ratio.
SOURCE: Henshaw (1987).

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.

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 due to the fact that 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 one means that one-eighth of pregnancies are ended by abortions, but, at a TFR of 2, an abortion rate of one would mean that one-third of all pregnancies are terminated by abortions.

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 that report the percentage of women childless at age 45-49. Table 5 presents data on percentage of childless women from a number of DHS reports.

Table 5

PERCENTAGE OF EVER-MARRIED WOMEN WHO REMAIN CHILDLESS AT AGES 45-49

Country	Year	Percent Childless
Bolivia	1989	3.6
Botswana	1987	3.5
Brazil	1986	4.5*
Burundi	1987	1.5
Colombia	1986	0.9
Dominican Republic	1986	1.7
Ecuador	1987	3.0
Egypt	1988	2.6
El Salvador	1985	0.8
Guatemala	1987	2.7*
Indonesia	1987	4.7
Kenya	1989	2.6
Liberia	1986	2.1
Mali	1987	3.1
Morocco	1987	3.8
Nigeria-Ondo State	1986	1.2
Paraguay	1990	2.7
Peru	1986	1.2
Senegal	1986	4.4
Sri Lanka	1987	2.6
Sudan	1989/90	2.0
Thailand	1987	2.9*
Togo	1988	1.9
Trinidad and Tobago	1987	2.1
Tunisia	1988	2.3
Uganda	1988/89	4.2**
AVERAGE		2.6

*Ages 40-44.
**Currently married women.
SOURCE: Selected Demographic and Health Surveys.

Total Fertility Rate

The total fertility rate (TFR) is the average number of live births a woman would have if she survived to age 50 and had births according to the prevailing age-specific fertility rates. The best sources of information on TFR are national surveys, such as the DHS, CPS or WFS. The estimates based on these surveys are also reported and used in the World Population Prospects, 1990 and in the annual series of World Development Reports from the World Bank, such as World Development Report, 1991, Oxford University Press, New York, 1991.

The Target-Cost Model is designed to improve the process of developing future TFR targets by determining the resources required to reach any future level of TFR. Therefore, the determination of future levels of TFR will often involve interactive use of the model to test the implications of different TFR targets.

Past experience in TFR decline should also be a useful guide in determining future targets. Table 6 shows the average decline in TFR during the 20-year period 1960-65 to 1980-85 for 78 developing countries. These countries are grouped by strength of program effort and level of development. The averages for each group are also shown. This table should serve as a useful reference for developing a realistic target for future declines in TFR.

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. By estimating 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 the TFR for urban women is 4 and for rural women it is 6 and that 30 percent of the population is urban. The total TFR would be 5.4. If in the target year, it is expected that 50 percent of the population will be urban, then the TFR would drop to 5.0 (0.5 x 4 + 0.5 x 6) if the new urban migrants adopt the behavior of current urban dwellers. This approach will indicate the decline in TFR that might be expected from development alone, without a significant increase in recruiting efforts.

Prevalence

Contractive prevalence is the percentage of women of reproductive age who are in union and who use contraception. An estimate of prevalence is usually derived from national surveys, including the DHS. They are the best sources of information on prevalence.

The Target-Cost Model requires prevalence to be specified for the initial year only. It will be calculated for all the other years. However, if desired, the model can be reversed to calculate the TFR that would result from a future level of prevalence. This might be the case if a program had a projection of the number of users it expected to serve in the future. The number of users could be converted into prevalence (by dividing by the number of MWRA) and entered into the model in order to determine the resulting TFR.

Table 6

TFR DECLINES BY FAMILY PLANNING PROGRAM EFFORT LEVEL OF DEVELOPMENT (1960/65 - 1980/85)

Development Index	Program Effort							
	Strong		Moderate		Weak		Very Weak or None	
High	Colombia	2.8	Fiji	2.5	Brazil	2.3	Iraq	0.5
	Hong Kong	3.5	Jamaica	2.1	Chile	2.5	Jordan	0.7
	Korea Rep	3.0	Malaysia	2.8	Costa Rica	3.4	Kuwait	2.2
	Mauritius	3.3	Panama	2.5	Cyprus	1.1	Saudi Arabia	0.0
	Mexico	2.6	Trinidad and Tobago	2.1	Guyana	2.8		
	Singapore	3.2			Venezuela	2.4		
	AVERAGE	3.1	AVERAGE	2.4	AVERAGE	2.4	AVERAGE	0.8
Upper Middle	China	3.6	Dominican Republic	3.1	Algeria	0.7	Bolivia	0.4
	Sri Lanka	1.9	El Salvador	1.6	Botswana	0.4	Congo	-0.1
			Philippines	1.9	Peru	1.9	Paraguay	2.0
			Thailand	2.9	Turkey	2.2	Syria	0.3
			Tunisia	2.3				
	AVERAGE	2.7	AVERAGE	2.4	AVERAGE	1.4	AVERAGE	0.8
Lower Middle	Indonesia	1.3			Egypt	1.8	Burma	1.3
					Guatemala	0.7	Ghana	0.4
					Honduras	1.2	Côte d'Ivoire	-0.1
					Kenya	0.0	Lesotho	0.0
					Liberia	-0.2	Nigeria	-0.2
					Morocco	1.7	Togo	0.1
					Papua New Guinea	0.6	Zaire	-0.1
					Tanzania	-0.2	Zambia	-0.6
					Zimbabwe	1.3		
	AVERAGE	1.3			AVERAGE	0.8	AVERAGE	0.1
Low	India	1.1	Bangladesh	0.5	Gambia	0.0	Benin	-0.2
					Haiti	1.1	Burkina Faso	0.2
					Pakistan	0.0	Burundi	-0.8
					Rwanda	-0.8	C.A.R.	-0.2
					Senegal	0.2	Ethiopia	0.7
							Guinea	0.2
							Madagascar	0.0
							Malawi	-0.1
							Mozambique	-0.1
							Niger	0.0
							Sierra Leone	-0.2
							Sudan	0.1
							Uganda	0.0
							Yemen N.	-0.1
							Yemen, PDR	0.2
	AVERAGE	1.1	AVERAGE	0.5	AVERAGE	0.1	AVERAGE	0.0

SOURCE: John Bongaarts, W. Parker Mauldin, and James F. Phillips, "The Demographic Impact of Family Planning Programs," Studies in Family Planning 21, 6 (1990): 299-310.

Method Effectiveness

For each method used in the Target-Cost Model it is necessary to specify an average effectiveness rate. The method effectiveness rate is the proportion of women using that method who do not become pregnant during one year of use. The opposite of the effectiveness rate is the failure rate, the annual proportion of users who do become pregnant while using the method.

Until recently most information on effectiveness rates was for developed countries or was developed from clinical samples in developing countries that may not be representative of the entire population of users. Recently, however, DHS data have been used to estimate effectiveness rates for the general population in a number of countries. Table 7 presents information from 15 countries prepared by Moreno and Goldman (1990). This table reports first-year failure rates for a variety of methods. The median failure rates and corresponding effectiveness rates are also shown for each method. These rates exhibit substantial variation from country to country. They apply to first-year use only and, therefore, probably overestimate average failure rates for all users.

Not shown in the table are rates for sterilization, injectables and Norplant. Since the effectiveness of these methods depends primarily on the technology and not user knowledge and motivation, effectiveness rates for these methods are generally considered to be nearly 100 percent. The only exception would be for injections, when women do not understand or follow the recommended schedule for frequency of injections.

Table 7

FIRST-YEAR METHOD FAILURE RATES

	Method				
Country	**Pill**	**IUD**	**Rhythm**	**Withdrawal**	**Other**
Bolivia	10.5	3.0	21.2	34.8	35.4
Brazil	5.4	13.0	22.8	20.7	16.8
Colombia	7.7	5.3	24.8	20.1	23.6
Dominican Republic	11.8	3.6	19.9	29.2	23.3
Ecuador	5.8	4.6	13.9	27.2	21.1
Egypt	6.9	1.8	38.4	10.3	8.9
Guatemala	9.8	7.7	24.6	12.0	16.6
Indonesia	2.7	1.9	10.8	8.5	2.6
Mexico	5.4	1.5	3.7	4.0	5.8
Morocco	8.6	1.1	30.5	11.5	22.6
Peru	5.9	4.2	23.6	17.3	16.8
Sri Lanka	7.2	3.4	13.0	11.5	8.1
Thailand	2.8	2.5	14.8	7.4	1.0
Trinidad and Tobago	5.9	4.2	13.7	17.6	15.2
Tunisia	5.4	2.7	14.2	12.5	21.2
MEDIAN	5.9	3.4	19.9	12.5	16.8
MEDIAN EFFECTIVENESS RATE	94.1	96.6	80.1	87.5	83.2

SOURCE: Moreno and Goldman, 1991.

Method Discontinuation

Method discontinuation refers to the percentage of users of a particular method that discontinues use each year. Use may be discontinued because of a desire to become pregnant, because of an unintended pregnancy or in order to switch to another method. Several different types of discontinuation are described in the family planning literature, including first-method discontinuation, extended discontinuation and super-extended discontinuation. The Target-Cost Model requires estimates of method discontinuation, that is, the percentage of users of a particular method who discontinue use of that method for any reason during the next year.

A number of studies have determined discontinuation rates for various methods and programs. These studies are not strictly comparable since they use different methods of calculating discontinuation rates; however, a summary of the results of available studies is presented in Table 8.

Table 8

METHOD DISCONTINUATION RATES

	Discontinuation Rates				
Country	**IUD**	**Orals**	**Norplant**	**Condoms**	**Injectables**
Several			21-23		
Bangladesh	20-42	59			33-44
Brazil		49-52			
Chile	9-14				
China	9-14		29		
Colombia	10-39	10	8	12	
Ecuador	12	13			
Egypt	26-36	39	10		
Ghana					40
India	30	70-80	14		68-69
Indonesia	8-23	34-47		37	
Iran	25-28				
Korea	31-46	72		67	33
Malaysia	26-31				
Mauritius		36			
Mexico	12-16	22-33		24	31
Morocco	23	48			
Nigeria	20-26				
Pakistan					78
Philippines	19-30	39-58		49-90	
Sri Lanka	21	35			
Sudan	27-30				
Taiwan	18-24				
Thailand					41
Tunisia	22	44			

SOURCES: Most data are taken from summary tables presented in Shireen Jejeebhoy, "Measuring Contraceptive Use-Failure and Continuation: An Overview of New Approaches," in Measuring the Dynamics of Contraceptive Use, Proceedings of the United Nations Expert Group Meeting on Measuring the Dynamics of Contraceptive Use, New York, 5-7 December 1988, United Nations, New York, 1991. Additional data are from the following sources: Sri Lanka. Family Health Bureau, "Continuation and Retention Rate Survey, Sri Lanka 1985," Colombo, Family Health Bureau, 1986; Indonesia: Affandi, B. et al., "Five year-experience with Norplant-6," presented at the 12th World Congress on Fertility and Sterility, Singapore, October 23-31, 1986; Korea: Park, III and SK Kong, "Contraceptive Failure and Discontinuation in Korea," Comparative Study of Fertility Control Experiences in Republic of Korea and Republic of China, Korea Institute for Population and Health, 1987; Egypt: DeClerque, JL and AO Tsui, "Contraceptive Discontinuation in Egypt: A Dilemma of High Availability and Brief Use," presented at the 11th Annual NCIH International Health Conference, Arlington, Virginia, June 10-13, 1984; Taiwan: Chen, YP, "Comparative Studies of Copper-Releasing IUDs, Nova-T and Copper-T IUD and Non-Medicated IUD, Lippes Loop," ICARP ASIA SEARCHER, 1983 (1): 16-21; India: Saxena, BN, "Experience and Problems Encountered with Availability Methods in Family Planning Programmes in India," unpublished, 1983.

These studies indicate that most countries experience discontination rates in the range of 10-30 percent for IUDs, 30-50 percent for orals and 30-70 percent for condoms. It will always be best to use country-specific estimates of discontinuation rates, if available, because of the wide range of reported results. Discontinuation rates may also vary by source within a country if different sources vary by the average age of their users or by the quality of service provided.

The importance of using the correct discontinuation rate depends on the method and the indicator being considered. Discontinuation rates tend to be more important for long-lasting methods, such as IUDs and Norplant, since most services and costs are associated with new acceptors of these methods. Thus greater costs are incurred to replace a discontinued user than to maintain a current user. For the temporary methods, such as condoms, costs are often more closely associated with the number of users rather than new acceptors.

The Target-Cost Model calculates the number of users discontinuing each year by multipying the number of users of a method at the beginning of a year by the average discontinuation rate for that method. In actual use, the pattern of discontinuation for a method such as the IUD is more complicated than this simple calculation. Generally there are a certain number of spontaneous expulsions that occur in the first month after insertion. A number of women will discontinue use in the first three months for a variety of reasons. The discontinuation rate usually declines after the first three months and remains low for the next two or three years. Removals increase after the recommended duration of use is reached, usually 3-5 years depending on the IUD and the program. Some women may keep the IUD longer than recommended, although the effectiveness may decline. The combination of the discontinuation rates for each of these periods produces an average duration of use for the IUD. To model this process precisely would require data on discontinuation rates for each of these periods. Since these data are rarely available, the Target-Cost Model uses a single average discontinuation rate. The table below shows the correspondence between the average discontinuation rate and the average duration of use. If the average duration of use is known, this table can be used to select the appropriate discontinuation rate.

Table 9

DISCONTINUATION RATES AND DURATION OF USE

Discontinuation Rate	Average Duration of Use (Years)
0.15	6.1
0.20	4.5
0.22	4.0
0.25	3.5
0.27	3.2
0.30	2.8
0.33	2.5

Units per CYP

The Target-Cost Model calculates the commodity consumption needed to achieve the TFR goal. For long-term methods, this calculation is based on the number of new acceptors. For example, the number of IUDs required in any year is equal to the number of insertions performed in that year plus any wastage of commodities (losses due to storing, theft, spoilage, etc).

For temporary hormonal methods the number of units per CYP is also affected only by the recommended usage and wastage. One CYP requires 13 cycles of pills or 4 injections of Depo-Provera or 6 injections of Noristerat. 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. However, it is unlikely to exceed 10 percent.

For coitus-dependent methods (condoms and vaginal methods) the number of units per CYP depends on the frequency of coitus and on wastage. The general standard used for frequency of intercourse has been 100 times per year. However, a recent analysis of DHS data indicates that it is probably lower than that in most countries (Blanc 1991). Table 10 presents figures for the average annual coital frequency for couples using coitus-dependent methods of contraception including condoms, vaginal methods, withdrawal and other traditional methods.

Wastage must also be considered for these methods. Wastage is likely to be largest when contraceptives are distributed free. In some situations, condoms may be distributed widely to people who accept them but do not actually use them. When condoms are purchased, however, particularly when they are purchased at more than token prices, there is not likely to be much wastage.

Recently, a working group of the Office of Population of the Agency for International Development reviewed commodity wastage and usage and recommended a set of standard values for units per CYP. These recommendations are shown in Table 11.

Table 10

MEAN ANNUAL COITAL FREQUENCY AMONG MARRIED WOMEN

Country	Women Using Coitus-Dependent Methods of Contraception	All Married Women
Brazil	96	96
Colombia	55	60
Dominican Republic	59	44
Ecuador	56	53
Guatemala	55	49
Mexico	42	38
Peru	55	48
Burundi	--	74
Ghana	--	14
Uganda	--	68
Kenya	--	36
MEDIAN	55	48

SOURCE: Blanc, 1991.

Table 11

STANDARD VALUES OF UNITS PER CYP

Method	Units per CYP
Oral Contraceptives	15 cycles per CYP
Cu "T" 380-A IUD	3.5 CYP per IUD inserted
Norplant (implant)	3.5 CYP per implant
Condoms	150 condoms per CYP
VFTs	150 tablets per CYP
Sterilization (male and female)	10 years per procedure
Depo-Provera (injectable)	4 doses per CYP
Noristerat (injectable)	6 doses per CYP

Average Age of Users

The aggregate version of the Target-Cost Model does not require any age-specific information. All rates such as percentage in union and percentage 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 and the calculation of

SCYP. The Target-Cost Model estimates the percentage of users of each method who are aged 45-49 from the average age of the users.

The average age of users is usually available from national surveys or can be calculated from the percentage of users of each method in each 5-year age group. For example, given data on the distribution of pill users by age, the average age of pill users can be calculated by multiplying the proportion of users in each age category by the average age in the category and summing these results for all age categories. Tables 12 and 13 show the results of these calculations for a number of countries that have had DHS surveys.

Table 12

AVERAGE AGE OF USERS BY METHOD

Country	Pill	IUD	Inject-ables	Condom	Female Ster.	Male Ster.
Indonesia	30.2	32.7	28.9	33.2	37.1	37.7
Thailand	30.9	31.2	29.4	31.1	35.7	36.7
Sri Lanka	28.9	33.6	27.5	33.7	36.2	34.2
Botswana	29.3	32.1	33.4	31.5	39.5	38.6
Ghana	31.0	35.7	35.8	25.4	30.5	-
Kenya	28.8	33.1	33.3	27.2	37.8	-
Mali	26.1	31.7	35.5	17.0	35.7	-
Nigeria	33.2	35.5	39.1	30.9	-	-
Senegal	32.6	31.9	23.8	30.1	37.4	-
Togo	32.9	31.5	38.3	30.1	38.1	-
Uganda	28.4	31.2	34.0	27.0	40.0	-
Zimbabwe	28.6	32.0	36.9	30.6	40.7	34.1
Egypt	33.2	33.0	37.1	35.2	40.3	47.0
Morocco	32.1	34.0	33.9	34.9	39.7	40.0
Tunisia	32.2	31.8	33.5	34.2	40.1	-
Ecuador	29.4	29.0	29.6	31.3	36.9	37.0
El Salvador	25.2	27.2	27.4	26.3	33.9	35.2
Peru	29.8	31.0	28.4	29.6	38.6	47.0
Trinidad	28.1	32.9	28.3	32.1	38.9	34.7

Table 13

AVERAGE AGE OF USERS BY METHOD

Country	Norplant	Periodic Abstinence	Withdrawal	Other
Indonesia	30.4	32.7	31.3	31.7
Thailand	29.2	30.5	32.7	36.0
Sri Lanka	-	33.9	32.2	38.9
Botswana	-	32.3	28.2	34.8
Ghana	-	31.5	31.3	30.3
Kenya	-	31.4	30.8	34.2
Mali	-	25.3	26.6	26.4
Nigeria	-	31.7	25.4	35.7
Senegal	-	30.0	23.3	28.7
Togo	22.0	29.3	30.3	31.4
Uganda	-	31.3	32.7	38.4
Zimbabwe	-	31.0	33.3	33.7
Egypt	-	38.6	36.9	32.2
Morocco	-	34.3	34.1	36.6
Tunisia	-	33.8	32.2	35.3
Ecuador	27.0	30.9	31.5	31.4
El Salvador	-	31.4	30.1	28.5
Peru	-	33.0	31.7	33.0
Trinidad	-	35.5	30.4	32.8

Method Mix

Method mix is the percentage of all users who use each 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.

If TFR is changing appreciably during the projection period, it is likely that method mix will also change. There may be specific program goals regarding method mix or method mix may be changing simply due to changing demand patterns. In either case, careful thought should be given to how method mix will change in the future since the mix will affect a number of factors including average effectiveness, prevalence, costs and commodities required.

Figure 3 shows the average pattern of method mix changes as prevalence increases. This pattern was derived from regression analysis of data from 124 national surveys for 58 developing countries. It may serve as a guide for estimating likely changes in method mix as prevalence increases.

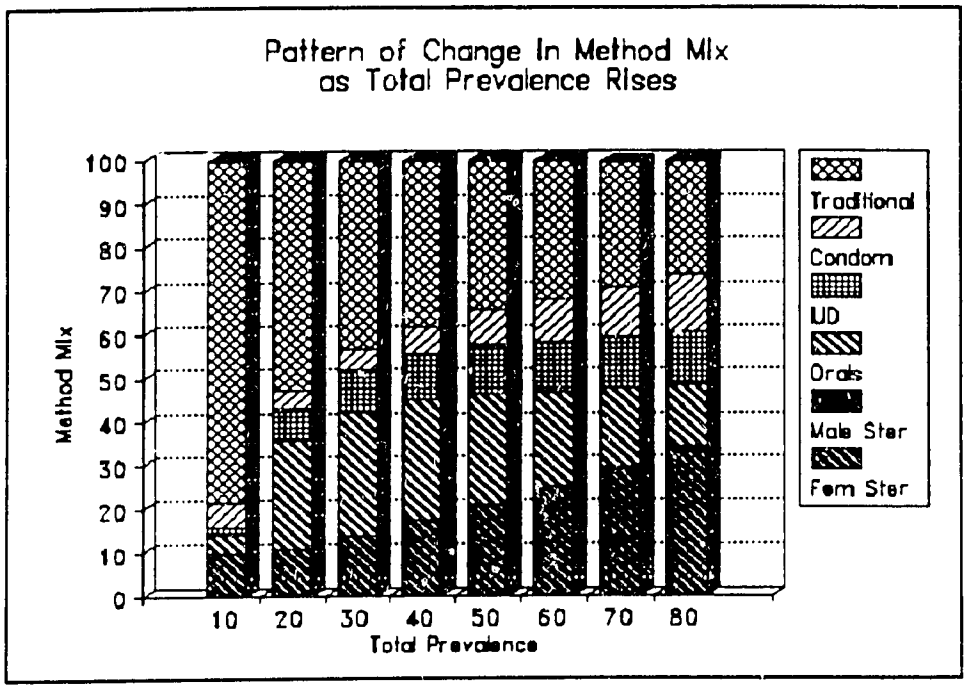

Figure 3. Pattern of Method Mix versus Total Prevalence

Source Mix

The Target-Cost Model 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 source of information on sources of services is usually a national survey.

Table 14 shows the mix of public, private and NGO sources for a number of countries for which DHS data are available. The mix of sources is affected by several factors including regulation, government programs and the strength of the private sector. For a good discussion of changes in source mix over time, see Cross (1991).

Table 14

SOURCE MIX FOR VARIOUS COUNTRIES

Country	Year	Modern Prevalence	Private Sector	NGO	Public	Other
Sub-Saharan Africa						
Botswana	1988	1.7	8.0	-	91.5	0.5
Burundi	1987	1.2	2.2	-	86.5	11.4
Ghana	1988	4.2	25.3	20.3	38.6	15.8
Kenya	1989	17.9	9.2	16.8	72.6	1.4
Liberia	1986	5.5	17.1	45.7	36.5	0.7
Mali	1987	1.3	1.5	7.6	75.9	15.0
Ondo St.	1987	3.8	23.1	-	75.9	0.9
Senegal	1986	2.4	48.6	-	45.8	5.6
Togo	1988	3.1	26.3	11.8	51.3	10.5
Uganda	1989	2.5	10.1	31.4	55.4	3.1
Zimbabwe	1989	36.1	4.2	2.0	88.6	5.1
North Africa						
Egypt	1989	35.5	71.4	0.7	25.9	2.0
Morocco	1987	28.9	20.3	1.2	74.5	4.0
Tunisia	1988	40.4	22.5	-	76.5	1.0
Asia						
Indonesia	1987	63.3	14.8	0.8	83.6	0.8
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
Latin America						
Bolivia	1989	12.2	62.4	1.0	34.7	1.9
Brazil	1986	56.0	68.4	1.0	28.9	1.8
Colombia	1986	52.4	38.9	36.6	22.5	2.0
Dominican Republic	1986	46.5	47.1	0.8	48.6	3.5
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	1987	19.0	27.5	38.7	31.1	2.6
Mexico	1987	44.6	36.1	-	62.1	1.8
Peru	1986	23.0	33.9	2.6	55.2	8.1
Trinidad	1987	44.4	46.1	14.6	38.1	1.2

SOURCE: Cross (1991).

Costs of Family Planning Services

The type of data required on the costs of family planning services depends on the method of cost calculation selected. The user cost methodology requires an estimate of the cost per user or

new acceptor by method (and source, if sources are used). The visit cost methodology requires estimates of the costs per type of visit by method (and source if sources are used).

Various estimates of the costs of family planning services have been made. The World Bank compiled a set of estimates on cost 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. The resulting estimates of public expenditure per user are shown in Table 15.

A more recent set of data is also shown in Table 15. These data were prepared from figures submitted by governments on their family planning expenditures. They have been published in various editions of the Nortman Fact Book (Nortman) and in Family Planning and Child Survival (Ross 1988).

Table 15

FAMILY PLANNING EXPENDITURE PER USER

Country	Year	Expenditure per User: Government Expenditure (US$) [1]	Expenditure per User: All Sources (US$) [2]
Sub-Saharan Africa			
Botswana	1984		3.41
Ghana	1977		33.29
	1980	16.00	
Kenya	1980	68.00	
Mauritius	1971		10.27
	1980	24.00	
	1981		14.32
Nigeria	1986		4.44
Kenya	1969		10.69
Zimbabwe	1976		20.00
	1980	13.00	
	1984		2.50
North Africa and Middle East			
Egypt	1980	22.00	
Iran	1969		39.20
	1980	38.00	
Jordan	1980	21.00	
	1983		7.35
Morocco	1988		4.34
Tunisia	1971		13.60
	1978		9.40
	1980	32.00	11.43
Turkey	1968		1.58
	1973		0.91
	1983		0.68

[1] Rololpho A. Bulatao, Expenditures on Population Programs in Developing Regions: Current Levels and Future Requirements, World Bank Staff Working Papers, No. 679, The World Bank, Washington, DC, 1985.

[2] Calculations based on data contained in John A. Ross, Marjorie Rich, Janet P. Molzan and Michael Pensak, Family Planning and Child Survival, Center for Population and Family Health, Columbia University, New York, 1988.

(Continued)

Table 15 (CONT.)

Country	Year	Expenditure per User: Government Expenditure (US$) [1]	Expenditure per User: All Sources (US$) [2]
Asia			
Bangladesh	1975		12.92
	1980	26.00	
China	1980	10.00	
Hong Kong	1969		1.68
	1979		3.08
	1980	3.00	
	1981		3.22
	1982		3.46
	1984		3.43
India	1969		7.34
	1970		5.23
	1980	10.00	4.46
Indonesia	1979		5.90
	1980	11.00	
	1985		7.88
Korea	1965		2.20
	1971		5.62
	1976		2.27
	1979		8.34
	1980	9.00	
	1985		9.37
Malaysia	1966		2.42
	1974		2.67
	1980	19.00	
	1984		9.71
Nepal	1980	69.00	
Pakistan	1968		39.28
	1975		33.01
	1979		46.75
	1980	33.00	
	1985		21.32
Philippines	1968		0.39
	1973		7.08
	1974		8.49
	1978		10.00
	1980	11.00	
	1986		3.91

[1] Rololpho A. Bulatao, Expenditures on Population Programs in Developing Regions: Current Levels and Future Requirements, World Bank Staff Working Papers, No. 679, The World Bank, Washington, DC, 1985.

[2] Calculations based on data contained in John A. Ross, Marjorie Rich, Janet P. Molzan and Michael Pensak, Family Planning and Child Survival, Center for Population and Family Health, Columbia University, New York, 1988.

(Continued)

Table 15 (CONT.)

Country	Year	Expenditure per User: Government Expenditure (US$) [1]	Expenditure per User: All Sources (US$) [2]
Asia (Cont.)			
Singapore	1970		3.12
	1973		3.69
	1977		5.58
	1980	7.00	
	1983		6.91
Sri Lanka	1988		1.26
Taiwan	1980	3.00	
Thailand	1980	7.00	
	1984		2.26
Latin America			
Colombia	1974		6.84
	1980	4.00	3.36
Costa Rica	1980	15.00	
Dominican Republic	1975		9.59
	1977		9.38
	1980	11.00	
Ecuador	1980	15.00	
El Salvador	1975		16.36
	1978		49.61
	1980	35.00	
Guatemala	1974		19.65
	1980	47.00	
Haiti	1980	27.00	
Honduras	1980	20.00	
	1984		14.80
Jamaica	1980	27.00	
Mexico	1980	15.00	
Panama	1980	26.00	
	1984		3.15
Paraguay	1980	13.00	
Peru	1980	5.00	
Puerto Rico	1980	43.00	

[1] Rololpho A. Bulatao, Expenditures on Population Programs in Developing Regions: Current Levels and Future Requirements, World Bank Staff Working Papers, No. 679, The World Bank, Washington, DC, 1985.

[2] Calculations based on data contained in John A. Ross, Marjorie Rich, Janet P. Molzan and Michael Pensak, Family Planning and Child Survival, Center for Population and Family Health, Columbia University, New York, 1988.

As Table 15 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 different definitions used by those preparing the estimates.

Figure 4 presents the results of a regression analysis that attempts to illustrate the trends in expenditure per user. In this figure observations from both sources in Table 15 are plotted versus total prevalence. The two curves depict the inverse relationship between expenditure per user and prevalence in the two data sets. This rationale for this relationship is discussed more fully in Chapter IV.

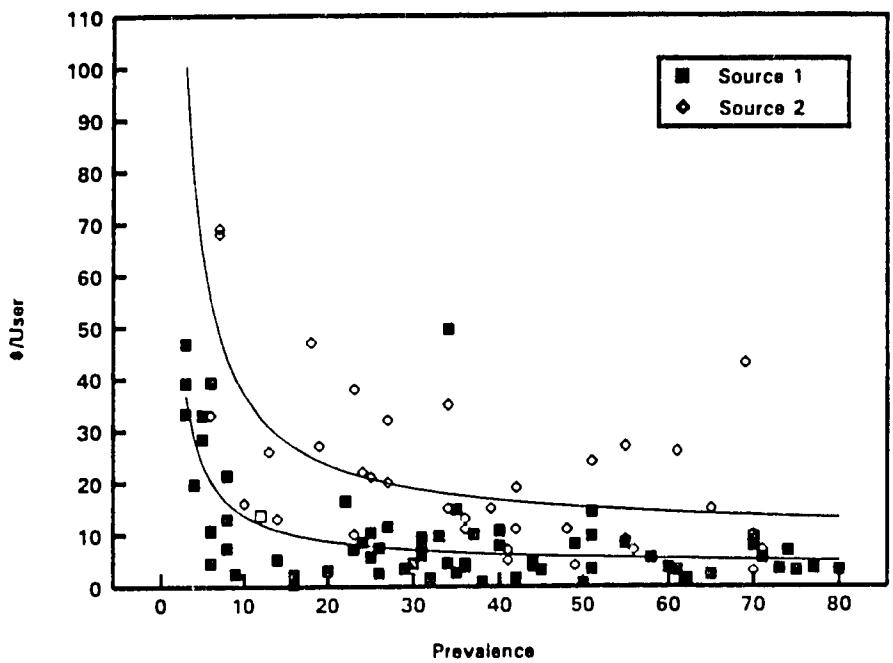

Figure 4. Expenditure per User versus Prevalence

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 16, taken from a study of ten developing countries by Huber and Harvey (Huber 1989).

Table 16

COST PER CYP BY SOURCE

Country	Cost per CYP ($)
Full Clinic	
Bangladesh	1-5
Nigeria	8
Egypt	6
Mexico	8-27
Nigeria	24-30
MEDIAN	9
Mini-Clinic	
Egypt	5
Sterilization Clinic	
Thailand	1-3
Bangladesh	1-2
Colombia	2
Sri Lanka	5
MEDIAN	2
Community-Based Distribution	
Mexico	5-15
Colombia	5
Bangladesh	5-13
Kenya	16-19
Sri Lanka	15-85
Guatemala	98
Nigeria	153
MEDIAN	19
Social Marketing	
Colombia	Profit
Sri Lanka	Profit
Mexico	<1
Egypt	3
Thailand	2
El Salvador	4
Bangladesh	6
MEDIAN	3

NOTE: "Profit" indicates that the program revenues exceeded its costs.
SOURCE: Sally Craig Huber and Philip D. Harvey, "Family Planning Programmes in Ten Developing Countries: Cost Effectiveness by Mode of Service Delivery," J. Biosoc. Sci. 21(1989): 267-277.

Costs also vary by method. Several studies have examined costs by method and reported these costs either on a per procedure or per visit basis. Tables 17 through 21 present data collected from various sources. 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 17

COSTS OF FEMALE STERILIZATION PROCEDURES

Country	Cost per Sterilization (US$)	Source
Honduras, 1988	96-101	1
Mexico, 1988, rural clinic	40	2
Mexico, 1988, urban hospital	173	2
Indonesia, 1988	37	1
Morocco, 1986	133	1
Colombia, 1985	31-42	3
Bangladesh, 1985	98	1
Guatemala, 1983/84	68	1
Latin America, 1985, private sector	50-666	4
Haiti, 1986	300	5

SOURCES: 1. Janowitz, 1990. 2. Nortman, 1989. 3. Jaramillo, 1986. 4. Lewis, 1985. 5. Bogue, 1986.

Table 18

COST OF IUD INSERTION

Country	Cost per Insertion (US$)	Source
Honduras, 1988	11	1
Thailand, 1989	10	1
Mexico, 1989, urban	18-24	2
Mexico, 1989, rural	10-13	2
Philippines, 1984	9	1
Bangladesh, 1985 (outreach workers)	18	1
Haiti, 1986	40	3

SOURCES: 1. Janowitz, 1989. 2. Nortman, 1989. 3. Bogue, 1986.

Table 19

COSTS OF ORAL CONTRACEPTIVES DELIVERY

Country	Cost per Acceptor Visit (US$)	Cost per CYP (US$)	Source
Clinic/Health Center			
Thailand, 1988	4.38	18.62	1
Honduras, 1988	7.63	31.15	1
Mexico, 1989, urban	8.80	22	2
Mexico, 1989, rural	1.73	6	2
Philippines, 1984	7.57	21.09	1
Morocco, 1987, urban		7.40-34.10	3
Morocco, 1987, rural		24.74-30.29	3
Community-Based Distribution			
Honduras, 1988		18.47	1
Mexico, 1989		11	2
Peru, 1986-87		6.18	1
Colombia, 1984-86		13.79	1
Social Marketing			
Bangladesh, 1985		5.62	1
Honduras, 1989		11.94	1
Colombia, 1984-86		4.69	1
D.R., 1990		2.50	4
Ecuador, 1990		11.30	4
Ghana, 1990		4.10	4
Indonesia, 1990		1.10	4
Zimbabwe, 1990		11.40	4

SOURCES: 1. Janowitz, 1990. 2. Nortman, 1989. 3. Knowles, 1989. 4. Stover, 1991.

Table 20

COSTS OF CONDOM DELIVERY

Country	Cost per CYP (US$)	Source
Social Marketing		
Honduras, 1989	14.77	1
Bangladesh, 1985	6.55	1
Barbados, 1990	11.80	2
D.R., 1990	5.90	2
Ghana, 1990	6.10	2
Indonesia, 1990	1.10	2
Mexico, 1990	3.80	2
Zimbabwe, 1990	12.70	2
Community-Based Distribution		
Honduras, 1988	21.72	1
Outreach		
Bangladesh, 1985	11.01	1

SOURCES: 1. Janowitz, 1990. 2. Stover, 1991.

Chapter IV discusses the elements of cost that should be considered in developing cost estimates for any program. That chapter also discusses how the different cost elements may be estimated and how they may be combined to produce an estimate of cost per user or per visit. Any serious attempt to determine the costs of a family planning program should follow the procedures described in Chapter IV for estimating program and source specific costs. However, if the necessary time and resources are unavailable, it is possible to make a rough estimate of costs using the information in the tables presented above. These tables indicate that the costs are likely to be in the following ranges:

IUD	$10-20 per insertion
Female sterilization	$90-100 per procedure
Orals	$20-25 per CYP for clinics $10-15 per CYP for CBD $ 5-10 per CYP for social marketing
Condoms	$ 5-20 per CYP

The above tables often present cost per procedure or per acceptor visit. The range of costs for follow-up visits is from $1.37 to $10.30. The average is $4-6 per follow-up visit.

Commodity Costs

The costs of commodities will depend on who is purchasing them and where the costs are counted. Commodities purchased by a large donor and costed at the point of purchase may be less expensive than commodities purchased by a small program and costed at the point of delivery. Commodity costs will often be available from country program records. In cases where commodities are donated, the costs may be set to zero if the analysis is just considering local costs. However, in most cases it will be better to include the donor payments for commodities in order to determine the full costs of the program and anticipate future costs when donated commodities may not be available. Table 21 presents representative figures for delivered commodities purchased in large volumes in 1990.

Table 21

COST OF COMMODITIES, 1990

Commodity	Purchased in U.S.	Purchased on International Market
Condoms	$0.0451	$0.0174
Pills	$0.1425	$0.19 to $0.23
Injectables	-	$0.78
IUDs -T Cu 380A	$1.06	$0.78
Vaginal Tablets	$0.0925	$0.0725
Sterilization	$8.24	$8.24
Norplant	$23.00	$23.00

SOURCE: W. Parker Mauldin and John A. Ross, "Contraceptive Use and Commodity Costs, 1990-2000," presented at the Annual Meeting of the Population Association of America, Washington, DC, March 21, 1991.

REFERENCES TO CHAPTER III

Blanc, Ann K., and Naomi Rutenberg (1991). "Coitus and Contraception: The Utility of Data on Sexual Intercourse for Family Planning Programs." Studies in Family Planning, Vol. 22, No. 3, pp. 162-176, May/June 1991.

Bogue, D. (1986). A Projection of Family Planning Needs and Costs. Chicago: Social Development Center.

Bulatao, Rololpho A. (1985). Expenditures on Population Programs in Developing Regions: Current Levels and Future Requirements. World Bank Staff Working Papers, No. 679. The World Bank, Washington, DC.

Cross, H., et al. (1991). "Contraceptive Sources and the For-Profit Private Sector in Third World Family Planning." Presented at the Annual Meeting of the Population Association of America, Washington, DC, March 21, 1991.

Henshaw, S. K. (1990). "Induced Abortion: A World Review, 1990." International Family Planning Perspectives, Vol. 16, No. 2, June 1990, pp. 59-65.

Huber, Sally Craig, and Philip D. Harvey (1989). "Family Planning Programmes in Ten Developing Countries: Cost Effectiveness by Mode of Service Delivery." J. Biosoc. Sci. 21(1989): 267-277.

Janowitz, B., J. Bratt, and D. Fried (1990). Investing in the Future: A Report to the Cost of Family Planning in the Year 2000. Research Triangle Park: Family Health International.

Jaramillo, V. M., et al. (1986). Surgical Cost Study. Bogota: Associacion Pro-Bienestar de la Familia.

Knowles, J. C., and L. Emrich (1989). The Cost-Effectiveness of Family Planning Services Provided by the Ministry of Health, Morocco. Chapel Hill, NC: The Futures Group.

Lewis, M. (1985). World Bank Working Paper, No. 684.

Mauldin, W. Parker, and John A. Ross (1991). "Contraceptive Use and Commodity Costs, 1990-2000." Presented at the Annual Meeting of the Population Association of America, Washington, DC, March 21, 1991.

Moreno, Lorenzo, and Noreen Goldman (1991). "Contraceptive Failure Rates in Developing Countries: Evidence from the Demographic and Health Surveys." Presented at the Annual Meeting of the Population Association of America, Washington, DC, March 1991.

Nortman, D. (1982). Population and Family Planning Programs: A Compendium of Data Through 1981: A Population Council Factbook. New York: The Population Council.

_____ and A. Tsui (1989). "A Family Planning Program Cost Model." Draft report prepared for The Futures Group.

Ross, J., M. Rich, J. Molzan, and M. Pensak (1988). Family Planning and Child Survival: 100 Developing Countries. New York, NY: Center for Population and Family Health, Columbia University.

Stover, J. (1990). DemProj: A Demographic Projection Model for Development Planning. Glastonbury, CT: The Futures Group.

_____ and Anne E. Wagman (1991). The Costs per Couple-Year of Protection for SOMARC Social Marketing Programs. Glastonbury, CT: The Futures Group.

IV. DEVELOPING COST ESTIMATES FROM COUNTRY-SPECIFIC DATA

A. Introduction

This chapter describes procedures for collecting and estimating the costs used as inputs to the Target-Cost Model. The model requires estimates of cost per user (for temporary methods, e.g., orals, condoms, injectables), cost per acceptor (for non-temporary methods, e.g., IUD, sterilization), or cost per visit (for any method) to project total costs. Either the cost per user/acceptor or cost per visit approach can be used, and both are described in this chapter. Case studies on cost per user and cost per acceptor are also provided in this chapter with data obtained from Moroccan hospitals and MOPH ambulatory health facilities. Section B of this chapter discusses approaches to estimating family planning costs; Section C describes cost elements in detail; Section D provides some short-cuts and rules of thumb that can be applied in cost estimation; and Section E presents the case studies.

This chapter provides a detailed description of how to obtain country-specific data. However, if a detailed cost collection effort is not possible, default values given in Chapter III may be used (see Tables 15-21). The level of effort required to obtain country-specific data depends on how much data are centrally available, the form of the available data, and the level of detail required for the exercise. The Moroccan data collection effort, which covered the full range of primary health services, took six months.

B. Approaches to Cost Estimation

There are essentially two approaches to estimating family planning costs. One approach is to use data available at a "macro" or aggregate level; the other approach is to collect data at the level of the individual facilities. The latter approach usually requires a more substantial level of effort.

The "macro" or "top-down" approach uses aggregate data to estimate family planning costs by categories of facilities. Costs are usually allocated between types of facilities and methods according to direct labor or number of workers at each type of facility. The "micro" or "bottom-up" approach starts with cost data obtained at the individual facility level and applies the data to all facilities of the same type countrywide. Aggregate-level data are used only if sufficient information is unavailable at the facility level. For example, it may not be possible to collect data at the facility level on salary scales, prices of commodities and vehicles, or on vehicle insurance rates.

C. Individual Cost Items

The final cost per user or cost per visit estimate (to be input into the Target-Cost Model) should include the following costs:

- Direct costs (labor, commodities, vehicles), which can be linked directly to specific services provided to patients.

- Indirect costs (both recurrent and capital overhead costs), which cannot be directly linked to specific services.

This section discusses methodologies for estimating each of the above costs, using both the "macro" and "micro" approaches.

D. Cost Estimation

1. Direct Costs

a. Labor

"Macro" Approach. The easiest approach to estimating direct labor cost starts with obtaining a list of all the facilities in the country engaged in the provision of family planning services, by category of facility, as well as a list of administrative offices for FP services at central and regional levels. It also will be necessary to obtain a list of all personnel working in each category of facility, by staff type and salary or grade level.

Labor costs include salaries and benefits (such as housing, insurance, uniforms and incentive payments). Salary rates for government health personnel may be available from the Ministry of Health or from the ministries responsible for setting or paying government salaries (e.g., Ministry of Finance). As a general rule, annual benefits can be estimated as a percentage of annual base pay (e.g., 30 percent). For automobile and housing allowances, the market value should be used if possible.

The next step is to identify all personnel directly involved in the provision of family planning services and obtain an estimate of the proportion of their time spent on these services. It may be possible to arrive at this information through interviews or surveys conducted at a representative sample of facilities. The result should be an estimate of FP direct labor time as a percentage of total direct labor time for each category of staff.

One type of survey that can provide estimates of the time each worker spends on the provision of direct family planning services is a Patient Flow Analysis (PFA). The PFA procedure requires that arriving patients be provided with a form on which each health worker having contact with the patient records the time an activity begins and ends as well as the nature of the activity performed (i.e., consultation, IUD insertion, etc.). See Knowles and Emrich (1990) for a more detailed discussion of PFA and other time use estimation techniques.

The benefit of using a PFA survey is that it also can be used to obtain estimates of other direct labor. For example, health workers often spend their time on activities other than family planning ("other direct labor," such as MCH). It is necessary to obtain estimates of the time spent on these other direct activities in order to estimate direct FP labor time as a percentage of total direct labor time.

If a PFA cannot be done, it may be necessary to make assumptions about the amount of labor time required for various activities. Table 22 below is a hypothetical schedule of time inputs (specific to method and personnel category) for first and return visits of acceptors and users.

Table 22

TIME REQUIRED (MINUTES) TO SERVICE VISIT

	Staff Type		
Method	**Doctor**	**Nurse**	**Paramedic**
First-Time Visit			
Pill/Injection	5	15	5
IUD	20	10	5
Female Sterilization	30	20	5
Male Sterilization	20	10	5
Other	2	15	5
Return Visit			
Pill/Injection	0	8	2
IUD	20	10	5
Female Sterilization	5	5	2
Male Sterilization	3	5	2
Other	0	5	2

Time input schedules like this one can be used to estimate annual direct family planning labor cost. The total time required to service first and return visits should be multiplied by salary per minute for each staff type and method. To use this approach, service statistics on the annual number of initial and return visits for each category of facility are needed in order to estimate annual direct family planning labor cost. This is simply the cost per initial (and return) visit multiplied by the total number of initial (and return) visits. If these health workers also spend time on non-family planning ("other direct") activities, an estimate should be made of annual "other direct" labor cost as well. Alternatively, if information is available on the ratio of direct to indirect labor, the proportion of FP direct labor to total labor can be computed in the absence of detailed information on other direct activities.

Estimates of annual direct family planning labor cost and annual "other direct" labor should be compared with the total annual salaries and benefits paid to these workers. The difference between total salaries and benefits paid and total direct labor cost is indirect labor cost. Family planning's share of indirect labor cost can then be determined by taking the ratio of direct family planning labor to total direct labor and applying it to total indirect cost.

"Micro" (Facility-Level) Approach. The following steps describe the process of estimating labor cost inputs to a program or service, starting at the facility level.

(i) As with the "macro approach," the first step is to identify all personnel working in the facility who are in any way connected with the provision of family planning services. Their salaries

and grade levels should also be obtained. (If these are not locally available, it may be necessary to obtain them from a central government source.)

Benefits and bonuses may vary widely among personnel at the same "job level"; therefore, it may be helpful to construct a salary scale that will provide "average salaries" for a particular position or grade (nurse 1, nurse 2, chief physician, etc.). The advantage to constructing a salary scale is that it eliminates differences in individual salaries due solely to benefits (e.g., benefits may be accorded on the basis of marital status or number of children) and thus provides more appropriate salary estimates for each position.

(ii) The second step in estimating labor cost is to estimate the amount of time each person spends on the provision of both method-specific and "other" family planning services. Examples of "other" family planning activities include IEC, consultation, and staff supervision.

Few workers know exactly how much time they spend per week on any given activity. Furthermore, they may be reluctant or unable to provide accurate information on time spent on indirect activities, i.e., idle time. One solution to this is to administer a time use survey to obtain a better understanding of the allocation of labor among various activities. A time use survey in combination with salary data will yield estimates of direct labor cost for all activities during the period of the survey.

In addition to the PFA survey previously discussed, the following two methods can also be used to collect time use data:*

- Direct Observation. Use trained enumerators to observe and record the activities of health workers during a period, such as a week. This method is most practical for fixed facilities where enumerators can walk around and record the activities of individual health workers at any given moment. In the case of mobile activities, time sheets may be a less costly and preferable means of obtaining data.

- Time Sheets. Have health personnel keep a record of their own activities, including the time spent on each activity. This method is the least expensive of the three and is practical for both fixed and mobile facilities; however, no outside observer is present to prevent possible bias in over- or under-reporting of activities.

(iii) As with the macro approach, service statistics should be collected (both for the full year and for the period of the survey). These will be used to convert the periodic direct labor cost estimates into annual ones, as described below.

In most cases, it is possible to connect a program or activity to a single service statistic and annualize costs on this basis. For example, the ratio of direct "pill" labor (i.e., labor spent on provision of pill-related services) to the number of pill visits during the week of the time use survey can be used to estimate annual direct "pill" labor costs for the entire year. The calculated ratio for each facility is applied to the sum of all its pill visits for the previous year, and an estimate of the annual direct labor cost for pills can then be made:

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*One advantage of using Direct Observation or Time Sheets over a PFA is that the former can provide detailed estimates of the time spent in various indirect (i.e., non-patient contact) activities while the PFA cannot. For a more detailed discussion of the advantages and disadvantages of each method, see Knowles and Emrich (1990).

$$\frac{\text{Periodic Pill Labor Cost}}{\text{\# of pill visits observed during period}} = \frac{\text{Annual Pill Labor Cost Estimate}}{\text{\# of pill visits recorded for previous year}}$$

In some cases, there is no appropriate service statistic to use; therefore, the observed periodic labor cost can be annualized simply by multiplying it by the number of periods in a year (e.g., 52 in the case of a week). For family planning programs, direct labor costs can be linked to the following service statistics:

Table 23

SERVICE STATISTICS BY METHOD

Method	Service Statistic(s)
Pill	Number of initial and continuing* pill visits
IUD	Number of initial and continuing IUD visits
Condom	Number of initial and continuing condom visits
Other FP Activities	Number of total visits

*Initial and continuing visits for all methods should be disaggregated for visit cost calculations. The time use data will need to be collected in such a way as to distinguish between time spent on both types of visits.

(iv) Finally, as with the macro approach, indirect labor cost can be estimated as the difference between the gross salaries and benefits of all personnel in the facility and direct labor costs (both family planning direct labor and other direct labor). To determine family planning's share of indirect labor cost, the ratio of direct family planning labor cost to total direct labor cost should be applied to indirect cost.

b. Commodities

The model requires an estimate of the unit cost of the commodity as well as the annual requirement per user for each method. A facility-level approach would be to base commodity costs on actual consumption, if the data are available. Data on consumption of commodities collected at the facility level and government price lists should be sufficient to provide estimates of annual costs.

It is also possible to take an aggregate-level approach to estimating commodity costs. The following formula determines the full cost of commodities as a function of purchase cost, transportation and wastage.

(37) $$CC_{m,s} = (PC_{m,s} + t_{m,s}) \cdot (1 + w_{m,s}) \cdot cons_{m,s}$$

where:

CC(m,s)	= commodity cost by method and source
PC(m,s)	= initial purchase cost per unit
t(m,s)	= transportation cost per unit
w(m,s)	= wastage per unit
cons(m,s)	= number of units consumed per CYP or visit

Data on transportation costs and wastage* should be available at the central level.

c. Vehicles

In some cases, vehicles may be specific to the family planning program. If this is not the case, a percentage of the annual cost of operating the vehicle should be allocated to family planning based on the proportion of kilometers or miles driven for family planning out of the total distance traveled (facility-level), or on the basis of the labor cost of family planning personnel using the vehicle in relation to total labor cost of all personnel using the vehicle (macro-level). Vehicles used by central or provincial offices should be included as well, if they are specific to certain programs or methods; otherwise, they should be included as part of indirect cost.

2. Indirect Costs

a. Recurrent Costs

A recurrent (or operating) cost is a resource that is purchased and used (or replaced) within one year's time. Examples include labor, building operation and maintenance, commodities and office supplies. Examples of indirect recurrent costs include indirect labor, cost of heating, utilities, telephone, postage, building maintenance, non-program medical supplies (i.e., bandages, syringes), non-medical supplies (i.e., stationery, cleaning materials), and fuel and other vehicle operating costs (if vehicles are not family planning vehicles).

Building operation and maintenance. The ongoing cost of running a facility may include charges for electricity, water, telephone, postage, photocopying, building maintenance, and medical and office supplies. Utility and supply costs can be estimated by examining each facility's monthly expenditures (if available), or by examining aggregate budget allocations at the central government level for each category of facility.

Building maintenance costs can be calculated as a percentage of their investment cost. The percentage will depend on the quality of the construction material, the age of the facility and the nature of the services provided by the facility. In general, these costs range from 2.5 to 4.0 percent worldwide and are often higher when the facilities are in poor condition or highly utilized (Background and Guidance, 1987, p. 30).

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*Wastage can be estimated as the difference between the total amount of contraceptives consumed by a program in a given year and estimates of the quantity required to meet the needs of the estimated number of users in that year.

Office, technical, and medical equipment operation and maintenance. In the absence of itemized data on these costs, several general rules can be used: office furniture and general office maintenance can be estimated at approximately 5 percent of the building cost per year. Operation and maintenance of office equipment and audiovisual aids can be estimated at approximately 10 percent of their annual capital cost per year; and medical and technical equipment maintenance varies between 10 percent and 20 percent of investment cost per year (Background and Guidance, 1987, pp. 19-33).

Motor vehicle operating cost. Vehicle operating costs should include insurance, fuel, spare parts, and maintenance expenses for vehicles assigned to both individual facilities and to central and provincial centers (Background and Guidance, 1987, Appendix C).

As with direct labor cost, there are two approaches to estimating recurrent indirect costs. At a macro level, an analysis of the health budget for utilities, fuel, etc., will provide a rough estimate of annual expenditures. This budget allocation can be disaggregated by category of facility based on the number of workers at each facility or on direct labor cost. Alternatively, working from the facility level, data on periodic expenditures or on physical consumption and price lists can be used to estimate these cost items.

In addition to each facility's own indirect cost, a share of the cost of operating central and provincial offices and facilities (administrative costs) should also be treated as part of a facility's indirect cost. Central and provincial administrative costs should include such items as annual capital costs, expendable medical and non-medical supplies, heating, utilities, and vehicle operating costs. Central and provincial personnel costs ("indirect labor") should also be included as part of this overall administrative cost figure.

It will probably prove difficult to allocate central and provincial administrative cost to an individual program or activity; instead, each facility's (or category of facility's) share of the total administrative cost can be estimated and allocated between programs and methods in proportion to the facility's direct labor cost.

b. Capital Costs

Unlike recurrent cost items, any item with a life expectancy of over one year should be classified as a capital cost item. Capital costs include land and buildings, vehicles, commodity stocks, medical equipment and furniture. The capital cost of an asset is spread over its useful life. Determination of both the current value of an asset and estimation of its life expectancy is discussed below.

Buildings. Cost estimates for building construction depend upon the type of construction material used and the size of the facility. The number of square meters should be multiplied by the replacement unit cost per square meter for the particular construction material. Rental values can be used to estimate building costs instead, if these are available. Fixed costs for site development are about 10 percent of building costs for peripheral health facilities (Background and Guidance, 1987, p. 19). Estimates of land value per square meter should also be made and can usually be obtained from provincial offices.

Furniture and office equipment. Furniture costs can be broadly estimated as 8 percent of construction costs; however, all office equipment and furniture costs should be itemized and estimated separately where possible (Background and Guidance, 1987, p. 19). Prices can usually be

obtained from local suppliers or through the procurement office of one of the central government ministries.

Medical and technical equipment. Estimates of medical and office equipment prices should include transportation costs. A general rule of thumb is to add 30 percent of the item's value for shipment by air and 15-20 percent of its value for shipment by sea (Background and Guidance, 1987, p. 20). Prices are usually available from local suppliers or government procurement offices.

Stocks of drugs/commodities. The cost of stocks of drugs or commodities should be considered an investment cost, with a life expectancy based on the average useful life of the drugs involved.

Motor vehicles. In order to estimate the replacement cost of motor vehicles, information will be needed on each vehicle's make, model, and year.

Cost annualization. The following formula (Reynolds and Gaspari, 1985, p. A-14) can be used to calculate the annual capital cost of an item:

$$ACC = ([r(1+r)^n] / [(1+r)^n - 1])\ CV$$

where ACC refers to annual capital cost, CV refers to the current value of the asset, n refers to the expected lifetime of the asset and r refers to the interest rate.

To estimate the current value of an asset, either the market price (if the item is newly purchased) or the replacement cost should be used. The expected life of an asset depends upon the type of asset being annualized. The cost of land and buildings might be annualized over a period of 25-30 years, while motor vehicles, medical equipment and furniture should be annualized over shorter periods of time, e.g., 3-7 years.

To estimate capital costs using a macro approach, an assessment should be made of how much it would cost to build a particular category of facility, i.e., health center, hospital, etc. This should be done for each type of facility currently providing family planning services in the country and multiplied by the number of facilities of each type in the country. Using a micro approach simply entails collecting data on each individual facility's building and land values. All capital costs should be annualized (see Chapter II for discussion of Methodology). These same procedures should be followed for estimating other capital costs, examples of which are also discussed in Chapter II.

If the capital item is not program-specific, it can be allocated in proportion to direct labor costs absorbed by the facility or method.

E. Case Studies

The following case studies present methodologies that can be used to produce cost inputs required by the Target-Cost Model.

1. Tubal Ligation Case Study, Morocco, 1986

The following case write-up is based on a 1986 study of tubal ligation surgery in Morocco (Price Waterhouse 1988). Tubal ligation services are carried out under the auspices of the

Association for Voluntary Surgical Contraception (AVSC) and the Ministry of Public Health (MOPH). The study focused on the provincial level, where family planning services, including sterilization, are provided through MOPH Reference Centers. Some of these centers are located on hospital grounds, some are outside the hospital, and some are completely autonomous and possess the infrastructure necessary to carry out tubal ligation surgery.

Tubal ligation surgical procedures were evaluated in six provincial hospitals and the National Center in Rabat. Based on discussions with representatives of the AVSC program in Morocco and with officials in charge of the program, twelve cost centers which affect the surgical procedure were identified:

Reception, information, triage
Operating room
Pharmacy
Patient's stay
Administration of the AVSC program
Central administration
Equipment service
Motor pool service
Laundry and linen
Maintenance service
Sterilization service
Other costs and charges

Estimates were made of expenses incurred by each of the above cost centers in all six hospitals as well as the National Center. This case study focuses on services provided by the CASABLANCA-ANFA Center.

a. Direct Costs

Direct costs were defined as the known costs and expenses borne directly by the MOPH (salaries and operating expenses) or settled through the funds of the AVSC program (e.g., salaries paid to personnel, purchases, and supplies). All estimation and determination of costs carried out were based on discussions with persons in charge and examination of MOPH budgets:

- Salary expenses were based on a table of net salaries paid by the MOPH.
- Cost of pharmaceutical products were based on a 1986 study conducted by the National Center for Training in the Field of Human Reproduction.
- All other expenses were based on accounting records and supporting documents.

b. Additional Costs

The following additional costs were included as part of the total cost of the tubal ligation procedure:

- Social benefits and taxes on salaries. This cost was estimated as 30 percent of net annual salaries.

- Amortization of audio-visual materials and office furniture. The purchase price was estimated based on discussions with appropriate people, and a 10 percent amortization rate was used.

- Amortization of medical and surgical equipment. A 25 percent amortization rate was used.

- Amortization of transportation equipment. An estimated value was assigned to the vehicles and a 20 percent amortization rate was used.

- Rental value. An estimate of the land area of each center was made, and the real estate value was established on the basis of price per square meter per month.

c. Apportionment of Costs

The share of annual cost absorbed by the tubal ligation procedure for each of the 12 cost centers was determined by taking the ratio of the total number of tubal ligations performed at the particular facility in 1986 to the total number of women hospitalized at the facility that year.

d. Cost Estimation Procedures

To estimate the direct labor required per acceptor, all health workers involved in the cost center's activities were identified. Their annual salaries were then aggregated to get total annual direct labor cost. In some cost centers, not all of these workers' time is spent directly on tubal ligation activities; therefore, only a portion of the total annual direct labor cost was counted as a cost of providing tubal ligation services. In the following example, workers in the Reception, Information and Triage cost center do not focus exclusively on tubal ligation services; therefore, their labor cost is prorated based on the number of tubal ligations carried out at the facility.

The CASABLANCA-ANFA Center carried out 423 tubal ligations out of a total of 8,536 women who received family planning services. The share represented by the ligation service is therefore 5 percent, which is then applied to the estimated annual direct labor cost and the estimated annual additional costs for the Reception, Information and Triage cost center. Table 24 illustrates costs incurred by this cost center.

Table 24

CASABLANCA-ANFA CENTER

Reception, Information and Triage
(all costs are in Moroccan dirhams)

Direct Costs: Personnel Expenses			
	Number of Staff Members	**Monthly Salary**	**Amount**
Graduate Nurses	2	2,000	48,000
Licensed Nurse	1	1,000	12,000
General-Purpose Nurse	1	1,000	12,000
			72,000
Share Represented by the Ligation Service: 5%			3,600
Additional Costs			
Social Benefits and Taxes on Salaries and Wages: 30%			21,600
Rental Value Estimated Area: 30m² - 30 dirhams/month			10,800
Amortization of Office Equipment Estimated Value: 20,000 dirhams Rate: 10%			2,000
			34,400
Share Represented by the Ligation Service: 5%			1,720
Total Share Represented by the Ligation Service			5,320

Table 25 illustrates costs incurred by another cost center within the CASABLANCA-ANFA Center, the Operating Room. In this cost center, all costs incurred can be directly attributed to tubal ligation services; therefore, prorating of costs is not necessary.

Table 25

CASABLANCA-ANFA CENTER

Operating Room
(all costs are in Moroccan dirhams)

Direct Costs: Personnel Expenses			
	Number of Staff Members	**Monthly Salary**	**Amount**
Physican 65%	1	4,800	37,440
Anesthetist 65%	1	4,800	37,440
Graduate Nurse	1	2,000	24,000
			98,880
Additional Costs			
Social Benefits and Taxes on Salaries and Wages: 30%			29,664
Rental Value Estimated Area: 30m² - 30 dirhams/month			10,800
Amortization of Office Equipment Estimated Value: 310,000 dirhams Rate: 20%			62,000
			102,464
Total			201,344

Costs for each of the 12 cost centers are then aggregated to arrive at a total annual cost for surgeries performed at that facility (the total annual cost should include all costs incurred by acceptors, including those from follow-up visits). This figure is then divided by the number of procedures performed by that center during the year, yielding cost per acceptor. Table 26 below presents the aggregate costs for all 12 cost centers of the CASABLANCA-ANFA facility and the resulting cost per acceptor.

Table 26

CASABLANCA-ANFA CENTER

Summary Table of the Calculation of the Cost Price of the Surgical Procedure for the Year 1986
(all costs are in Moroccan dirhams)

	Direct Costs	Additional Costs	Total
Reception, Information, and Triage	3,600	1,720	5,320
Operating Room	98,800	102,464	201,344
Pharmacy	72,185	-	72,185
Patient's Stay	21,600	26,480	48,080
Central Administration	3,648	1,094	4,742
Equipment Service	-	-	-
Motor Pool Service	-	-	-
Laundry and Linen	-	-	-
Maintenance Service	-	-	-
Sterilization Service	12,000	6,100	18,100
Other Expenses and Charges	-	-	-
	211,913	137,858	349,771
Number of Procedures: 423			
Cost per Acceptor	500.98	325.90	826.88

To arrive at an annual cost for tubal ligation in the country, costs incurred by a particular size or type facility should be multiplied by the number of like facilities in the country. Once these costs are aggregated, cost per acceptor can be calculated by dividing by the total number of tubal ligations performed that year.

2. Cost per User, Moroccan Case Study

Cost data on family planning services were collected from individual facilities where possible and from central or provincial sources when necessary. Costs were estimated using a "micro" (facility-level) approach. A time-use survey in combination with service statistics provided the means to estimate annual labor costs at each facility. Other cost data were collected from individual facilities or central sources.

One of each of the following types of facilities was selected from each of three provinces:

Urban Health Center (CSU)
Urban Dispensary (DU)
Family Planning Reference Center (CRPF)
Rural Health Center (CSR)
Rural Dispensary (DR)
Basic Rural Dispensary (DRB)

a. Data Collection and Sources

The following data were collected from each of the sampled facilities or from other sources:

Personnel cost. A list was compiled of all personnel working in the surveyed facilities and in provincial health centers, and salary data (including fringe benefits) were obtained from the Ministry of Finance. These data were used to construct a salary scale, by grade and level, to estimate average annual salaries.

Utilities. Data on water, electricity, telephone, postage, etc., were obtained from provincial administrators.

Motor vehicle operating costs. Operating costs, including fuel, lubricants, spare parts and maintenance expenses were obtained from provincial administrators. Data on vehicle insurance costs were obtained from central government offices.

Non-medical supplies. Actual prices paid and quantities consumed were available at provincial health offices.

Drugs and medical supplies. Data on actual consumption of these items were available at each facility, and prices were obtained at the central level from official price lists.

Buildings. A construction expert in the USAID mission provided information on the cost per square meter of different types of construction. Ministry-provided housing was not included in the cost survey (nominal rents for this housing are deducted from net pay).

Land. Estimates of land value per square meter were obtained from provincial health officers.

Motor vehicles. An inventory of motor vehicles was obtained from provincial health offices, and estimates of the replacement value of the vehicles were obtained from central government sources.

Medical equipment. An inventory of medical equipment was obtained from each health facility and from provincial offices. Price estimates for each item were obtained from official price lists.

Office furniture. Follows the same guidelines used in estimating medical equipment cost.

b. Service Statistics

Service statistics on the number of initial visits, IUD insertions and reinsertions, initial and return pill and condom consultations, IUD and sterilization referrals, etc., were obtained both for the period of the time-use survey (one week) and for the preceding year. These statistics provide the link which allows the direct labor costs recorded during the period of the time use survey to be converted into estimates of direct labor cost for the preceding year.

c. Estimating Annual Costs

The observed time health workers spent on providing direct family planning services during the period of the time use survey, in combination with salary data collected from the Ministry of Finance, yielded estimates of labor cost for family planning activities for the period of the survey. Service statistics were then used to convert these weekly labor costs into estimates of annual direct labor costs. For a discussion of this methodology, see Chapter II.

Data on other direct costs (e.g., contraceptives, drugs, program-specific supplies) were then added to the estimates of direct labor costs. Indirect costs include both fixed and variable costs of running the facility (e.g., administrative costs, utilities, amortized capital costs) and were allocated among various services in proportion to direct labor costs.

Total cost reflects direct and indirect costs (both labor and non-labor) of providing method-specific (i.e., pill, condom or IUD) services. It does not include central FP administrative costs. Total cost is calculated separately for fixed and mobile strategies.

COST PER USER
(Pill)

Total "pill-related" labor reflects the total cost of direct labor provided for pill-related services. "DPL" refers to direct pill labor, "OFPL" refers to the prorated share of "other" direct FP service labor cost (i.e., the ratio of direct pill labor to total method-specific labor). Table 27 presents total labor (in Moroccan dirhams, 8 Dh = 1 US$ at time of survey) for all three provinces combined.

Table 27

TOTAL PILL-RELATED LABOR COST

Facility Type	Fixed DPL	Fixed OFPL	Fixed Total	Mobile DPL	Mobile OFPL	Mobile Total
Urban						
CSU	3,238	14,475	17,713	422	349	771
DU	3,146	10,688	13,834	-	-	-
CRPF	306	1,349	1,655	-	-	-
Rural						
CSR	11,714	5,983	17,697	558	1,834	2,392
DR	3,087	892	3,979	1,322	421	1,743
DRB	829	493	1,322	108	131	239
TOTAL	22,320	33,879	56,199	2,411	2,734	5,145

Other direct costs (commodities) absorbed by provision of pill-related services (in dirhams), for all three provinces combined:

Table 28

OTHER DIRECT COSTS

Facility Type	Fixed	Mobile
Urban		
CSU	19,850	2,943
DU	13,046	-
CRPF	2,622	-
Rural		
CSR	20,811	6,134
DR	10,920	6,948
DRB	2,108	586
TOTAL	69,357	16,611

The indirect costs below reflect the sum of each facility's indirect costs for all three provinces combined. Indirect costs include personnel, vehicles, buildings and land, office furniture, technical equipment, utilities, transportation, and medical supplies.

Table 29

INDIRECT COSTS

Facility Type	Fixed	Mobile
Urban		
CSU	2,292,802	786,149
DU	1,531,415	-
CRPF	377,326	-
Rural		
CSR	2,044,496	1,286,925
DR	572,084	572,084
DRB	143,143	143,143
TOTAL	6,961,265	2,788,301

Table 30 shows the distribution of indirect cost data by major category for all facilities combined. It is intended to illustrate the types of costs included in the indirect cost estimate as well as their relative magnitudes.

Table 30

DISTRIBUTION OF INDIRECT COSTS

	Percent
Provincial	
Administrative Cost	19.5
Fixed Costs:	
Vehicles	1.5
Buildings	10.3
Land	5.2
Office Furniture	1.0
Technical Equipment	3.7
Subtotal	21.7
Variable Costs:	
Labor	55.1
Cleaning Supplies	0.2
Office Supplies	0.1
Medical Supplies	0.4
Heating Oil/Gas	0.0
Transportation	0.5
Utilities	2.5
Subtotal	58.8
TOTAL	100.0

Total indirect costs were then prorated on the basis of direct "pill-related" labor to total direct labor to arrive at the "pill-related" share of indirect labor, also for all three provinces combined:

Table 31

PILL-RELATED SHARE OF INDIRECT COSTS

Facility Type	Fixed	Mobile
Urban		
CSU	75,734	4,324
DU	104,758	-
CRPF	26,175	-
Rural		
CSR	97,218	15,803
DR	39,934	18,278
DRB	17,199	4,518
TOTAL	361,018	38,599

The following total costs reflect the sum of total pill-related labor costs, other direct costs, and the pro-rated share of indirect costs. Totals reflect the cost of all three provinces combined:

Table 32

TOTAL COST

Facility Type	Fixed	Mobile
Urban		
CSU	113,297	8,038
DU	131,638	-
CRPF	30,452	-
Rural		
CSR	135,726	24,329
DR	54,833	26,969
DRB	20,629	5,343
TOTAL	486,575	64,679

The following are total CYPs provided by the three provinces combined, by fixed and mobile facilities. The number of CYPs was estimated from service data on commodities distributed, using a conversion factor of 13 cycles per CYP.

Table 33

CYP

Facility Type	Fixed	Mobile
Urban		
CSU	1,097	34
DU	828	-
CRPF	168	-
Rural		
CSR	899	800
DR	511	683
DRB	145	28
TOTAL	3,648	1,545

Total cost per CYP (which is equivalent to the cost per user data input required by the Target-Cost Model) is as follows, for fixed and mobile facilities:

Table 34

COST/USER

Facility Type	Fixed	Mobile
Urban		
CSU	103	236
DU	159	-
CRPF	181	-
Rural		
CSR	151	30
DR	107	39
DRB	142	190
TOTAL	133	42

3. Mexico Social Security Administration Case Study

In Mexico, the Social Security Administration (IMSS) is the largest provider of contraceptive services and supplies. IMSS derives most of its income from employer and employee tax contributions. It is in a sense a prepaid plan that provides health care, including MCH and family planning, as well as retirement pensions. The IMSS family planning program is a sophisticated, large scale, efficient enterprise employing well-trained medical, technical, promotional, and administrative personnel. The health care and treatment equipment is often state of the art. Based on modern accounting principles, its financial recordkeeping system and service statistics are timely, current, and highly reliable.

In 1984, IMSS undertook a field survey of a representative sample of its urban hospitals and clinics to determine family planning expenditures, isolated from integrated health-family planning operations. The survey consisted of 37 hospitals and 16 clinics in 13 of 32 *delegaciones* (mostly states) selected in a two-stage sampling process based on productivity in family planning quota achievement. It yielded findings for each type of contraceptive, on time (minutes) spent by specific personnel and supplies utilized to perform the service.

Other direct costs (e.g., annualized cost of buildings, equipment, vehicles, utilities) were determined from financial records and converted into a multiplier on personnel and commodity costs. For example, other direct costs for sterilization in urban hospitals was calculated to be 40 percent of the cost of personnel and supplies. Finally, an indirect cost factor also was calculated as a percentage of total direct costs. The other direct and indirect inflation factors are such that summation of total cost across all method/delivery types amounts to the IMSS annual family planning budget.

In a one-week intensive study, IMSS staff, working collaboratively with a consultant engaged by Family Health International, applied the above methodology to 1988 IMSS data and records. The

findings are summarized below in Table 35. The following discussion illustrates the input data and the methodology used to obtain the unit cost of providing specific contraceptives through different delivery channels.*

Table 35

SUMMARY OF UNIT COST BY CONTRACEPTIVE METHOD/DELIVERY CHANNEL: IMSS 1988

Method/Delivery	1988 Cost per Unit ($)[a]
Sterilization	
Urban Hospital	
Female	$216 per acceptor[b]
Male	$265 per acceptor[b]
Rural Hospital	
Female	$37 per acceptor[b]
Male	$46 per acceptor[b]
IUD	
Urban Hospital	$19 per acceptor[c]
Urban Clinic	$26 per acceptor[c]
Rural Hospital	$11 per acceptor[c]
Rural Clinic	$14 per acceptor[c]
Hormones	
Urban Clinic	$36 per CYP
Rural Clinic	$8 per CYP
Rural CBD	$4 per CYP[d]

[a]Converted from pesos at rate of US$1 = 2,500 pesos.

[b]The male cost exceeds the female cost because six return visits are prescribed for males, two for females.

[c]The clinic cost exceeds the hospital cost because hospitals insert IUDs only in post-partum or post-abortion patients. Since the follow-up visit of such patients is for the medical service, the cost of the IUD follow-up done at the same time is negligible unless there is a problem.

[d]Personnel are volunteers who receive incentives but no salary. If salary-based, the cost per CYP has been estimated at $14.

*We wish to express our gratitude to the IMSS Family Planning Program Director and his staff for permission to present their data and methodology.

a. Sterilization Cost per Acceptor

Tables 36 and 37 illustrate the application of this approach to determine sterilization cost per acceptor in urban and rural hospitals. Sterilization is not performed in clinics. The tables are deceptively simple since they utilize the voluminous body of data and calculations prepared by IMSS.

Table 36 shows the calculations of cost per sterilization performed in rural hospitals. Line 1 gives the recommended schedule of two return visits for female sterilization and six return visits for male sterilization. In Line 2, the direct personnel costs per procedure are shown. These figures were derived by estimating the time required per acceptor and the average salary of each personnel type. This calculation is shown below for female sterilization.

	Personnel				
	Doctor	**Anesthetist**	**Nurse**	**Paramedic**	**Total**
Monthly Salary	$508.34	$399.20	$316.50	$266.37	-
Hourly Rate (160 hrs/mo)	$3.18	$2.50	$1.98	$1.66	-
Minutes per Acceptor	44	44	60	15	-
Salary Cost per Acceptor	$2.33	$1.83	$1.98	$0.42	$6.56

A similar calculation is used to estimate the direct labor cost per return visit in Line 3. Total direct labor costs per acceptor are summed in Line 4. Indirect personnel costs (Line 5) are calculated as 40 percent of direct personnel costs. Other direct costs are calculated as 130 percent of total personnel costs (Line 7). Finally, other indirect costs are calculated as 25 percent of total personnel and other direct costs. The factors for calculating indirect personnel costs, other direct costs, and other indirect costs were calculated from IMSS financial records for each type of service delivery.

Given these factors, the personnel component accounted for 35 percent of the total, other direct costs 45 percent, and indirect costs the remaining 20 percent.

Table 36

STERILIZATION COST PER ACCEPTOR
IMSS RURAL HOSPITALS, 1988

	Item	Female	Male	Comment
1.	Number of Return Visits per Acceptor	2	6	
2.	Direct Personnel Cost per First Visit	$6.56	$5.17	See Note b
3.	Direct Personnel Cost per Return Visit	$1.40	$1.02	See Note c
4.	Total Direct Personnel Cost per Acceptor	$9.36	$11.30	(2) + (1) x (3)
5.	Indirect Personnel Cost per Acceptor	$3.74	$4.52	0.4 x (4)
6.	Total Personnel Cost per Acceptor	$13.10	$15.83	(4) + (5)
7.	Other Direct Costs per Acceptor	$17.03	$20.59	1.3 x (6). See Note d
8.	Total Personnel and Other Direct Costs per Acceptor	$30.13	$36.43	(6) + (7)
9.	Other Indirect Costs per Acceptor	$7.53	$9.11	.25 x (8)
10.	Total Cost per Acceptor	$37.64	$45.54	(8) + (9)

NOTE: Numbers in parentheses in comment column refer to item number.

[a]Data are a weighted average of the 52 hospitals that participate in the program.

[b]Based on salary cost per unit of time and time per procedure for doctor, anesthetist, nurse, and paramedic to perform the sterilization.

[c]Estimated on basis of proportion of RV to FV cost in urban hospitals.

[d]Annualized cost of buildings, equipment, vehicles, plus supplies, utilities, etc.

A similar calculation is shown in Table 37 for sterilizations performed in urban hospitals.

Table 37

STERILIZATION COST PER ACCEPTOR
IMSS URBAN HOSPITALS, 1988

Item	Female	Male	Comment
1. Number of Return Visits per Acceptor	2	6	
2. Direct Personnel Cost per First Visit	$50.36	$40.39	See Note a
3. Direct Personnel Cost per Return Visit	$10.80	$8.00	
4. Total Direct Personnel Cost per Acceptor	$71.96	$88.39	(2) + (1) x (3)
5. Other Direct Costs per Acceptor	$100.74	$123.74	1.4 x (4). See Note b
6. Total Direct Costs per Acceptor	$172.70	$212.13	(4) + (5)
7. Indirect Costs per Acceptor	$43.17	$53.03	.25 x (6)
8. Total Cost per Acceptor	$216.00	$265.00	(6) + (7)

NOTE: Numbers in parentheses in comment column refer to item number.

[a]Based on salary cost per unit of time and time per procedure findings obtained in a representative sample survey of IMSS hospitals and clinics conducted by IMSS for its cost-benefit project. (See *Analisis del Costo Beneficio del Programa de Planificacion Familiar del Programa de Mexicano del Suguro Social*, Dr. J. Martinez Manautou, ed., Mexico City, 1987.)

[b]Annualized cost of buildings, equipment, vehicles, plus supplies, utilities, etc., including IMSS main office personnel directly involved in hospital administration and services.

It is interesting to note that the protocol requires that males return six times for follow-up visits, which adds considerably to the cost. Also noteworthy is the finding that sterilization performed in an urban hospital is almost six times more costly than in a rural hospital.

b. IUD Cost per Acceptor

Like sterilization, the IUD is also costed on a per acceptor basis. IMSS subdivided return visits into three groups: no problem (75 percent of acceptors), problem (25 percent), and reinsertion (one-half the problem, or 12.5 percent of acceptors).

Table 38 shows the calculation of costs per IUD acceptor. The direct costs for the insertion visit, shown in Line 3, are the direct service costs plus the costs of commodities. Additional costs are calculated for return visits in Lines 4-8. Line 4 shows the average number of return visits per insertion. In Line 5, the service costs of these visits are calculated. The calculations use an estimated service cost per return visit (Line 5) that is based on IMSS experience in urban hospitals. Additional commodity costs for re-insertion are shown in Line 7. The addition of other indirect costs (estimated at 40 percent of total direct costs) produces the final estimate for costs per IUD acceptor.

As shown in Table 38, the differential between hospitals and clinics is not in the direct insertion cost (personnel, other direct, and commodity, item 3), but in the fact that the "no problem" hospital return visitors are no cost to the hospital because their return visit is a post-partum or post-abortion follow-up in which the IUD follow-up is incidental. The resulting finding that in the IMSS system the cost per IUD acceptor in a clinic exceeds that in a hospital is not a likely typical finding. On the other hand, the urban-rural differential is in line with expectations: almost twice as much in urban hospitals and clinics as in their rural counterparts.

Table 38

IUD COST PER ACCEPTOR
IMSS HOSPITALS AND CLINICS, 1988

Item	Urban Hospitals	Urban Clinics	Rural Hospitals	Rural Clinics	Comment
1. Direct Service Cost per Acceptor	$9.67	$9.29	$3.45	$4.70	
a. Personnel	$4.52	$4.34	$1.61	$2.20	
b. Other	$5.15	$4.95[a]	$1.84[a]	$2.50[a]	
2. Commodity Cost per Acceptor	$.80	$.80	$.80	$.80	See Note b
3. Total Direct Insertion Cost per Acceptor	$10.47	$10.09	$4.25	$5.50	(1) + (2)
4. Number of Return Visits per Acceptor	0.375[c]	01.125	01.125	01.125	[(4a) + (4b) + (4c)]
a. No Problem	0.750	0.750	0.750	0.750	
b. Problem	0.250	0.250	0.250	0.250	
c. Reinsertion	0.125	0.125	0.125	0.125	
5. Service Cost per Return Visit	$7.84	$7.52[d]	$2.79[d]	$3.81[d]	Empirical data for urban hospitals
6. Return Visit Service Cost per Acceptor	$2.94	$8.46	$3.14	$4.29	(4) x (5)
7. Return Visit Commodity Cost per Acceptor	$.10	$.10	$.10	$.10	(2) x (4c)
8. Total Direct Cost per Acceptor	$13.51	$18.65	$7.50	$9.89	(3) + (6) + (7)
9. Indirect Costs	$5.40	$7.46	$3.00	$3.96	0.7 x (9)
10. Total Cost per Acceptor	$18.91	$26.11	$10.50	$13.85	(8) + (9)

NOTE: Numbers in parentheses in comment column refer to item number.

[a]Estimate based on urban hospital proportion of "other direct" to personnel cost.
[b]Includes 10 percent allowance for wastage, transportation, and storage.
[c]Excludes "no problem" acceptors (item 4a) since they incur only a trivial IUD RV cost. The reason for this is that, in urban hospitals, IUDs are provided only to post-partum or post-abortion women; their RV is, therefore, for post-partum or post-abortion follow-up. Other women wishing an IUD are advised to go to clinics.
[d]Estimate based on urban proportion of return visit service cost to direct service insertion cost per acceptor.

c. Hormone Cost per CYP in Urban and Rural Clinics

A somewhat different methodology was employed to obtain hormone cost per CYP delivered through urban and rural clinics. It was considered important to distinguish between acceptors of previous years who come for resupply during the year under review and acceptors who, having discontinued or never used the method, require screening as well as supply upon their first visit during the year in question. Clearly, the screening or first visit (FV) is more costly than the return visit (RV). This refinement is unimportant if the ratio of new acceptors to carryover users is trivial, but if it approaches or exceeds one, as is the case in IMSS clinics, failure to take account of the cost differential between an FV and an RV can considerably bias the cost/CYP estimate.

Another refinement was the assumption that new acceptors enter as a cohort at midyear. If a cohort of A acceptors is subject to an attrition schedule given by the exponential decay curve exp(- rt), where r is the discontinuation rate per unit of time, and t is the time duration from acceptance, the number of CYPs they will experience in their half-year of use during the year under review is

$$U_A = A \times \int_0^{1/2} e^{-rt}\, dt$$

which is

(38)
$$U_A = A \times \frac{[1 - e^{-r/2}]}{r}$$

A consequence of midyear acceptance is that acceptors have the time opportunity for only one-half the number of RVs accorded to carryover users. As shown in Table 39, Lines 3a and 3b, the number of return visits per year is assumed to be four for continuing users and two for new acceptors in that year.

The calculations of pill cost per CYP are shown in Table 39. IMSS records indicate that each year there are 1.1806 new pill acceptors in urban clinics for each continuing user. Assuming that new acceptors enter at the middle of the year, each new acceptor would result in 0.476 CYP that year (using equation 38). Therefore, an average CYP would be composed of 0.5617 CYP from new acceptors (1.18 x 0.476) and 0.438 (1 - 0.5617) CYP from continuing users. These values are shown in Tables 36 and 37. Assuming four return visits per continuous user and two per acceptor (since they start use in the middle of the year), the total number of first visits and return visits is shown in Lines 4 and 5. Based on these values, the direct and indirect costs are calculated as in the previous tables. The service costs per visit were calculated as follows:

	Personnel			
	Doctor (Training)	Doctor (Resident)	Paramedic	Total
Hourly Rate	$.86	$2.02	$1.51	
Minutes per Acceptor	10	10	15	
Service Cost per Acceptor	$.14	$.34	$.38	$.86
Recordkeeping, etc.				+15%
Total Service Cost per Acceptor				$.99

Return visits are estimated to have service costs that are two-thirds of first-visit service costs.

Table 39

HORMONE COST PER CYP
IMSS CLINICS, 1988

	Item	Urban	Rural	Comment
1.	Number of New Acceptors	1.1806	1.3307	Ratio to users
2.	Users	1.0000	1.0000	
	a. Use by Acceptors	0.56[illegible]7	0.6332	With r = .2/yr, U_A = .4758 x (1)
	b. Use by Previous Acceptors	0.4383	0.3668	(2) - (2a)
3.	Number of Return Visits			
	a. Per Acceptor	2	2	
	b. Per Previous Acceptors	4	4	
4.	Total Number First Visits	1.1806	1.3307	Same as (1)
5.	Total Number Return Visits	2.8766	2.7336	(2a) x (3a) + (2b) x (3b)
6.	Unit Service Cost per First Visit	$6.23	$.99	
7.	Unit Service Cost per Return Visit	$4.17	$.56	.67 x (6)
8.	Service Cost per CYP			(1) x (6) + (5) x (7)
9.	Commodity Cost per CYP	$19.35	$2.85	
10.	Personnel + Commodity Cost per CYP	$2.08	$2.08	(8) + (9)
		$21.43	$4.93	
11.	Other Direct Costs per CYP			.3 x (10)
12.	Indirect Cost Inflation Factor	$6.43	$1.48	0.30 x [(10) + (11)]
13.	Total Cost per CYP	$8.36	$1.92	(10) + (11) + (12)
		$36.22	$8.33	

NOTE: Numbers in parentheses in comment column refer to item number.

d. Hormone Delivery through the Rural CBD Program

IMSS' community-based distribution program is a rural family planning program for hormone distribution to household women of reproductive age. Field workers are midwives who receive no salary but are given various perquisites and incentives for program participation. Because they often receive no monetary payment for delivering a baby, they do not perceive that program participation conflicts with their role as a midwife. On the contrary, the training the CBD program offers them in prenatal care and midwifery greatly enhances their prestige in the community, affording more than adequate compensation for any loss of delivery income. Other incentives, as shown in Table 40,

include transportation, uniforms, delivery kits, educational materials, and a much anticipated annual reunion. Given the free labor, the commodity cost accounts for five-eighths of the direct cost.

Given the nature of the distribution system, to determine cost/CYP, it is neither necessary nor, indeed, appropriate to distinguish between new and carryover acceptors as was done in the case of clinic distribution. (As a point of interest, however, it may be noted that, in 1988, the ratio of new acceptors to CYPs for the year was .77.)

In Table 40, annual costs were divided by number of users (CYPs) to obtain the direct cost/CYP for the specified items. Summing the items, and inflating for indirect cost, yields a total cost/CYP of $4.49 in 1988.

An interesting question to address was the cost/CYP if, instead of free labor, workers were paid a salary equivalent to the rural prevailing rate for their skill and training. With a paid labor force, the cost/CYP would be $14.23 instead of $4.49. The exercise, shown in Panel B, Table 40, is predicated on the assumption that, on a full-time basis, the size of the required labor force (supervisors and midwives) would be one-quarter that of the number of volunteers.

Table 40

HORMONE COST PER CYP
IMSS RURAL CBD PROGRAM, 1988

Item	Amount	Comment
Panel A. Volunteer Workers (Actual Case)		
1. Users (U = CYPs)	1.0000	
2. Direct Cost per CYP	$3.45	
a. Salary	0	
b. Reunion	$.26	
c. Training (FP, prenatal, delivery)	$.34	
d. Field Worker Transportation	$.45	To pick up supplies
e. Supervisor Transportation	$.14	$12/supervisor/mo
f. Educational Materials	$.04	
g. Delivery Kits, Uniforms	$.06	
h. Commodities	$2.16	See footnote a
3. Indirect Cost per CYP	$1.04	.3 x (2)
4. Total Cost per CYP	$4.49	(2) + (3)
Panel B. Estimate if Salary Based at Prevailing Market Rates		
1. Users (U = CYPs)	1.0000	
2. Monthly Salary per Supervisor	$144.00	
3. Monthly Salary per Midwife	$96.00	
4. Number of Supervisors per CYP	0.2462×10^{-3}	
5. Number of Midwives per CYP	6.4076×10^{-3}	
6. Salary Cost per CYP: Total	$7.807	(6a) + (6b)
a. Supervisors	$.425	12 x (2) x (4)
b. Midwives	$7.382	12 x (3) x (5)
7. Other Direct Costs per CYP	$3.136	Empirical data
8. Total Direct Cost per CYP	$10.943	(6) + (7)
9. Total Cost (Direct + Indirect/CYP)	$14.23	1.3 x (8)

NOTE: Numbers in parentheses in comment column refer to item number.

[a]Unit commodity cost inflated by 20 percent for transportation, storage, and wastage.

REFERENCES TO CHAPTER IV

Knowles, James C., and Laurie Emrich (1990). The Estimation of Family Planning and Primary Health Service Costs in Morocco. Draft: October 31, 1990. Chapel Hill, NC: The Futures Group.

Price Waterhouse (1988). "Evaluation Study of the Surgical Tubal Ligation in Morocco-Year 1986." Morocco.

Resources for Child Health, John Snow, Inc. (1987). ANE Bureau Guidance for Costing of Health Service Delivery Projects. Background and Guidance, October 1987.

Reynolds, Jack, and K. Celeste Gaspari (1985). Cost-Effectiveness Analysis. Pricor Monograph Series: Methods Paper 2, Chevy Chase, MD.

V. A SAMPLE APPLICATION OF THE TARGET-COST MODEL

This chapter describes a typical application of the Target-Cost Model. 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 survey is available for the sample country and that most of the information regarding the proximate determinants of fertility is derived from the DHS report. The DHS report is also the source of the initial method mix. The projection of women of reproductive age is assumed to be taken from the UN projections described in Chapter III. Changes in method mix and other variables are estimated using general patterns described in Chapter III. The default values in the model are used for the method attributes, such as effectiveness and discontinuation rates. Cost estimates are derived from the average values presented in Chapter III. This example uses the cost per user methodology and assumes declining cost as prevalence increases. The basic model inputs for this example are shown in Tables 41 and 42.

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.

The TFR is assumed to be 6.5 in the base year. Table 6 was used to develop a target level of TFR decline of 1.0 over 15 years. Thus the target TFR is 5.5.

Contraceptive Prevalence

The prevalence level required to achieve the target level of TFR is calculated by the model to be 28.0 percent. The required prevalence increases by 133 percent. The increase would have been even higher, except that the shift in method mix to more effective methods resulted in the average effectiveness increasing from 85 percent in 1990 to 89 percent by 2005.

The Effect of Changes in the Proximate Determinants of Fertility

In order to see the effect of the changes in percentage in union, breastfeeding 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 43 compares the base case with projections assuming changes in these variables. If all three factors remained constant, the required prevalence in the final year would be 26.9 percent, slightly less than when all three factors change as in the base case.

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Table 41

PROXIMATE DETERMINANTS AND METHOD MIX FOR SAMPLE APPLICATION

	1990	2005
Proximate Determinants		
Women of Reproductive Age	3,000,000	4,744,000
Percent in Union	70%	67%
Postpartum Infecundability	13 months	11.7 months
Total Abortion Rate	0	0
Sterility	2%	2%
TFR	6.5	5.5
Contraceptive Prevalence	12%	-
Method Mix		
Condom	9.3%	12.0%
Female Sterilization	7.8%	12.0%
Injection	2.3%	2.3%
IUD	3.9%	10.0%
Orals	14.0%	28.0%
Traditional	62.7%	35.7%

Table 42

METHOD ATTRIBUTES FOR SAMPLE APPLICATION

Method	Effectiveness	Discontinuation Rate	Units per CYP	Average Age of Users	Cost per User/ Acceptor	Commodity Cost per User per Year
Condom	85%	50%	150 units	25.4	$20/user	$6.80
Female Sterilization	100%	1%	10 CYP per acceptor	30.5	$100/ acceptor	$0.82
Injectables	95%	25%	4 injections	35.8	$20/user	$3.20
IUD	97%	33%	3.5 years per insertion	35.7	$20/ acceptor	$1.10
Orals	94%	35%	15 cycles	31.0	$15/user	$2.10
Traditional	80%	50%	-	30.3	$0	$0.00

Table 43

EFFECT ON REQUIRED PREVALENCE OF HOLDING CONSTANT OTHER PROXIMATE DETERMINANTS

Change in Base Projection	Required Prevalence in 2005
Base Projection	28.0%
Constant Percent WRA in Union	31.3%
Constant Postpartum Infecundability	22.2%
Constant Percent WRA in Union and Postpartum Infecundability	25.7%
Constant Method Mix	29.3%

If the percentage in union remained constant while the other two factors changed as in the base case, the required prevalence would increase to 31.3 percent. Thus, the expected drop in the percentage in union, due largely to increasing age at first marriage, reduces the prevalence required to achieve the target TFR by 10 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 only 22 percent. This is 20 percent

lower than the base projection. Clearly, if the expected decline in breastfeeding could be avoided, 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 the TFR goal.

Holding constant both percentage in union and postpartum infecundability would result in a required prevalence of 25.7 percent. This is less than the base case. Thus, in this application, changes in these two variables do not cancel each other. The changes in postpartum infecundability have a stronger effect on prevalence than changes in percentage in union.

If the method mix remained at the 1990 levels, then the required prevalence in 2005 would be 29.3 percent instead of the 28 percent in the base case. This difference is due to the change in the average effectiveness that results in the base case when the method mix changes to more modern methods.

The Number of Users Required

Although the level of prevalence required increases by 133 percent, the number of users increases even more, by 250 percent. This is due to the fact that the number of women of reproductive age is also changing during this period, increasing by 55 percent from 1990 to 2005.

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 1990 but increase to 64 percent by 2005. The number of modern method users increases by 500 percent, an annual increase of almost 13 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 the TFR goal. Growth in the number of users of particular methods is also quite large.

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 further investigate some of the related indicators of family planning service requirements. If, after reviewing these results, it appears that the rapid growth rates required do not seem feasible, it may be necessary to revise the TFR goal downward to a level that is possible to achieve.

The Number of New Acceptors Required

The annual number of new acceptors increases from 140,000 to almost 360,000 per year. For modern methods, the increase is from 41,000 to 183,000, a 10 percent annual increase. This increase is substantial but less than the annual increase in the number of users because of the shift to long-lasting methods, such as female sterilization. Because of the long-lasting nature of sterilization, an increase of 8.6 percent per year in new acceptors of sterilizations is sufficient to provide a 12 percent annual increase in the number of users of sterilization.

Births Due to Contraceptive Failure

Since effectiveness of contraception is not 100 percent, some births will occur to women who are using contraception. The number of such births in this application would rise from 8,600 in the base year to 18,500 within 15 years. The increase is due to the increase in the number of women using contraception. It is only partially offset by the increase in average effectiveness. The percentage of births that are due to contraceptive failure rises from 2.2 percent to 3.7 percent, but this is largely due to the fact that more women are using contraception by the end of the period than at the beginning.

Total Costs of Family Planning

The total costs of providing these services would increase from $1.35 million in 1990 to $4.44 million in 2005, using the cost per user assumptions shown above. The annual rate of increase averages 8.2 percent. This is less than the increase in the number of modern method users because of the assumption that cost per user declines as prevalence increases. In fact, in this application, the average cost per user for all modern methods decreases from $14.50 in 1990 to $7.75 by 2005.

It is useful to compare the costs of the different methods under the assumptions of this sample application. Table 44 shows the costs according to three different measures for each method. These measures are the cost per user in the base year, the cost per CYP and the cost per SCYP (standardized CYP) as calculated by the model.

Table 44

COSTS BY METHOD IN 1990

Method	Cost/User ($)	Cost/CYP ($)	Cost/SCYP ($)
Condom	20.00	20.00	20.00
Female Sterilization	22.90	10.00	12.00
Injections	20.00	20.00	37.04
IUD	10.60	5.71	9.42
Orals	15.00	15.00	18.56

Table 44 indicates that, in this application, the IUD is the most cost effective method. This results from the fact that the cost per acceptor is relatively low and is spread over three to four years of use. Sterilization provides more CYP per procedure than IUD but because of the high initial cost, it remains more expensive than IUDs. Injections show a high cost per standardized CYP because the average age of injection users is the highest of any method at almost 36 years. Thus, the number of CYPs is discounted heavily because of the high average age.

The costs in the final year of the projection are shown in Table 45. This table shows quite clearly the effects of assuming a decline in the costs per user as prevalence increases. In fact, in this example the prevalence increase is in the range that produces the steepest drop in cost per user. Costs per user have dropped by 45 percent from the base year.

Table 45

COSTS BY METHOD IN 2005

Method	Cost/User ($)	Cost/CYP ($)	Cost/SCYP ($)
Condom	10.86	10.86	10.86
Female Sterilization	7.82	5.23	6.30
Injections	10.86	10.86	20.12
IUD	3.96	2.86	4.73
Orals	8.15	8.15	10.06

Commodity Costs

Commodity costs grow from $269,000 in 1990 to $1,440,000 in 2005, an annual growth rate of almost 12 percent. By the year 2005, condoms are used by 19 percent of all modern method users, but account for 50 percent of all commodity costs. Orals account for 43 percent of users but only 37 percent of commodity costs. Female sterilization accounts for 19 percent of users but only 6 percent of commodity costs.

Exploring Alternate Program Configurations

Once the initial analysis has been prepared it can be used to explore the consequences of different program configurations on program goals. Several of the issues that might be investigated using the Target-Cost Model are discussed briefly below.

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 is significant demand for limiting births. The effects of this type of program can be tested with the Target-Cost Model by changing the method mix. Suppose, for example, that the method mix for 2005 in the sample application were changed to increase female sterilization from 12 to 15 percent and IUD from 10 to 20 percent, and to reduce traditional methods from 35.7 percent to 22.7 percent. The result would be an increase in average effectiveness in 2005 from 89 percent to 90 percent. The required prevalence would decrease slightly from 28 percent to 27.5 percent. The number of modern

method acceptors and costs in 2005 would be 6 percent more than the base case due to a smaller number of users of traditional methods.

Introduction of New Technology

The next decade may see the introduction of a number of new contraceptive technologies. The Target-Cost Model can be used to examine the effects of these new technologies on acceptors, total costs and commodity costs. Suppose, for example, that Norplant were introduced in the sample country and that it provided 5 percent of modern method use by 2005 (substituting equally for the other modern methods). If Norplant is assumed to have a commodity cost of $23 and a cost per user of $60 then the total costs for modern methods would increase by 1.4 percent and average effectiveness would increase by 1 percent. The number of Norplant users would rise to 44,000 by 2005.

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 be increasing in the future, particularly as programs are expanded to promote condom use for protection against sexually transmitted diseases, including 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. This can be done with the Target-Cost Model 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 percentage using condoms in 2005 could be increased from 12 percent to 22 percent. The result would be an increase in costs and an increase in the number of condom users and acceptors. For example, total costs would increase by 22 percent by 2005.

Programs to Promote Breastfeeding

Programs to promote the practice of breastfeeding can have beneficial effects on child survival. They will also affect the requirements for family planning since increased breastfeeding lengthens the period of postpartum infecundability. This effect can be seen using the Target-Cost Model by lengthening the period of postpartum infecundability or 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 infecundability were to remain constant in the sample application, then the required prevalence would rise to only 22 percent instead of 28 percent. This would mean 21 percent fewer modern method users and a 21 percent reduction in costs in the year 2005.

Programs to Reduce Sterility

In some countries high levels of sexually transmitted diseases lead to problems of sub-fertility and infertility. Programs to detect and treat these diseases can reduce the incidence of pathological sterility in the population. This can be examined by reducing the estimate of sterility. In the sample

application, a reduction in the prevalence of sterility from 2 percent to 1 percent by 2005 would result in an increase in the required number of users by 4 percent.

Programs to Reduce the Incidence of Abortion

Although the sample application used here assumes no abortion, in some countries the use of abortion does have a significant effect on the TFR. The Target-Cost Model can be used to examine this relationship by changing 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.

Programs to Improve the Quality of Family Planning Services

Although the quality of services is not easy to measure, there are several indicators in the Target-Cost Model 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 methods correctly and that the methods chosen are appropriate for each client. High discontinuation rates may often be a reflection of poor quality of service. The effects of a program to improve quality could be partially examined by increasing effectiveness rates and reducing discontinuation rates in the model. For example, a 10 percent reduction in discontinuation rates and an increase in effectiveness for orals, condoms and IUDs in the sample application would result in a reduction in the number of users of 3 percent and a 3 percent reduction in costs by 2005.

Cost Recovery

Although not considered in this sample application, the Target-Cost Model 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 that higher user fees might result in some decline in the demand for family planning services. The relationship between demand and cost needs to be considered when using the Target-Cost Model to examine the impact of cost recovery programs.

Changes in Source Mix

The Target-Cost Model can also be used to examine the effects of changing source mix. This 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. The Target-Cost Model could be used to examine the effects of this changing source mix on the number of users and acceptors that 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.

VI. USER'S GUIDE TO THE TARGET-COST PROGRAM

This chapter describes the operation of the Target-Cost Model on a personal computer. In general, all the instructions for using the program appear on the screen at the appropriate time while the program is being used. It is possible to use the program without reading this chapter by paying close attention to the instructions on the screen. Detailed information on the use of the program is provided in three sections in this chapter. The sections are: A. Installing and Running the Target-Cost Model, B. General Procedures for Using Target-Cost, and C. Description of Program Elements.

A. Installing and Running the Target-Cost Model

The Target-Cost Model can be run from a floppy diskette or from a hard disk.

Installing the Program on a Hard Disk

To install the program on a hard disk, put the Target-Cost floppy diskette in the A: drive and type:

INSTALL

This will install the program on the C: drive in a directory called: \TARGET. If you want to install it in a different drive or directory, just add the full pathname to the INSTALL command. For example, to install the program on the D: disk drive in a directory called TARGCOST, use the command:

INSTALL D:\TARGCOST

Installing the Program on a Floppy Diskette

The Target-Cost files are provided on floppy diskette in compressed format. Therefore, you cannot run the program from the master diskettes provided. The files must first be expanded. This expansion is performed by the INSTALL program.

1. If you have two floppy disk drives you can install the program on a floppy disk with the following procedure:

   - Prepare a blank, formatted floppy diskette and place it in drive B:
   - Place the master diskette in drive A:
   - Type the command: INSTALL B:\

   This will copy the files from the master diskette to the new program diskette and expand them for use.

2. If you have only one floppy drive you can install the program on a floppy diskette with the following procedure:

   - Prepare a blank, formatted floppy diskette. This will be the new program diskette.
   - Place the master diskette in drive A:
   - Type the command INSTALL F.
   - When the message "Insert diskette for drive B: and press any key when ready" appears, remove the master diskette from the disk drive and insert the new program diskette.
   - When the message "Insert diskette for drive A: and press any key when ready" appears, remove the new program diskette and insert the master diskette.
   - Repeat the above two steps, changing diskettes as requested, until all the files are copied from the master diskette to the new program diskette. When you see the prompt "Remove master diskette from drive A: and insert new program diskette," remove the master diskette and place it in a safe place. Insert the new program diskette in drive A: and press any key when ready.

Printer Setup

The Target-Cost program can print all tables and graphs on most types of printers. However, you need to indicate the type of printer you are using in order to have tables formatted correctly and to have graphs print correctly. To set up the printer, type the command SETUP from the Target-Cost directory. For example, if you installed Target-Cost in the default directory C:\TARGCOST, then you would start the setup program by typing

```
C:
CD\TARGCOST
SETUP
```

The setup program will display the current settings and allow you to change the printer, the orientation of graphics on the printer page, the graphics resolution and the printer port for graphics printouts. After you have made the appropriate selections, choose QUIT from the menu and save the new setup. You do not have to repeat this setup procedure unless you change printers.

Starting the Target-Cost Program

Before starting the program, make the Target-Cost disk and directory the default directory. If you are using the program on a floppy disk in drive A, you can make it the default by typing

```
A:      [ENTER]
```

where [ENTER] means press the **Enter** key. If you are using the program on a hard disk (on disk C in the directory TARGCOST, for example) you can make it the default directory by typing

```
C:                  [ENTER]
CD \TARGCOST        [ENTER]
```

Once you have done this you can start the program by typing either the full command

```
TARGCOST
```

or the shortcut command

TC

You will see an opening screen giving the name and version number of the program. Press any key to continue to the main menu.

B. General Procedures for Using Target-Cost

Making Menu Selections

You can make a selection from any Target-Cost menu in one of three ways.

1. Use the arrow keys to move the highlighted bar to the menu choice you want to select. Then press the **Enter** key.

2. Press the highlighted letter for the menu choice you want.

3. If you have a mouse, you can move the mouse pointer to the menu selection and press the left mouse button.

If you are finished with one of the pull-down menus and want to return to the previous menu, press the **Esc** key. Alternatively, you can use the mouse to select the previous menu or press the right mouse button.

Using the Data Editors

When you enter any data into Target-Cost you will be presented with a full-screen data editor. These editors function in a manner similar to editors in spreadsheets, such as Lotus 1-2-3. The data are arranged in rows and columns. If your projection period is longer than five years then all the years will not fit on the screen at one time. The editor will display the first five years. You can see additional years by moving the cursor to the far right of the screen and pressing the right arrow key again. The entire screen will shift one column to the right. Similarly you can return to previous years by using the left arrow key. Pressing the **Ctrl** key and the right or left arrow key simultaneously will move the editor an entire page to the right or left. The End and Home keys will move the cursor to the far right or far left of the editor.

The data editors in Target-Cost are different from spreadsheet editors in a few operations. If you are editing a cell or entering a number in a cell, the arrow keys will move the cursor within the cell. You must press the **Enter** key to finish editing that cell and move to another one.

The Target-Cost editors have function keys for copying (**F4-Copy**) and interpolating (**F3-Interpolate**) between columns. Typically you will use the copy function to copy the value in the first year to all future years if you do not expect a change. The interpolate function is useful for entering a value for just the first and last years and filling in the intermediate years with a linear interpolation. To use either of the functions, put the cursor on the column where you want to start the operation, press the appropriate function key (**F3-Interpolate** or **F4-Copy**), move the cursor to the end column and press the function key again. This process will operate on a single row or across several rows. To copy values from the first column to the last column for all rows, place the cursor

on the first column and first row, press the F4-Copy key, move the cursor to the last column and bottom row and press the F4 key again.

Some of the edit screens in Target-Cost have more than one editor on the screen at once. For example, when entering the proximate determinants there is one editor for the TFR and prevalence and another for the other proximate determinants. You can move from one editor to the other by pressing the **Tab** key.

The editors for METHOD ATTRIBUTES and VISIT ATTRIBUTES indicate at the top of the screen the method and source that are being edited. To change the method or source, use the **Tab** key to move to the method or source row and press the **F2-Edit** key. This will produce a list of methods or sources. Move the cursor to the desired selection and press the **Enter** key. The editor will then display the data for that method or source.

When you are finished editing, return to the previous menu by pressing the **Esc** key.

Getting Help

Your best source of help when using the Target-Cost Model is this manual. However, the program also provides help for some operations. Whenever the **F1-Help** key label appears at the bottom of the screen, you can press the F1 key to get on-screen help. These help screens will be either in the form of text or graphs. For example, when entering information on the proximate determinants, pressing the **F1-Help** key will display a graph showing the relationship between percentage in union and TFR, or post-partum infecundability and TFR, depending on which row you are editing at the time.

Special Displays and Functions

Some special displays provide help for special operations. These special displays and functions are as follows.

When editing the Proximate Determinants, the **F5-Visual** key will appear at the bottom of the screen, whenever you are editing any of the proximate determinants in the top half of the screen. Whenever this key label appears at the bottom of the screen, you can press this key and the program will display a visual representation of the proximate determinants. You can change any of the proximate determinants listed in this display and immediately see the effect on the TFR.

When editing the Proximate Determinants, the **F5-Effects** key label will appear at the bottom of the screen whenever you are in the editor in the bottom half of the screen, editing TFR or prevalence. Whenever this key label appears you can press F5 to see a chart of the decline in TFR experienced by various developing countries by level of socioeconomic development and family planning program effort. The small + sign can be moved from box to box with the arrow keys. Pressing the **Enter** key at any time will display the countries used to calculate the average for that box.

When editing the Cost per User assumptions, the **F5-Calc** key label will appear at the bottom of the screen. Whenever this key appears you can use it to calculate the cost per user for the current method. If you have entered a figure for cost per user in the first year, then pressing the **F5-Calc** key will cause the program to calculate the cost per user for future years. This calculation will result in declining future costs per user as prevalence increases. The methodology for this calculation is

presented in Chapter III. If no value has been entered for the first year, then the program will supply values for all years. Note that if you do not provide a value for the first year for any method, then the costs per user will be the same for all methods, if you use this procedure.

Solving for Prevalence or TFR

In normal operation, the Target-Cost Model is used to estimate the prevalence required to achieve a target TFR. However, it can also be used to calculate the TFR that would result from a future level of prevalence. You can indicate which method you want to use by selecting TFR or PREVALENCE in the PARAMETERS editing screen.

Using the Cost per User or Visit Method of Costing

You may select either of two methodologies for performing the cost calculations. To indicate which method you want to use, select the choice SELECT METHODOLOGY under the COST sub-menu. You will be asked to choose either the COST PER USER method or the VISIT method. Once you make a selection it will remain in force until you change it. Please note that the inputs required are different depending on the method you choose. In the case of the Cost per User method, the required inputs are costs per user for each method. In the Visit method you must select the appropriate visit types for each method and enter the attributes of each visit. You may enter both types of data and switch from one methodology to the other at any time. However, if you choose a methodology and then do not enter the appropriate data for that methodology, the cost calculations will show zero costs. If this happens be sure to check that you have selected the appropriate costing methodology and entered the necessary cost information.

Selecting Methods, Sources and Visits

The output from Target-Cost can be produced for any combination of methods, sources and visits. For example, you can display the costs per CYP for just condoms, or for condoms, pills and VFT. You can display all sources or selected sources. You can display data for all visit types or selected visit types.

Unless you make a different selection, the displays will show all methods, sources and visit types. If you wish to choose only certain methods, sources or visits, you can do so from the DISPLAY choice on the main menu. This choice will produce a pull-down menu that will contain choices for method, source and visit. If you select one of these, you will see a list of the possible selections. Any selection with a check mark beside it is selected. If it does not have a check mark it is not selected and will not be used in the calculations. You can select or remove choices by using the arrow keys to move a particular choice and pressing the **F2-Select** key (or the **Enter** key) to add or remove a selection. When you have finished, press the **Esc** key to return to the previous menu. Once you have made some selections, they will remain in force until you change them.

You can always review your selections by selecting SUMMARY from the DISPLAY pull down menu or by pressing the **F2-Summary** function key when you have a table of output on the screen.

Using a Comparison Projection

If you are using the Target-Cost Model to examine the effects of alternate program configurations you will want to make changes to the inputs and compare the results with the initial

set of inputs. This can be accomplished by loading the original data file as a comparison projection. After you have opened the primary file with which you are going to be working, you can choose COMPARE from the FILE submenu and select the same file for the comparison. You can edit the assumptions for the primary file that you loaded using OPEN, but you will not be able to edit the file loaded using COMPARE. However, all tables and graphs will show the results from both files. If you do not see the results from both files, select COMPARE from the DISPLAY submenu and set COMPARE to ON.

Sequence of Operations

When you start a new session with the Target-Cost Model, you will normally select FILE from the main menu and then select OPEN from the pull-down menu to open a data file stored on disk. After retrieving a data file you can proceed to change data through the DATA or COST selections on the main menu or to display the output through the DISPLAY section.

If you are entering data for a new analysis, you must first enter a minimum amount of data before you can do any calculations. You should first choose DATA from the main menu. Then you should go through each of the items in the pull-down menu, one at a time. In PARAMETERS you will enter the title of the analysis and the first and last years of the projection. In ADD/DELETE METHODS and ADD/DELETE SOURCES you choose the methods and sources you wish to consider. You must choose at least one method to do a Target-Cost analysis. You may choose as many methods as you wish. You do not need to choose any sources, if you do not want to consider sources.

In the METHOD MIX section you must enter the percentage of all users that use each method that you have selected. Normally, these figures should add up to 100 percent in each year. In the METHOD ATTRIBUTES section you describe each method in terms of its effectiveness, average discontinuation, etc. You may choose to use the default values provided by the program or you can modify them by entering your own estimates. In PROXIMATE DETERMINANTS you will enter values for the proximate determinants and the TFR target values.

Cost information is entered by selecting COST from the main menu. You can select one of two methods for entering cost information: cost per user or visit method. If you select the cost per user method then you should also select the USER COST item in the pull-down menu and enter the required information for each method. If you select the visit method then you should choose ADD/DELETE VISITS to indicate the correct visit types for each method and source and then select VISIT ATTRIBUTES to enter the cost data. Then you can return to the main menu (by pressing the Esc key) and display any of the indicators under DISPLAY.

Displaying Data

To display data you should first select INFORMATION from the DISPLAY menu. This will display a list of indicators that are available. If you want to show the results as a line graph or bar chart, you should select just one indicator to display. Then press Esc to return to the DISPLAY menu and select DISPLAY TYPE. Select LINE GRAPH or BAR CHART and the display will appear on the screen.

If you want to display the results as a table you may select more than one indicator from the INFORMATION menu. The program can display up to five indicators in the same table. After selecting the variables you wish to examine, press Esc to return to the DISPLAY menu and select

DISPLAY TYPE. Select TABLE and the results will appear on the screen, in a file or on the printer.

C. Description of Program Elements

The main menu of the Target-Cost program contains five choices:

FILE	EDIT	COST	DISPLAY	SETUP

The procedures associated with each of these choices are discussed below.

FILE	EDIT	COST	DISPLAY	SETUP

Open
Compare
Save
Save as
New
Change Dir
Exit

Open - Select and read a Target-Cost data file as the primary file for analysis.

Compare - Select and read a Target-Cost data file to be compared with the primary data file.

Save - Save the current data in a Target-Cost data file on disk. The data will be saved in the current directory using the same file name as the file which was OPENED. The data in the original file will be replaced with the current data.

Save as - Save the current data in a Target-Cost data file using a new file name.

New - Erase the data currently in memory. If the data have not been saved to disk, the program will display a message warning that the data will be lost unless they are saved to disk before executing NEW.

Change Dir - Change the data directory where data files are stored.

Exit - Exit the Target-Cost program and return to DOS.

FILE	EDIT	COST	DISPLAY	SETUP

- Parameters
- Add/Delete Method
- Add/Delete Sources
- Method Mix
- Method Attributes
- Proximate Determinants
- Change Source/Visit Names
- Print Summary
- Print All Inputs

Parameters - Set the title of the projection, the first and last years of the projections and indicate whether the projection should calculate prevalence or TFR.

Add/Delete Method - Select the methods to be included in the analysis.

Add/Delete Sources - Select the sources to be included in the analysis.

Method Mix - Enter the distribution of users by method.

Method Attributes - Enter the attributes for each method including effectiveness, discontinuation, units per CYP and average age of users.

Proximate Determinants - Enter the data on proximate determinants of fertility including percent in union, duration of postpartum infecundability, abortion, sterility, TFR and prevalence.

Change Source/Visit Names - Allows you to change the names of sources or visits provided by the program.

Print Summary - Prints a summary of input values to the printer or to a file.

Print All Inputs - Prints all inputs to the printer or to a file.

FILE	EDIT	COST	DISPLAY	SETUP

- Cost per User
- Add/Delete Visits
- Visit Parameters
- Select Methodology

Cost per User - Enter the cost per user for each method and source.

Add/Delete Visits - Select the visit types to be included in the analysis.

Visit Parameters - Enter the parameters for each visit type including whether it is recurring or one time only, the cost per visit, the commodity cost per visit and the fee per visit.

Select Methodology - Select the cost calculation methodology: Cost per User or Visit Cost Method.

FILE	EDIT	COST	DISPLAY	SETUP

- Information
- Method
- Source
- Visit
- Comparison
- Display
- Selections
- Special

Information - Select the indicators to display.

Method - Select the methods to display.

Source - Select the sources to display.

Visit - Select the visit types to display.

Comparison - Indicate whether the comparison projection should be displayed.

Display - Select the display type (line graph, bar chart, table on the screen, table on the printer, table to file) and display the indicators selected under **Information.**

Selections - Display the methods, sources and visits selected for displays.

Special - Display special tables showing users, acceptors and costs by all methods and sources.

FILE	EDIT	COST	DISPLAY	SETUP
				Graphics
				Language
				Date Display
				Decimal Point
				Money Unit
				About

Graphics - Set the type of graphics display used, CGA, EHA HI, EGA LO, or auto detect the highest resolution available.

Language - Select the language to use. The program will display a list of languages available.

Date Display - Select the type of date display to use on printouts, MM/DD/YYYY or DD/MM/YYYY.

Decimal Point - Select the decimal point character, period or comma.

Money Unit - Select the symbol to be used to indicate money, $ or other character.

About - Displays the version number of the program and the amount of free memory.

VII. TUTORIAL

This chapter presents a brief tutorial that demonstrates how to use most of the features of the Target-Cost Model. More detailed information on the Target-Cost procedures is provided in Chapter VIII.

Start the Target-Cost Model by moving to the Target-Cost directory and typing the command TC. If you have installed the program in the default directory (C:\TARGET) then the commands to start the program would be:

```
CD \TARGET
TC
```

Once the program starts you will see the title screen. Press the **Enter** key to continue to the main menu of the program. The screen should show the following menu:

FILE	EDIT	COST	DISPLAY	SETUP

The first selection, FILE, will be highlighted. Therefore, you can select this choice by pressing the **Enter** key. Press the **Enter** key to see the FILE submenu. The screen should now look like this:

FILE	EDIT	COST	DISPLAY	SETUP
Open				
Compare				
Save				
Save As				
New				
Change Dir				
Exit				

This highlighted cursor should be on the selection "Open." This procedure opens a data file stored on disk. Since the highlight is already on "Open," you can select it by pressing **Enter**. Press **Enter** now.

Next you will see a list of Target-Cost data files in the data directory. If you installed Target-Cost in the default directory, you will see one or more files listed. If you do not see any files listed you may need to change the data directory. In that case, press **Esc** to return to the FILE menu,

select "Change Dir" and type in the name of the directory where you installed Target-Cost (this might be A:\ if you installed it on a floppy disk).

You want to select the file named SAMPLE. Use the up and down arrow keys to move the highlighted cursor to the name SAMPLE and press **Enter**. The program will read the SAMPLE data file and return to the FILE submenu.

Next you should move to the EDIT submenu in order to examine the assumptions in the SAMPLE data file. To do this, press **Esc** to return to the main menu bar, then press the right arrow once to move the highlighted bar to EDIT then press **Enter** to see the EDIT submenu. Alternatively, you could just press the right arrow and move directly from the FILE submenu to the EDIT submenu. The menu should look like this:

FILE	EDIT	COST	DISPLAY	SETUP

- Parameters
- Add/Delete Methods
- Add/Delete Sources
- Method Mix
- Method Attributes
- Proximate Determinants
- Change Source/Visit Names
- Print Summary of Inputs
- Print All Inputs

Parameters

The highlighted cursor should be on the "Parameters" selection. Press **Enter** to see the parameters editor. This editor allows you to specify the title of the projection and the first and last years of the projection. Use the up and down arrow keys to move the cursor from one item to the next. The final item in the editor is labeled "Solve for." This indicates whether the model will be used to calculate contraceptive prevalence based on a TFR assumption or to calculate TFR based on a prevalence assumption. You can change this selection by moving the cursor to this line in the editor and pressing **Enter**. Each time you press **Enter** the selection will switch between "TFR" and "Prevalence." To leave the parameters editor, press the **Esc** key.

Add/Delete Methods

Press the down arrow key once to move the cursor to the selection "Add/Delete Methods." Press **Enter** to select this choice. After making this selection, you will see a list of methods like the one shown below.

```
==ADD/DELETE METHODS==
 Billings
√Condom
√Female Sterilization
√Injectables
√IUD
 Male Sterilization
 Norplant
√Oral
 Other
 Rhythm
√Traditional
 Vaginal Barrier
 Vaginal Tablets
 Withdrawal
```

The checkmark character √ indicates that a method is included in the analysis. If there is no checkmark next to a method name then it is not included. You can add or delete methods by using the up and down arrow to move to the desired method and pressing **Enter** to add or remove checkmarks. Once you have finished examining this list, press the **Esc** key to return to the EDIT submenu.

Add/Delete Sources

The next item on the EDIT submenu is "Add/Delete Sources." You do not have to include sources in the analysis. If you skip this item you will be able to examine all the Target-Cost output but it will include no information by source. If you do select sources then all output can be examined by source.

Select the "Add/Delete Sources" item by moving the highlighted cursor to that line and pressing **Enter**. You will see a list of methods. Choose a method and you will see a list of potential sources. This list works just like the list to add/delete methods. You move the highlighted cursor to a source and press the **Enter** key to add or remove checkmarks. This sample data file does not include sources; therefore, none of the selections have checkmarks. Return to the EDIT submenu by pressing **Esc** twice.

Method Mix

The next selection in the EDIT submenu is "Method Mix." Select this item to see the method mix editor. It should look like this:

Condom	9.3%				
Method Distribution	1985	1986	1987	1988	1989→
Condom	9.3%	9.5%	9.7%	9.8%	10.0%
Female Sterilization	7.8%	8.1%	8.4%	8.6%	8.9%
Injectables	2.3%	2.3%	2.3%	2.3%	2.3%
IUD	3.9%	4.3%	4.7%	5.1%	5.5%
Oral	14.0%	14.9%	15.9%	16.8%	17.7%
Traditional	62.7%	60.9%	59.0%	57.4%	55.6%
Total	100.0%	100.0%	100.0%	100.0%	100.0%

F2-Edit **F3-Interpolate** **F4-Copy** **F5-Graph** **↑↓←→** **Home** **End** **Esc**

This table shows the percentage distribution of contraceptive users by method. The right arrow → shown at the end of the year 1989 in the second row means that additional columns of later years are not shown. You can see these columns by pressing the right arrow key until the additional columns appear.

Using the method mix editor you can specify the current and projected future distribution of method use. Simply use the arrow keys to move highlighted bar to the cell you wish to edit, type the new value and press **Enter**. Pressing the **F5-Graph** key will display a pie chart showing the method mix in the first and last years of the analysis. The **F3-Interpolate** and **F4-Copy** keys are used to make entry of method mix data easier. Their use is described in Chapter VII.

After examining the method mix assumptions, press **Esc** to return to the EDIT submenu.

Method Attributes

The next item on the EDIT submenu is "Method Attributes." The method attributes editor is used to specify attributes for each method, including effectiveness, discontinuation rates, average age, units per CYP and source distribution. The editor looks like this:

To Edit					
Method	Condom				
Attributes	1985	1986	1987	1988	1989→
Effectiveness	83.00%	83.00%	83.00%	83.00%	83.00%
Discontinuation	40.00%	40.00%	40.00%	40.00%	40.00%
Average/Age	25.40	25.40	25.40	25.40	25.40
Condoms/CYP	150.00	150.00	150.00	150.00	150.00
Source Distribution	1985	1986	1987	1988	1989→
Total	100.0%	100.0%	100.0%	100.0%	100.0%

F2-Edit **Tab Esc**

The highlighted cursor is initially placed on the method name; in this case, Condom. The rest of the table specifies the attributes of condoms. To select another method, press the **F2-Edit** key and select the method from the list of methods in the analysis. The rest of the table will change to show the attributes of the newly selected method.

Once the method has been selected, move to the attributes editor by pressing the **Tab** key. Anytime the Target-Cost Model shows a split screen editor, you can move from one section of the screen to another by pressing the **Tab** key.

Note that the line for CYP conversion factors (Condoms/CYP, for example) does not appear for the long lasting methods, such as female sterilization and IUD. The number of CYP provided by these methods is calculated from the discontinuation rate. Only temporary methods require a separate estimate of number of units required per CYP.

After reviewing the method attributes editor press the **Esc** key to return to the EDIT submenu.

Proximate Determinants

The last item on the EDIT submenu is "Proximate Determinants." This editor is used to enter data on the proximate determinants of fertility and to specify the target level of TFR or prevalence. The editor looks like this:

Number of WRA	3000000				
Prox Determinants	1985	1986	1987	1988	1989→
Number WRA	3000000	3090000	3182700	3278200	3376500
% WRA in union	70.0%	69.8%	69.6%	69.4%	69.2%
P.P. Infecundability	14.0mths	13.9mths	13.7mths	13.6mths	13.4mths
Total Abortion Rate	0	0	0	0	0
Sterility	2.0%	2.0%	2.0%	2.0%	2.0%
	1985	1986	1987	1988	1989→
TFR	6.5	6.4	6.4	6.3	6.2
Prevalence	12.0%	13.1%	14.1%	15.3%	16.4%

F1-Help F2-Edit F3-Interpolate F4-Copy F5-Visual ↑↓←→ Home End Tab Esc

The highlighted cursor is initially in the upper editor on the screen. You can move to any row in this editor using the up and down arrow keys. Several of the items have special help available. Press the down arrow key to move the cursor to the line labeled "% WRA in union." Press the **F1-Help** key. You will see a graph showing the relationship between percent in union and TFR for a number of different countries. A similar graph is available by pressing **F1-Help** from the line labeled "P.P. Infecundability." The **F5-Visual** key can be used to produce a visual representation of the relationship between the proximate determinants and TFR.

To move to the second editor on the screen press the **Tab** key. In this editor you can set the target value of TFR. If you do change TFR the program will automatically recalculate the prevalence required to achieve that TFR when you leave the editor. To see the results immediately, press the **F6-Calc** key. The **F5-Effects** key will produce a table showing experience in TFR decline from a number of countries. This table shows the average TFR decline during the period 1965-1985 for countries categorized by level of socioeconomic development and population program effort.

To leave the proximate determinants editor, press the **Esc** key.

Cost per User

The final set of inputs required for a complete Target-Cost analysis concerns the costs of family planning. To examine these assumptions select COST from the main menu and select "Cost per User" from the submenu. This will display the cost per user editor. It will look like this:

Method	Condom				
To Edit					
Method	Condom				
	1985	1986	1987	1988	1989→
Cost per user	$20.0	$18.6	$17.6	$16.6	$15.8
Commodity cost	$6.8	$6.8	$6.8	$6.8	$6.8
Fee	$0.0	$0.0	$0.0	$0.0	$0.0

F1-Help **F2-Edit** **↑↓** **Tab** **Esc**

To change the method displayed, press the **F2-Edit** key when the cursor is on the "Method" line. A list of methods will be displayed. Move the cursor to the desired method and press **Enter**.

Press the Tab key to move to the cost editor. With the cursor on the "Cost per user" line, the **F1-Help** key will be active. It will produce a graph showing data from a number of countries relating cost per user for all methods with total modern method prevalence.

The **F5-Calc** key will be displayed when the cursor is in the cost editor. Pressing this key will cause the program to automatically adjust the cost per user figures. If the "Cost per user" line is blank when the **F5-Calc** key is pressed, then values will be calculated based on the graph shown in the help screen and the calculated total prevalence level. If values for cost per user are already present, then they will be adjusted to decline from the value in the initial year according to the graph shown in the help screen and total prevalence.

To leave the cost editor and return to the main menu press the **Esc** key.

Displaying Results

To display the results of an analysis, select DISPLAY from the main menu bar. Next select information from the DISPLAY submenu. This will produce a list of indicators that is available for display. The first indicator "Prevalence" will be selected. This is indicated by the presence of the checkmark next to "Prevalence." To view "Prevalence" press **Esc**; to return to the DISPLAY submenu, select "Display" and select a display type. The program will display a graph or table for prevalence. After examining the results press **Enter** to return to the DISPLAY submenu.

To select a different indicator follow these steps:

- Select "Information" to see the list of indicators
- Move cursor to "Prevalence"
- Press **Enter** to remove the checkmark from "Prevalence"
- Move the cursor to another indicator
- Press **Enter** to select that indicator
- Press **Esc** to return to the DISPLAY submenu

- Select "Display"
- Select a display type.

You can display more than one indicator at a time by placing checkmarks next to several indicators. If you display the results as a graph, only the first indicator selected will be shown. However, is you display the results in a table, then each indicator will be shown in a separate column.

The displays will show the calculations for all methods and sources. You can see the calculations for particular methods by selecting "Methods" from the DISPLAY submenu. Press **Enter** or **F2-Select** to select the method or methods you wish to examine. For example if you select condoms and IUD. Then all displays will show results just for condoms and IUDs until you change the selection again. You can select the sources to be shown in a similar manner using the "Sources" selection from the DISPLAY submenu. You can see the selected methods and sources when a graph or table is in the screen by pressing the **F2-Display** key.

Several special output tables are available by selecting the "Special" item on the DISPLAY submenu.

To leave the DISPLAY submenu, press **Esc**.

Exiting the Target-Cost Program

To leave the program select FILE from the main menu bar. Then select "Exit" from the FILE submenu. If you have changed any data, you will be given a chance to save the data before exiting the program.

This tutorial has covered only a selected set of the features in the Target-Cost program. You should read Chapter VIII for an explanation of some additional features.

VIII. DEFINITIONS OF INPUT AND OUTPUT VARIABLES USED IN THE TARGET-COST COMPUTER PROGRAM

% of costs recovered	The percentage of total costs that are recovered through user fees.
% of births due to failure	The percentage of all births that occur due to contraceptive failure. In other words, the percentage of all births that occur to women who are using some form of contraception at the time of conception.
% WRA in union	The percentage of all women of reproductive age who are in union.
# births due to failure	The number of births that occur due to contraceptive failure.
Acceptor	A new user. In order to avoid confusion with the term "user," a new user is usually called a "new acceptor." People may be "new program acceptors," "new method and source acceptors" or "new method acceptors."
Average age	The average age of all users of a particular method.
Average effectiveness	The average effectiveness of all selected methods. If all methods have been selected for display, then this variable will be the average effectiveness of all methods in the program. However, if only some of the methods have been selected for display, then this variable will report the average effectiveness for just those methods that are selected.
Compliance	The percentage of users of a particular method that comply with the recommended visit schedule by making the recommended visit. If the program recommends a follow-up visit for IUD users one month after insertion, then compliance is the percentage of new IUD acceptors who return for the follow-up visit one month after insertion.
Cost per CYP	The total costs in some year divided by the number of CYP produced in that year.
Cost per SCYP	The total costs in some year divided by the number of SCYP produced in that year.

Couple-years of protection	A measure of the total value of protection provided by services delivered in any time interval. For temporary methods this is the equivalent number of continuing users that would consume the commodities provided to all users. For long-term methods this is the number of new acceptors multiplied by the average number of years that they will be protected.
Cumulative costs	The total costs required to meet the target, summed for all year from the first year of the projection to the year of the calculation.
CYP	Couple-years of protection.
Discontinuation	The percentage of users of a particular method at the beginning of a year who will stop using that method by the end of the year.
Effectiveness	The effectiveness of a method in preventing pregnancy. It is expressed as the percentage of women using a method during an entire year who will not become pregnant during the year. In estimating the effectiveness of a method, consider both the theoretical effectiveness of the method if used correctly and the proportion of women who will use the method correctly and incorrectly.
Fee	Any money paid by the user to the service provider for family planning services.
Gross cost per year	The total costs of providing family planning services in a year. This measure ignores any revenues that might be received.
Net cost per year	The total costs of the program minus the total fees received by the program in any year.
New acceptor	A new user of a particular method and source. A new acceptor may be a user who was not previously using family planning or a user who switched from a different method. Since the Target-Cost Model does not require estimates of source discontinuation, it does not calculate users who continue with the same method but switch sources. It does, however, count a user who switches from one method to another as a new acceptor of the second method.
Number of users	The number of full-time users of contraception. In this definition, one person who uses contraception continuously for an entire year is equivalent to two people who each use contraception for one-half year.
Number of WRA	The number of women of reproductive age.

Postpartum infecundability	The average number of months that elapse after a birth before a woman is again able to conceive.
PPI	Postpartum infecundability.
Prevalence	The percentage of women of reproductive age who are using any form of contraception.
SCYP	Standardized CYP.
Solve for	Allow the user to use the Target-Cost Model to solve for TFR or prevalence. Solving for TFR means that the user provides an estimate of prevalence and the program will calculate the TFR that would result from that prevalence level given the other proximate determinants. Solving for prevalence means that the user provides a TFR goal and asks the program to calculate the required level of prevalence to reach that TFR goal.
Standardized CYP	Standardized couple-years of protection. This measure is similar to CYP except that years of protection are adjusted for the age of the woman to take account of waning fertility as a woman ages.
Sterility	The percentage of women who are unable to conceive. In the Target-Cost Model it is measured by the percentage of all women aged 49 who remain childless.
Schedule	The schedule for a visit depends on the visit type. For a recurring visit, the schedule is the number of times per year that the visit occurs. For example, if pill users are resupplied every 3 months, then the schedule for the resupply visit would be 4 times per year. For long-term methods the schedule is the year in which the visit occurs, relative to the initial acceptance visit, which is year 0. Thus, a removal visit for Norplant might have a schedule of 5 if it takes place five years after insertion.
Total abortion rate	The average number of abortions a woman would have if she survived to the end of her child-bearing years and had abortions at the prevailing age-specific rates.
TFR	The total fertility rate. The average number of live births a woman would have if she survived to the end of her child-bearing years and had births at the prevailing age-specific rates.
Type	The refers to visit type. A visit can be one of two types: "once only" or "recurring." A "once only" visit occurs once for each new acceptor. An IUD insertion is a "once only" visit. A "recurring" visit is any visit that takes place more than once for a user. Visits for resupply of pills or condoms are "recurring" visits.

User	A full-time user of contraception. In this definition, one person who uses contraception continuously for an entire year is equivalent to two people who each use contraception for one-half year.
User cost	One of the two methods of projecting family planning costs in the Target-Cost Model. The "user cost" approach uses assumptions about the average cost per user by method and source to project the total costs of providing services.
Visit cost	One of the two methods of projecting family planning costs in the Target-Cost Model. The "visit cost" approach uses assumptions about the average cost per visit by method, source and visit type to project the total costs of providing family planning services.
WRA	Women of reproductive age. This usually refers to women aged 15-44 or 15-49.

TARGET-COST REGISTRATION FORM

Please take a moment to complete this form and mail it to us. This will ensure that you receive information about future updates.

Name _____
Title _____
Institution _____
Address _____
City _____
State or District _____ Postal Code _____
Country _____

Target-Cost Version Number _____

What type of computer are you using with Target-Cost?

_____ 486 _____ 386 _____ 286 _____ 8088

What type of display do you use?

_____ monochrome _____ CGA _____ EGA _____ VGA

Do you use a mouse? _____ Yes _____ No

Do you regularly use Windows? _____ Yes _____ No

What language are you using with Target-Cost?

_____ English _____ French _____ Spanish

Have you received any training in Target-Cost other than reading the manual?

_____ Yes _____ No

How do you plan to use Target-Cost? _____

Additional comments _____

Please return this form to:
John Stover
The Futures Group
80 Glastonbury Boulevard
Glastonbury, CT 06033 U.S.A.