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"THE TIPPS MODEL FOR PROJECTING COSTS AND BENEFITS OF FAMILY PLANNING SERVICES DELIVERY"

A User's Manual

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THE TIPPS MODEL FOR PROJECTING COSTS AND BENEFITS OF FAMILY PLANNING SERVICES DELIVERY

A USER'S MANUAL

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INTRODUCTION

The *TIPPS* Project (Technical Information on Population for the Private Sector) is designed to encourage private, for-profit companies to invest in family planning services for their employees and employee dependents by analyzing the costs and benefits of such programs for company management. For participating companies, this consists of an individualized analysis which provides the following information:

- Current levels of maternity-related behaviors (births, abortions, contraceptive use, etc.) among female employees, wives of male employees, and other eligible dependents;

- Current annual company expenditures for maternity-related benefits;

- Level of potential demand for family planning on the part of company employees and dependents;

- Potential health benefits to female employees, wives of male employees, and their children through improved birth spacing and reduction of unwanted and high risk pregnancy;

- Probable costs to the company of providing family planning services, in terms of personnel, training, equipment, supplies, and administration;

- Probable financial benefits to the company, due to reduced expenditures for hospitalization, maternity leave, illness among employees and their dependents, and other categories of employee benefits related to pregnancy and childbearing;

- Benefits-to-costs ratios, including cash flow, present discounted value of future savings, pay-back period, and internal rate of return.

The *TIPPS* approach to the business analysis is based on the following assumptions:

- A sizable proportion of the company's labor force shows low levels of contraceptive prevalence, use of less effective contraceptive methods, and high levels of unwanted and/or mistimed pregnancies.

- The unwanted pregnancies incur high costs to the employer in terms of legislated or contractually-mandated maternity leave, child care, and salary supplements, as well as lowered productivity and absenteeism due to women's impaired health status.

- The promotion and provision of company-provided or supported family planning services increases contraceptive usage and improves the contraceptive method mix, thereby reducing the incidence of unwanted/mistimed pregnancies occurring among employees and employees' wives.

- The costs incurred by family planning services are more than compensated for by cost reductions in averted maternity-related services, leading to a positive benefits-to-costs ratio, improved employee health, attendance, productivity, and other mutual employer-employee benefits.

Marital fertility rates are determined by contraceptive prevalence rates, contraceptive method mix, induced abortion rates, and postpartum infecundability caused by lactation and/or postpartum abstinence. The company analysis estimates the current fertility rates among female employees and wives of male employees, their current patterns of contraceptive behavior, and the current rates of induced abortion. It is assumed that if more women use contraception, or use more effective contraceptive methods in the future, the pregnancy rate will decrease and lead to fewer births, better birth spacing and a reduction in the rate of induced abortion.

A. CONDUCTING THE COST-BENEFIT ANALYSIS

There are three basic elements in a cost-benefit analysis:

1. The direct cost to a company for each child born to any employee or employee's spouse, treatment of abortion complications, and other maternity-related health costs, along with indirect and possibly continuing costs such as child medical insurance, health care, educational assistance, and housing allowances;

2. The estimated number of births, abortion complications, and other health conditions that can be averted through use of family planning or, for current users, a change to more effective methods;

3. The cost to the company of providing family planning services.

1. The Cost-Benefit Analysis

In its simplest form, a cost-benefit analysis involves two steps:

First, the *benefit*, or health care savings to the company as a result of births averted, is computed:

Cost of each birth, abortion, health condition	x	Number of births, abortions, health conditions averted by family planning	=	Health care savings

Then, the *cost* of providing family planning services is subtracted from the *benefit* to determine the *total savings* to the company:

Health care savings	–	Cost of family planning program	=	Total savings to company

Costs and benefits are calculated on a year-by-year basis. Because of the nine-month gestation period between conception and birth, it is assumed that first-year family planning acceptors do not begin averting births until the second year; however, it is possible that the program will avert

some abortion complications in its first year of operation. Thus, most corporate family planning programs can expect to lose money, or be out-of-pocket, in the first year. Depending on the kinds of maternity-related benefits paid by the company, first-year costs may begin to be recovered in the second year.

Because many companies cover the costs associated with not only the birth of an employee's child, but his schooling, medical care, and other expenses, for up to 18 years or more, one averted birth may save the company money not only during the year of the birth, but in future years as well. Therefore, births averted by the family planning program will continue to save the company money in the future, even after the program is discontinued. For example, if a company pays for schooling and medical care for dependent children up to 18 years of age, and funds a family planning program for five years, it continues to receive benefits for 24 years (program efforts in the fifth year will avert births in the sixth year; these averted births will generate benefits for 18 additional years). If the family planning services include long-lasting contraceptive methods such as IUDs and voluntary sterilization, program benefits will continue to accrue for an even longer period of time.

A complete cost-benefit analysis should include not only the costs and benefits incurred during the years of family planning program operation, but future benefits as well. Therefore, the *TIPPS* Model includes four economic indicators of program impact:

1. Cash-Flow Analysis: compares money paid out and benefits received on a year-by-year basis and computes net savings or costs;

2. Payback Period: compares cumulative costs and benefits to compute the time needed to recover program costs;

3. Benefits-to-Costs Ratio: compares total program costs to total program benefits. Since one dollar recovered in the future is worth less than one dollar spent in the present, the Model allows the user to specify an annual discount rate for future costs and savings. The benefits-to-costs ratio compares total program costs to total program benefits at the present discounted value; a benefits-to-costs ratio of less than 1.0 indicates that total costs exceed total benefits. A benefits-to-costs ratio of more than 1.0 indicates that total benefits exceed total costs.

4. Internal Rate of Return: considers all program costs and the years in which they were incurred, as well as all program benefits and the years in which they were accrued, to compute an annual rate of return on the company's investment. In times of economic uncertainty, it is not always possible to predict in advance an appropriate annual discount rate. Company management can compare the return rate for family planning with the rate of return on other company investments.

To calculate the potential costs and benefits of providing family planning services, *TIPPS* uses a detailed mathematical model. The researcher furnishes information about the company's employees and their dependents, the number of births, the use of family planning, and the costs to the company for each child born or abortion complication treated, as well as anticipated costs of providing family planning. Other input variables, such as use-effectiveness of the various contraceptive methods, commodities needed for family planning acceptors, etc., have default values provided with the Model. While these values should be retained at least in the initial projections, they can be varied to reflect local conditions.

2. Estimating the Number of Births and Abortions

The number of births per year is taken from company records. Current rates of contraceptive use are estimated from surveys of workers and/or spouses. Marital fertility rates are determined, and an estimate is calculated for current rates of induced abortion.

3. Determining the Cost of a Birth

The company's cost for each child usually consists, at least in part, of legally-mandated or contractually-mandated benefits such as maternity leave, prenatal care and hospital delivery, etc.

Some companies also pay the educational costs for employee's children, dependent medical care, housing salary supplements, and even gifts at holidays or birthdays. In addition, medical care costs and absenteeism due to abortion are expenses that employers often assume. These costs must be aggregated over time (e.g., monies paid out at birth, paid out during the first year of the child's life, etc.).

4. Projecting Demand for Family Planning and Impact on Fertility

Surveys of workers and/or spouses are usually used to estimate demand for family planning services and future contraceptive use. Alternatively, future contraceptive prevalence can be modeled by the investigator (e.g., "what would happen if..." prevalence doubled in three years, or 75% of the current users of traditional methods switched to modern methods, or ..., etc.). These estimates of future contraceptive use are input into the Model, as well as an estimate of the likelihood that women who currently use induced abortion will switch to contraception. The Model computes expected declines in pregnancy rates and calculates the number of births averted and abortions averted.

5. Estimating the Cost of Family Planning Services

The cost of providing family planning services to workers and spouses depends on the delivery system adopted. Services may be provided through existing company facilities, and if this is the case, service costs may include salaries, commodities, capital investment in equipment and facilities, training, and promotional campaigns. Companies may also contract third-party service providers, such as local family planning associations, insurance companies, or private medical practices. Costs associated with third-party providers may include consultation costs, commodities, and information, education, and communication campaigns. The Model allows the user to include both fixed and recurring costs, with recurring costs being separated into consultations and commodities.

B. USING THE TIPPS MODEL

The *TIPPS* Model has been programmed interactively to allow the analyst to input baseline information and view the impact of different scenarios (target prevalence, service delivery models, etc.) on anticipated costs and benefits. The programming environment is Host, a microcomputer software system developed by Research Triangle Institute through their Integrated Population and Development Planning (INPLAN) Project with the U. S. Agency for International Development (AID).

The Model is programmed in the Turbo Pascal computer language, and no reprogramming of the Model should be necessary. Only the compiled version of the **Host** software is included with this manual. The program permits bar graph displays of several measures of benefits and costs, and supports the comparison of one projection's results with another.

The remainder of this manual is organized into the following chapters:

I Theoretical Overview of the *TIPPS* Model
II Installing **Host** and the *TIPPS* Model
III Using the *TIPPS* Model
VI The Modeling Process
V Advanced Topics
Appendices

I. THEORETICAL OVERVIEW OF THE TIPPS MODEL

A. INTRODUCTION

Retrospective cost-benefit analyses of existing family planning programs have clearly demonstrated the economic benefits of corporate investment in family planning (see Nortman, et. al., 1986; Sirageldin, et. al., 1983). However, the methodologies used by these studies are often insufficient to convince companies to offer family planning for the following reasons:

1. Management requires projections which reflect local conditions.

2. Retrospective methodologies do not permit any estimation of the future costs of providing family planning services, nor do they include measures of source or method substitution rates among current contraceptive users who switch over to the company program. In the past, cost-benefit analyses have assumed that all program acceptors were new contraceptive users, which is *not* the case in areas with significant levels of pre-program contraceptive use.

3. Previous methodologies have not included an analysis of the impact of increased contraceptive use on induced abortion. Although induced abortion is illegal in many countries, it is often a major determinant of observed fertility levels. Analytic techniques that do not explicitly allow for users of abortion to switch to contraception will over-estimate the fertility impact of increased usage and improved methods of contraception.

The *TIPPS* Model is based on the births averted methodology (Nortman) and the proximate determinants of fertility (Bongaarts). Marital fertility rates are additively determined by contraceptive prevalence rates and method mix, use of induced abortion, and postpartum infecundability and/or postpartum abstinence. Baseline fertility, contraception, and postpartum infecundability rates are measured directly, through a combination of company records, published surveys, and special interviews.

Baseline abortion rates are estimated indirectly by comparing potential fertility in the absence of contraception with estimated maximum biological fertility. Where medical records are available, records of gynecological surgery (dilation and curettage) provide an external validity check on the abortion estimate.

Contraceptive targets are based on estimates of potential demand for family planning services. Employees and spouses are asked about future fertility intentions and interest in receiving company-provided services. Because long-term planning is often difficult in developing countries, short-term targets are usually limited to two to five years. In areas of high existing contraceptive prevalence, attention is focused on improving the contraceptive method mix. In low-prevalence areas, both increased usage and better method mix are included in the targets.

Future fertility is projected on the basis of contraceptive targets and contraception-for-abortion substitution. The Model permits a continuum of scenarios, ranging from no reduction in the baseline abortion rate (usually in cases of low baseline abortion rates) to maximum reduction of baseline abortion rates (constrained by age-specific increases in contraceptive usage and method mix). Changes in the size and age structure of the target population are also considered, and births and abortions averted are calculated on the basis of the future target population.

The potential costs of family planning service delivery are calculated according to current local costs. Depending on the service delivery system selected, costs can include information, education, and communication (IE&C) campaigns, capital expenses for clinic remodeling and equipment, training costs, commodity costs, and costs of outside contractors. The Model distinguishes between fixed and variable costs to assist management in choosing payment modalities for contracted services (payment for services used vs. fixed prepayment regardless of demand).

The benefits of family planning are conceptualized as cost reductions associated with averted births and induced abortions as well as other health improvements among employees and dependents. Current cost levels are assumed, and may be based on actual company expenditures (e.g., payments to clinics for prenatal care and deliveries) or on contractual norms (e.g., salary supplements expressed as a fraction of the minimum wage).

The cost-benefit analysis includes four economic indicators:

1. Yearly non-discounted cash flows (costs of providing family planning and maternity costs averted) are calculated for each year of program functioning, usually up to 5 to 10 years.

2. Cash flow analyses project years to break-even and payback period (years to recover initial investments).

3. Costs to benefits ratios are calculated for the entire benefit horizon, for as many years as the company pays child benefits, based on present discounted value of both program costs and benefits. The Model allows company management to select the appropriate discount rate or to simulate the effects of various discount rates.

4. Finally, the internal rate of return is calculated for all program costs over the entire benefit horizon. Managers can compare the internal rate of return from family planning with other capital investments.

The Model can be divided conceptually into five stages:

* Analysis of present fertility behavior
* Projection of future fertility
* Estimation of costs of offering family planning services
* Estimation of benefits accruing from averted births, averted abortion complications, and averted illnesses
* Calculation of cost-benefit measures.

The remainder of this chapter describes each of these stages in detail.

B. ANALYSIS OF PRESENT (BASELINE) FERTILITY BEHAVIOR

The purpose of this analysis is to establish baseline age-specific rates for marital fertility, contraceptive prevalence, method-mix, and induced abortion. Program benefits are projected by comparing target rates (fertility, prevalence, abortion) against these measures.
All women in union between the ages of 15 and 49, inclusive, are considered in standard five-year age groups (15-19, 20-24, etc.). Each age group is characterized by the percentage of women in the age group who are fecundable and by their maximum biological fertility rates (unconstrained by either breastfeeding or fertility control). Universal estimates of these rates are included in the sample data tables.

The analyst must provide the following information for each age group: the number of women in union, the number of live births in the last year, the mean length of postpartum amenorrhea, current contraceptive prevalence and current contraceptive method mix. Postpartum amenorrhea is determined principally by breastfeeding practices: in the absence of breastfeeding, menstruation usually returns within 1.5 to two months after childbirth; on the average, each additional month of breastfeeding increases amenorrhea by less than one month. Some societies practice abstinence during the breastfeeding period; if average postpartum abstinence is longer than average postpartum amenorrhea, the former measure should be used. The Model calculates the length of postpartum amenorrhea from the average length of breastfeeding or allows the analyst to enter the length of postpartum amenorrhea (or postpartum abstinence) period directly.

Contraceptive prevalence is defined as the percentage of women who are currently using some recognized means of reducing the probability of conception; since postpartum amenorrhea is treated separately, breastfeeding and postpartum abstinence should not be considered contraceptive methods.

Contraceptive method mix is the percent distribution of different methods among all contraceptive users. Each contraceptive method is characterized by its effectiveness. The universal effectiveness estimates are included in the sample data tables.

The outputs of the Model at this stage include baseline marital fertility rates, baseline marital abortion rates, and the number of abortions occurring in each age group, as well as a number of intermediate variables. The mathematical equations for these and other output measures are shown in Appendix C.

C. PROJECTION OF FUTURE FERTILITY

The projection of future fertility requires the analyst to establish target contraceptive prevalence rates and method mix for each group. The Model allows the analyst to specify the number of years for the family planning program to reach its target prevalence and method mix. During this time, levels of contraceptive prevalence and method mix are interpolated linearly between base period levels and target year levels. The Model also requires the analyst to estimate the degree of contraception-for-abortion substitution; that is, the extent to which women who formerly used induced abortion will begin using contraception as the means of regulating their births. Maximum biological fertility, percent fecundable, and length of postpartum amenorrhea are assumed to remain constant throughout the years of the family planning program.

The Model works backwards from the maximum fertility rates to calculate new fertility and abortion rates. Abortion rates are calculated by subtracting the change in abortion rates due to increased contraceptive prevalence from the base period abortion rates. Fertility rates are calculated by subtracting births averted by the new contraception rates from potential fertility in the absence of contraception (maximum fertility corrected for lactation, less births averted by abortion).

The Model assumes that fertility rates in each period are determined by contraceptive practices in the preceding period, while abortion rates are determined by contraceptive practices in the same period. Accordingly, no births are averted by the program until the second time period. To calculate the number of births averted and induced abortions averted, the analyst must specify the number of women in union in each time period. Where the target population of women at risk differs from the base period population, the analyst may either interpolate between the base and target populations by specifying the number of years to reach the target or by manually entering the new target population year by year. This allows for changes in the size and composition of the work force.

Births averted are calculated by multiplying the number of women at risk by the change in fertility rates between baseline and program year; abortions averted are calculated similarly, using the change in abortion rates.

Family planning programs which include long-lasting contraceptive methods such as voluntary sterilization will continue to avert births even after program efforts are terminated, until the last acceptors leave the pool of women at risk. Programs using supply methods (pills, condoms, and other barrier methods) can assume prevalence will return more rapidly to baseline levels after activities are terminated. The Model allows the analyst to estimate the speed at which contraceptive rates return to baseline thereby regulating the time horizon of the family planning program impact.

D. ESTIMATION OF PROGRAM COSTS

To estimate the costs associated with delivering family planning services, it is necessary to project the number of contraceptive acceptors and users required each year to reach and maintain the target prevalence and method mix levels as well as the percentage of new acceptors and continuing users who will be served by the program. Every year new acceptors must be recruited, both to replace users from previous periods who have discontinued their contraceptive practices and to raise prevalence to the higher target level.

The number of continuing users of a contraceptive method in any time period is calculated as the number of users in the previous time period, adjusted for annual discontinuation. In the first time period, the number of continuing users is projected as the proportion of base period users who continue to use program sources. This proportion is set by fixing the immediate source/method substitution rate.

Acceptor targets are projected as the difference between the number of target users and the number of continuing users, divided by the first-year continuation rate. First-year continuation is determined by the immediate continuation rate and the annual discontinuation rate, which are included in the sample data tables.

Contraceptors can be divided into three groups: continuing users (those who accepted a contraceptive method in an earlier period and continue to use it throughout the present period), continuing acceptors (those who accept a method in the present period and continue to use it throughout the entire year), and discontinuing acceptors (those who accept a contraceptive method but stop using it before completing the year). Each type of contraceptor is assumed to generate a fixed number of consultations and to consume a fixed quantity of commodities.

Universal values for the number of consultations and the number of commodities required, by type of contraceptor and method, are included in the sample data tables. The program's share of new acceptors and continuing users are input variables; the Model assumes that acceptors from both the company family planning program and non-company family planning program sources show the same continuation rates.

The costs of delivering family planning services are calculated as the sum of the program's yearly fixed costs, the consultation costs, and the commodity costs. The cost per consultation and cost per unit of commodities reflect local conditions and are input variables. Fixed costs include salaries, equipment, educational efforts, etc., that do not depend on the volume of acceptors recruited.

E. ESTIMATION OF PROGRAM BENEFITS

The Model projects the benefits obtained in each period from the net number of births, abortions, and illnesses averted by the program. Benefits from births averted may accrue from several sources - including reduced delivery costs, maternal and child medical care costs, maternity leave costs, and school and housing allowances - and may be distributed over a number of years. Benefits from abortions averted are in the form of savings of the costs of treating abortion complications and are assumed to occur in the year in which the abortion is averted. Benefits from health conditions (illnesses) averted accrue from the reduction in health care costs for the treatment of STDs.

Current family planning program benefits are projected as the sum of benefits from averted births, benefits from averted abortions, and benefits from other averted health conditions.

Benefits from averted births are projected as the product of the projected number of net averted births in all periods up to and including the current period, and a matrix of benefits over time, which represent in each row the different categories of benefits paid out in each year of a child's life. Benefits from averted abortions are projected as the product of abortions averted in the current period and the average benefits per averted abortion. Benefits from other averted health conditions are projected as the product of other health conditions averted in the current period and the average benefits per health condition averted.

The Model also calculates future benefits (i.e., benefits which do not occur during the projection period,but which occur in the future as the result of births averted during the projection period) as well as future births averted by acceptors of long-lasting contraceptive methods (IUDs and voluntary sterilization).

F. CALCULATION OF COST-BENEFIT MEASURES

The Model calculates various summary measures of family planning program benefits and costs based on the projections of benefits and costs in each period. These include (a) cash flow or break-even point; (b) cumulative benefits and costs, or pay-back period; (c) cost-benefit ratio; and (d) internal rate of return. The analyst specifies the time horizon (number of years) for which the cost-benefit measures are to be calculated. Depending on management needs, this time horizon may be shorter than the benefit horizon, or may encompass the entire period during which benefits from births averted will accrue. The Model calculates summary measures for both the time horizon specified by the researcher and the entire benefit horizon.

The break-even point is defined as that period when annual benefits first exceed annual costs. The payback period is defined as that period in which cumulative benefits first exceed cumulative costs. Both of these measures are calculated on the basis of non-discounted cash flows.

The cost-benefit ratio is defined as the ratio of the discounted stream of benefits to the discounted stream of costs. To compute the discounted costs and benefits, the analyst is required to enter the annual discount rate which reflects local economic conditions. Two benefits-to-costs ratios are produced: one ratio considers only costs and benefits actually accrued during the projection period, and the other, an extended ratio, includes current discounted costs and total discounted benefits (including future benefits occurring after the program has been terminated).

The internal rate of return is, for all practical purposes, the rate of return on corporate funds invested in family planning, which equates the present values of the benefit and cost streams. Mathematically, the internal rate of return is defined as that *r* such that:

$$C_0 + \frac{C_1}{(1+r)} + \frac{C_2}{(1+r)^2} + \ldots + \frac{C_t}{(1+r)^t}$$

$$= B_0 + \frac{B_1}{(1+r)} + \frac{B_2}{(1+r)^2} + \ldots + \frac{B_t}{(1+r)^t}$$

Two measures of the internal rate of return are computed: one which is limited to benefits occurring during the projection period, and another which includes benefits occurring after the projection period but which can be attributed to births averted by the family planning program.

II. INSTALLING HOST AND THE TIPPS MODEL

This chapter describes how to:

* Install the **Host** program and the *TIPPS* Model on a microcomputer hard disk
* Configure the **Host** system to run specific applications
* Load and modify data files

Information given in this chapter presumes that the reader has some familiarity with IBM PC-DOS. Data requirements and interpretation of the Model's outputs are described in detail in Chapter IV.

Host is a microcomputer software system designed for the construction and application of mathematical models. **Host**-implemented Models consist of a linked series of "application modules" which are programs written in Turbo Pascal. Once a Model has been programmed and compiled, all of the calculations and linkages between modules are invisible to the researcher. The researcher will see only a series of menus similar to those used by Lotus 1-2-3 and WordStar.

The product of a **Host** Model is a projection or forecast of future events based on current baseline conditions and assumptions. When the Model is run, the data obtained from the first module are used as input data to the next module, and so on. Therefore, **Host** does not distinguish between input and output variables and stores them all in the same data file. This means that a careless researcher can ruin the input data. However, **Host** offers many opportunities to back up data files before doing anything that can damage them seriously.

In the command line examples given in the text, the material enclosed in a box is what will appear on the display screen. The **bold** print in the text or inside the screen simulations indicates the words and/or symbols which must be typed by the researcher. The <u>underlined</u> text in the menu simulations indicate the text which will be highlighted on the screen.

A. SOFTWARE AND HARDWARE REQUIREMENTS

The following equipment is *required* to install **Host**:

- IBM PC, XT, AT or compatible microcomputer with at least 512 Kbytes of RAM
- Hard disk or cartridge with at least 2 Mbytes of free space
- 8087 or 80287 numeric coprocessor
- PC-DOS version 2.0 or higher

The following equipment is *optional*:

- IBM graphics monitor (needed for graphics application)
- RAMdisk with at least 2 Mbytes (speeds data access time)
- Plotter

B. INSTALLING HOST

This section describes how to install **Host** on a microcomputer hard disk. For the purpose of illustration, the hard disk will be referred to as drive C:, and the floppy disk drive where the **Host** source diskettes are read will be referred to as drive A:. The **Host** diskettes are not copy-protected, so back-up copies can be made and used if needed while the source diskettes are safely stored away in a dry, dustproof environment. Once **Host** is installed on the hard disk, it can be run repeatedly. Only one installation is required.

I. The Config.Sys File

On the diskette from which the computer is booted, or in the root directory of the hard disk, there is a file called CONFIG.SYS. The CONFIG.SYS file must contain *files* and *buffers* statements similar to the following lines:

```
files=16
buffers=24
```

To determine whether this file already exists, enter the DOS **DIR** command from the system prompt (**C:>**), and press the [**ENTER**] key:

```
C:>dir config.sys [ENTER]
```

If the file CONFIG.SYS exists, the following message is displayed:

```
Directory of C:\

CONFIG   SYS   ##   ##-##-##   ##:##
       1 File(s)     ##### bytes free
```

The "#" signs in the display above refer to the various numbers (filesize, date, time, and number of bytes of storage remaining on the disk) appearing on the screen when the filename is displayed.

If your hard disk or DOS system floppy diskette does not have a CONFIG.SYS file, the computer will display the following message:

```
C:>dir config.sys [ENTER]
   File not found
```

To examine the contents of the CONFIG.SYS file, enter the command:

```
C:>type config.sys [ENTER]
```

The computer will list the contents of the CONFIG.SYS file on the screen. If the file does not contain the lines for *files* and *buffers*, or if there are fewer than 16 files or 24 buffers, the CONFIG.SYS file must be modified. Do not modify the existing CONFIG.SYS file; instead, rename it CONFIG.OLD by typing the following command line:

```
C:> ren config.sys config.old [ENTER]
```

If there is no CONFIG.SYS file on your system, or if the CONFIG.SYS file has been renamed to CONFIG.OLD, a new CONFIG.SYS file must be created. This requires two steps:

First, if CONFIG.SYS does exist, examine the listing of the command lines in the current file:

```
C:>type config.old [ENTER]
```

Second, if there are any command lines in the CONFIG.OLD file that are not related to *files* and *buffers* (such as **Device = Ansi.sys**), those lines must be copied before the files and buffers lines in the new CONFIG.SYS file. Retype the lines *exactly* as they are. Then enter the *files* and *buffers* lines from the example below:

```
C:>copy con config.sys [ENTER]
        (Type in any existing lines here)
   files=16 [ENTER]
   buffers=24 [ENTER]
   [F6] [ENTER]
```

When the [F6] key is pressed, ^Z will appear on the screen. The new file will be saved to disk as soon as [ENTER] is pressed, and then "1 File(s) copied", will be displayed.

After creating a new CONFIG.SYS file, re-boot the computer by pressing three keys simultaneously:

```
C:>[Ctrl] [Alt] [Del]
```

Now the computer is prepared for installation of the **Host** program and the *TIPPS* Model.

2. Subdirectories

Three subdirectories, named \HOST, \TIPPS, and \STARTUP, are required to store the programs and data files provided on the **Host** and *TIPPS* diskettes. A fourth subdirectory will be needed for the sample data which will be used for discussion throughout this manual.

If there is a previous version of **Host** already installed on the hard disk and a new version is to be installed, the old **Host** files from the \HOST subdirectory must be deleted. (Check the **DEL** command in your DOS manual if you need instructions about how to delete files.) The subdirectories need not be removed or recreated after the files have been deleted. If there is not a previous version of **Host**, create the required subdirectories with the following command lines. In place of the subdirectory name \COMPZ and filename **COMPZ** in the example, type in the name of the company being analyzed. Subdirectory names and file names may be up to eight characters long. (See the DOS manual for other restrictions on filenames.)

```
C:>md host [ENTER]
C:>md host\tipps [ENTER]
C:>md host\tipps\startup [ENTER]
C:>md host\tipps\compz [ENTER]
```

3. Copying the Files

The **Host** system program modules are distributed on six diskettes. The contents of all six diskettes should be copied to the \HOST subdirectory on the hard disk. Be sure each of the six diskettes is write-protected with a write-protect tab before you begin copying the files, to prevent inadvertent erasure of the files.

Put the first **Host** diskette in drive A:, close the drive door, and enter the command lines:

```
C:>copy a:\*.*  c:\host\*.* [ENTER]
```

When the computer has finished copying the first diskette and the blinking cursor returns, remove the diskette from drive A: and insert diskette #2. Press the [F3] key, and DOS will display the copy command just entered. Press the [**ENTER**] key to execute it. After the second diskette has been copied, remove it, insert diskette #3, press [F3] and [ENTER]. Do the same for diskettes #4, #5, and #6.

The *TIPPS* diskette contains the compiled MODEL module and the compiled graphics module in the \MODEL subdirectory. Twelve additional files are necessary to run an application, and these are contained in the \STARTUP subdirectory of the *TIPPS* diskette. Insert the *TIPPS* diskette in drive A:, and copy the files:

```
C:>copy a:\model\*.*  c:\host\tipps\*.* [ENTER]
C:>copy a:\startup\*.*  c:\host\tipps\startup\*.* [ENTER]
C:>copy a:\startup\*.*  c:\host\tipps\compz\*.* [ENTER]
```

Before a projection is attempted, the sample data tables and all the files named START.* in the \COMPZ subdirectory should be re-named with the company name:

```
C:>ren host\tipps\compz\start.*  compz.* [ENTER]
```

WARNING!

Do not run the company analysis on the original files in the \STARTUP subdirectory.

Appendix F of this manual contains a sample run with all the required input data. The sample data are stored on the *TIPPS* Tutorial diskette. Copy the sample data into your own applications file using the \COMPZ **copy** and **ren** (rename) examples above. After running a projection, compare your results with the tutorial files. (See Appendix F, *Tutorial*, for a listing of the sample data.)

C. USING THE KEYBOARD AND MENUS IN HOST

1. The HOST Screen

The Host screen is divided into six areas:

```
 ____________________________________________________________________
|
| Uppermost left Message area:                Uppermost right Message area:
| Current or last Model Activity              Current Model Activity Mode
|
| Menu Options list
| Brief explanation of highlighted option features
|____________________________________________________________________
|
|
|
|                              Work area
|
|
|
|____________________________________________________________________
|
| Lower left Message area:                    Lower Right Message Area:
| Brief Error Messages                        Toggle Indicator
|____________________________________________________________________
```

2. The HOST Keyboard

a. Using the Keyboard in Menu Mode

In the **Host** Menu system, the keyboard works as in Lotus 1-2-3 or WordStar:

[/] The Forward Slash key calls the Menus. It allows the user to move from inside the work area back to the menu.

[**arrow**] The Arrow keys move the cursor right and left across the menu, to highlight an option.

[**ESC**] takes the user one level up in the menu structure. Pressing [**Esc**] repeatedly will take the user back to the Main Menu.

WARNING!

In Edit mode, pressing [ESC] will cause a return to the Main Menu without saving the newly entered data.

There are two ways to select options from the menus:

1. Press the key corresponding to the first letter of the option's name. For example, to get to [E]dit mode from the Main Menu, press the [**E**] key.

2. Use the [**arrow**] keys to move the cursor to the item and then press [**ENTER**]. For example, to get to Edit mode from the Main Menu, press the right-arrow key to move the cursor until [E]dit is highlighted, and then press [**ENTER**].

In many cases, when a **Host** menu prompts for the name of a variable or an option, it will display either a [**=**] or [**?**] sign immediately to the left of the cursor:

[**=**] allows the user move through the options by pressing the [**Space**] bar until the desired option is highlighted. The option is selected by pressing the [**ENTER**] key.

[**?**] indicates that a list of the variable or option names is available by pressing the Query keys (the [**Shift**] key and the [**?**] key pressed simultaneously). When the list is displayed, move the cursor to the desired item and select it by pressing the [**ENTER**] key.

b. Using the Keyboard in Edit Mode

In Edit mode, the keys function much as they do in any other software:

[**Backspace**]	Erase one character to the left of the blinking cursor.
[**Del**]	Erase the character over the cursor.
[**Ins**]	Toggle the Insert and Overwrite modes on and off.
[**arrow**]	Move the cursor left, right, up, and down to different areas of the editor screen.
[**Q**]	Quit. Exit **Host** from the Main Menu and return control to the DOS operating system.
[ESC]	Escape from or cancel the current activity and return to the Main Menu without saving the data.

WARNING!

In Edit mode, pressing [ESC] will cause a return to the Main Menu without saving the newly entered data.

Appendix D contains a list of all the **Host** commands and the keystroke combinations which invoke them.

D. GETTING INTO THE HOST SYSTEM

To enter the **Host** system, be sure you are in the correct drive, change to the **\HOST** subdirectory, and type **HOST**, then press the [**ENTER**] key:

```
C:>cd \host [ENTER]
C:>host [ENTER]
```

When the program is fully loaded, the **Host** title screen is displayed. At the top of the screen is the highlighted prompt:

```
Press [Esc] to leave, any other key to proceed.
```

Press any key and the ACCESS screen of the Opening Menu is displayed:

```
                                                    ACCESS
User      Manager    Quit
Restrict access to the normal user.
```

Press the [**U**] key or the [**ENTER**] key to gain access as a "User". The message at the top of the screen acknowledges the requested access level, and the Main Menu is shown:

```
                                                          MAIN MENU
Configure Define Edit Run Tabulate Graph Instruct Manage *DOS Quit
Specify file names, directories, printer and monitor settings.
```

E. CONFIGURING HOST TO RUN THE TIPPS MODEL

Before the Model is run, a data set must be loaded into a subdirectory of the \TIPPS subdirectory (see the \COMPZ example above). Create separate subdirectories for each data set to facilitate handling of the data files. To begin a new simulation, a blank data set can be copied directly from the \STARTUP data files into a new subdirectory, renamed, and then modified from within the program.

To configure the **Host** system to run the *TIPPS* model, enter **Host** and gain access to the system as a "User". Select "Configure" from the Main Menu by pressing the [**C**] key or moving the cursor until "Configure" is highlighted, and then pressing the [**ENTER**] key. The Configure Menu will be displayed:

```
                                                          CONFIGURE
Files Output Directories Printer Monitor Save Quit
Edit Data.  Comparison and Instruction file names.
-----------------------------------------------------------------------
FILES                      PRINTER SETTINGS          MONITOR SETTING

Data          : COMPZ      Left Margin    :  5       Monochrome : Yes
Comparison    :            Top Margin     :  5
Instruction   :            Bottom Margin  :  5
                           Page Length    : 66
OUTPUT DEVICES             Line Length    : 65

Table : Printer            Page Eject     : Yes
Graph : Printer            Setup String   :

DIRECTORIES

Data          : \HOST\TIPPS\COMPZ
Module        : \HOST\TIPPS\
Library       : \HOST\TIPPS\COMPZ
Instruction   : \HOST\TIPPS\
```

Select the [F]iles option. Type in the name of the data set (e.g., "**COMPZ**") on the line titled "Data".

```
FILES

Data          : COMPZ
Comparison    :
Instruction   :
```

Leave the spaces for the Comparison file and the Instruction file blank for now. Their use is described in Chapter V, Section B, *Instruction Files*. Return to the Configure Menu by pressing the [/] or [**ESC**] key.

Select the "Directories" option, either by pressing [**D**] or moving the cursor until "Directories" is highlighted, then pressing the [**ENTER**] key. Enter the names of the subdirectories containing your company data on the "Data" and "Library" lines:

```
DIRECTORIES

Data          : C:\HOST\TIPPS\COMPZ
Module        : C:\HOST\TIPPS
Library       : C:\HOST\TIPPS\COMPZ
Instruction   : C:\HOST\TIPPS
```

Return to the Configure Menu by pressing the [/] or [**ESC**] key.

If output is to be directed to the screen instead of the printer, select the "Output" option. The change from "printer" to "console" can be typed in, or you can press [**+**] to examine each of the available output options in turn. When your selection is displayed, press [**ENTER**] to select it. Return to the Configuration Menu by pressing the [/] or [**ESC**] key. The "Printer" and "Monitor" settings can also be modified as needed, by selecting the appropriate option from the Configuration Menu and typing in the correct settings.

When the configuration settings are complete, return to the Configuration Menu and select the [S]ave option, either by pressing the [**S**] key or by moving the cursor until "save" is highlighted, then pressing the [**ENTER**] key. The program will save the new configuration and respond

"Configuration has been saved".

Return to the Main Menu via the [**Q**]uit option. The *TIPPS* Model has been configured and is ready for use.

If the Configuration file already contains the proper specifications, they need not be re-entered. Select [**Q**]uit to return to the Main Menu.

If the display is difficult to read, or if an error message is displayed, the problem may be automatically corrected once the system has been properly configured. Other reasons for difficulty at this stage are inadequate equipment and improper installation.

III. USING THE TIPPS MODEL

Chapter II described how to install the **Host** software and the *TIPPS* model. Instructions were given concerning how to create subdirectories, configure the **Host** system, load the data, and move around the **Host** Menus to use the various **Host** User options.

Information given in this chapter presumes that the program files have been installed and the sample data files from the original A:\STARTUP subdirectory have been copied onto the C: drive and into a subdirectory which has been given a company name (for example, \COMPZ), and that the files named START.* (all extensions) have been re-named with that company name (for example, COMPZ.*).

WARNING!

Do not run the company analysis on the
original files in the \STARTUP subdirectory.

Many input variables must have a value, or the Model will not execute. An error message, such as

"Variable <name> contains no data"

will be displayed when the required data have not been entered.

This chapter describes how to enter and modify data, run a projection, examine the results, and terminate a **Host** session.

A. ENTERING AND MODIFYING DATA

1. Selecting the File and the Variable to be Modified

To select the file into which new data will be entered or existing data modified, select [E]dit from the Main Menu. The program will request the name of the file to be edited from the subdirectory designated during the "Configure" procedure.

```
                                                SELECT FILE
        COMPZ  Quit
        Edit Data File COMPZ.
```

Use the [**arrow**] keys to move the cursor until the file name is highlighted, and press the [**ENTER**] key to select the file. The program will request a variable name:

```
                                                SELECT VARIABLE
        Variable name ? _______
```

Select the variable by typing the name of the variable in which data are to be entered or edited, *exactly as the name appears in the Model*, or press the query ([**Shift**] and [**?**]) keys to obtain an alphabetical list of all the variables available in the Model. Move the cursor to highlight the name of the variable to be entered or edited, then press the [**ENTER**] key. A list of the available variables is presented in Appendix B.

For example, suppose the variable name BBIRTHS is to be edited. Enter the variable name BBIRTHS, or press [**Shift**] and [**?**] and use the [**arrow**] keys to move the cursor until BBIRTHS is highlighted. Then press the [**ENTER**] key:

```
Data File:  COMPZ                                   EDIT DATA
Variable Name  :  BBIRTHS
```

The existing data for the variable will now appear on the screen:

```
Data File:  COMPZ                                          EDIT DATA

Variable Name  :  BBIRTHS
Description  :  Base Period Number of Births (B)
-------------------------------------------------------------------
        AGE

       15-19    0.000000000
       20-24    0.000000000
       25-29    0.000000000
       30-34    0.000000000
       35-39    0.000000000
       40-44    0.000000000
       45-49    0.000000000
```

2. Entering New Data/Editing Existing Data

Enter new data or edit the existing data by moving the cursor and typing the correct numbers in the appropriate places, being sure to press the [**ENTER**] key after each entry. Existing data will be overwritten.

If the numbers being entered are inserted instead of overwriting the existing data, press the [**Ins**] key once to toggle the Insert/Overwrite function. Move from one field to another with the cursor [**arrow**] keys.

Errors in data entry can be corrected before moving on to a new field, by using the [**Backspace**] key to erase the error, then typing the correction. If an error is discovered after the field has been left, use the [**arrow**] keys to move the cursor back to the field and type the correct value over the old one. When the value for the last age group has been entered, the program will issue a warning tone as soon as the [**ENTER**] key is pressed.

When the entry or editing is complete, press the [/] key to save the data and return to the Edit

Menu. (The [**ESC**] key will return the cursor to the Main Menu without saving the data.) When all the data for the current variable have been correctly entered, press the [**/**] key to return to the Edit Menu. The menu will be displayed:

```
                                                          EDIT MENU
Resume Area Period Interpolate Save Dimension Variable File Quit
Resume editing current variable.
```

Press [**S**]ave to save the data. When the program suggests saving the variable under its own name, press the [**ENTER**] key to do so. If the data are not saved at this point, they will be lost.

WARNING!

Remember to save all changes you make to the data.

Any changes NOT saved will be lost.

To return to the current variable if additional editing is required, press [**R**]esume.

To edit another variable, press [**V**]ariable. The computer will request the name of the variable to be edited. Enter the name of the new variable, either by typing its name or by pressing the query keys ([**Shift**] and [**?**] pressed simultaneously) to display the entire variable list. See Chapter IV for a detailed discussion of the variables for which you will need to input data before running a projection.

After editing each variable, [**S**]ave the changes before going on to edit the next variable. After saving the last changes made to the last of the variables, press the [**F**]ile key to select another file for editing, or press the [**Q**] key to [**Q**]uit the Edit Menu and return to the Main Menu.

Host makes no distinction between input and output variables, so any variable in the set can be examined and modified through the Edit option. Any changes made to output variables will be overwritten the next time a projection is run. See Appendix B for the classification of input and output variables.

3. Editing Three-Dimensional Data

Three-dimensional periodic variables such as $DECAYDAT_{[age,\ method,\ decayper]}$ are displayed by projection period. Since the computer can display only two dimensions at one time (one as rows, the second as columns), the first screen displays only the first value or level of the third dimension (time).

To reach subsequent levels, return to the Edit menu by pressing the [/] key, then select "[D]imension". Press the [+] or [−] key to obtain a display of the data for a different period than is shown on the screen.

A non-zero value must be entered for every projection period; if the true value is zero, enter a very small fraction (e.g, 0.000000001).

4. Editing Periodic Data

Periodic variables (e.g., FIXCOSTS) require a value for every period for which a projection is to be run, even if the value does not change. As indicated by the menu, the function keys can be used to move from period to period: [**F4**] to advance one period and [**F3**] to go back one period.

A non-zero value must be entered for every projection period; if the true value is zero, enter a very small fraction (e.g, 0.000000001).

5. Verifying the data

After the input tables have been printed (See Chapter V, Section B, *Instruction Files* for printing the input tables), visually inspect the values for each variable. The sums of the column values for BMETHMIX must equal 1.000, as must the sums of the column values for TMETHMIX.

Once you have verified the data, you are ready to run a projection.

B. RUNNING A PROJECTION

1. The Run Screen Parameters

When all the input variables have been entered, a projection can be "Run". From the Main Menu, select the "[**R**]un" option. When prompted for the name of the module, enter "**MODEL**". The computer will display the default setting of several parameters, including a **data file** (COMPZ, or as determined by the settings in the Configuration file; see Chapter II, Section E, *Configuring Host To Run The TIPPS Model*), a **Starting Period** (default=1), and the **Number of Periods** (T) to project (default=1).

```
Application module   : MODEL
Data file            : \HOST\TIPPS\COMPANYZ\COMPZ
Starting period      :    1
Number of periods    :    1
```

Using the default settings, the Model will begin with period one and project one additional period, for a total of two periods. For most projections, the Starting Period should be left at one (the default), while the Number of Periods may be set at a higher value. To check the base period rates before projecting future fertility, leave the Number of Periods at one. To project the impact of a family planning program over a number of years, the length of the projection should be equal to or greater than the length of the program plus the time required to return to baseline fertility:

$$\text{Number of Periods} \geq (\text{YRSTOEND} + \text{DECAYDAT}_{[start]} + \text{DECAYDAT}_{[end]})$$

2. Running the Program

Use the [**E**]dit option from the Run Screen Menu to modify the default settings, and when the Run screen parameters have been edited, press the [/] key to return to the Run Menu. Select "[**G**]o" to begin the projection.

After the "Go" command is given, the data file can be backed up. The projection that is about to run will overwrite the output variables calculated by the previous projection. To preserve the old output variables, respond [**Y**] to the computer prompt, and give the backup file a new name:

C:\HOST\TIPPS\COMPZ\ARCHIVE

If you do not wish to back up the previous data file, respond [**N**] to the computer prompt. The model will continue processing the data.

Before making any projections, the program checks the values of several input variables. Variables used as the denominators in division operations cannot be given a value of zero or the program will not proceed. For example, in equation 1.1 (shown in Appendix C), base period age-specific fertility rates are calculated by dividing the observed number of births by the number of women at risk:

$$BMASFR_{[age]} = BBIRTHS_{[age]}/BFEMRISK_{[age]}$$

BFEMRISK (an input variable) is the denominator of a division operation; it cannot be given a value of zero (0) in any age group. The program automatically checks all such variables and if it encounters a zero value as a denominator, an error message is displayed:

```
| **** MODEL will Abort because [variable] contains a Zero value *** |
```

The value of the variable mentioned can be modified via the [E]dit option from the Main Menu (see Chapter III, Section A, *Entering and Modifying Data*). If, after correcting the value of the variable, the Model does not run, exit to the operating system and re-enter **Host**. Attempts to run the Model with incorrect data will cause the Model to terminate abnormally and automatically exit to the DOS.

The Model verifies that the sums of the age-specific contraceptive method mix across all methods (columns) within each age group for both BMETHMIX and TMETHMIX equals exactly 1.000. If any errors are encountered, processing is suspended and one of the following messages is displayed, depending on which variable contains a sum of values not equal to 1.000:

```
**** WARNING ****
Column(s) of TMETHMIX do(es) not sum to one
Recommend you verify values before proceeding
Do you wish to halt further processing (Y/N)?
```

or

```
**** WARNING ****
Column(s) of BMETHMIX do(es) not sum to one
Recommend you verify values before proceeding
Do you wish to halt further processing (Y/N)?
```

To verify the values of the input variables BMETHMIX and TMETHMIX, type: [**Y**] [**ENTER**]. To continue processing, type: [**N**] [**ENTER**].

As the program begins processing the data, it displays a status message:

```
Performing Base Period Fertility Analysis...
```

When data processing is completed, the program displays:

```
Performing Base Period Fertility Analysis...completed
```

This message means that the base period analysis has finished successfully, and the program will begin the projections. A status message is also displayed for each period specified in the "Run" set-up:

```
Projecting for period [T]
...births averted  ...acceptors  ... costs  ...benefits
```

If the Modeling program encounters a data error, an error message will flash briefly on the bottom of the screen, the run terminates prematurely, and the Modeling program exits to DOS.

The most common error is failure to enter values for the periodic input variables (i.e., FIXCOSTS, BENCOND1) for each of the years of the projection periods specified in the Run Screen set-up. Re-enter **Host** and correct the data, then try again.
When the Modeling program has successfully terminated the projection, the Run Menu will appear again:

```
Application Module  ?
Data File           : \HOST\TIPPS\COMPZ\COMPZ
Starting period     :   1
Number of periods   :   1
```

Press [**ESC**] and then [**Q**]uit. The [/] key cannot be used to exit from the Run Menu.

C. EXAMINING THE RESULTS (OUTPUT VARIABLES)

The *TIPPS* Cost-Benefit Model produces output in both tabular and graphic forms. In addition, individual output variables can be examined via the "Edit" option.

1. With the "Edit" Option

As explained earlier, **Host** stores all input and output variables in the same data file without distinction. This feature permits the results of any projection to be examined through the "Edit" option. The variables are requested from the Edit Menu as described earlier.

There are two major disadvantages to using the "Edit" option to examine the results.

First, the output values will appear only on the screen. They cannot be exported to another computer file.

Second, and most importantly, **Host** does *not* reset the output variables to zero before a new projection is run. Instead, the old values are overwritten. If the current projection runs for fewer periods than were specified on previous runs, **Host** keeps the values from the earlier projections in the periods that were not specified in the new run. The current projection will not overwrite all of the values of the previous projection, and the old values cannot be distinguished from the new ones. To avoid these problems, use the [T]abulate option for routine examinination of the Model projection results.

2. With the "Tabulate" Option

The *TIPPS* Model diskette contains two files (TABLE.LIB and TABLE.IDX) in the \STARTUP subdirectory which contain a set of predefined tables. (See Appendix B for a list of the predefined tables.) **Host** uses these predefined table definitions to generate tables from data in one or more **Host** data files. Tabular output can be directed to the screen, to a printer, or to a disk file for use with other software packages.

Select the "[T]abulate" Menu from the Main Menu, either by pressing [T] or by highlighting "[T]abulate" with the cursor and pressing the **[ENTER]** key. The Tabulate Menu will be displayed on the screen:

```
|                                                                |
|                                                   TABULATE     |
|   Table Name        ? _______                                  |
|   Data File         : \HOST\TIPPS\COMPZ\COMPZ                  |
|   Comparison File   :                                          |
|   Output File       : PRN                                      |
|   Periods           : ALL                                      |
|_______________________________________________________________|
```

Either type in the table name or press the Query ([**Shift**] and [**?**]) keys simultaneously to obtain a list of all the predefined tables. Use the [**arrow**] keys to move the cursor to highlight the table to be displayed, and press the [**ENTER**] key.

Select the output file to which the data are to be directed. ".PRN" will send the output to a print-ready disk file, "LPT1" or "PRN" (depending on your particular printer setup) will send it to the printer, and "CON" will display it on the screen. The output destination can be changed at any time.

The default for Periods is "ALL", but any subset of the available periods can be specified (up through T+1, as specified in the "Run" set-up):

* Individual or non-consecutive periods to be included in a table should be separated by commas (e.g., 1,6,11).
* A range of included periods should be separated by a hyphen (e.g., 1-3).
* Both hyphens and commas can be used in the same specification (e.g., 1-3,5).
* Leading and trailing hyphens can also be used (e.g., -3 is equivalent to 1,2,3, and 3- is equivalent to 3,4,5,...,T+1).

If output tables other than those included in the *TIPPS* diskette are required for specific applications, refer to Chapter V, Section D for information concerning table creation.

Press the [/] key to return to the Tabulate Menu and select [**G**]o to run the tabulation. After examining the data, return to the Tabulate Menu again. Select [**S**]ave to save the table, and then select [**Q**]uit to return to the Main Menu.

3. With the GRAPH Application Module

A special graphics module (GRAPH) has been designed for the *TIPPS* Model. The data to be displayed in the graph must have been previously generated by running a projection of the MODEL Module.

The GRAPH Application Module permits several variables to be displayed simultaneously in bar graphs, both individually and in pairs. It is especially designed for group presentations; see Chapter V, Section A, *Sensitivity Analysis*, for an explanation of how to use it.

D. TERMINATING THE SESSION

Exit **Host** from the Main Menu by selecting the "[Q]uit" option. When the computer requests confirmation ("Return to operating system?)", type "**Yes**" or press the [**Y**] key, then press the [**ENTER**] key. The computer system DOS prompt (**C>:**) will appear.

IV. THE MODELING PROCESS

In this chapter, each of the five stages of the modeling process will be discussed in detail:

1. Calculating Baseline Fertility
2. Projecting Future Fertility
3. Estimating Costs
4. Estimating Benefits
5. Cost-Benefit Analysis

To clarify the modeling process, data are classified as input variables and output variables.

* Input variables with Universal Values are supplied in the START.* data files. These need not be altered by the researcher.

* Input variables with User-Supplied Values must be entered by the researcher, using the **Host** "Edit" option from the Main Menu (see Chapter III, Section A, *Entering and Modifying Data*).

* Output variables are produced as the result of a "Run" of the Model, with the researcher specifying the number of periods to be projected.

Each of the five stages of the modeling process is discussed in a separate section of this chapter. Input variables and their data sources and output variables are described, and information is provided regarding the interpretation of each output variable produced during each phase of the analysis.

Many of the input variables have universal values that apply to all companies in all countries, and these variables are listed first for each stage of the modeling process in which they are to be found. They include such factors as maximum biological fertility for women of different age groups and effectiveness of different contraceptive methods.

The universal values are based on published studies, and whenever possible, they should be used without modification. They are stored in the START.* data files in the \STARTUP subdirectory.

Should it be necessary to modify the universal values, they can be changed with the "Edit" option, just like any other input variable.

Some of the dimensioned variables may have levels which do not apply to the analysis at hand. For example, BMETHMIX (Base period contraceptive method mix) allows entry for all age groups from 15 to 49; yet a company may have no eligible women in the 15-19 age group. Similarly, all contraceptive methods are included, including some which may not be locally available (e.g., Norplant implant or vasectomy).

The researcher should not attempt to redefine these variables. Instead, zero values should be entered whenever the variable level does not apply. In some cases, a very small positive value (.00000001) should be entered instead of zero, to avoid a division error. The data in the START.* files already have the appropriate zero values entered, and the text will indicate throughout the chapter whenever a non-zero value must be entered.

Data sources for user-supplied input variables may include company records, surveys of workers and/or spouses, and secondary sources such as national surveys or censuses. The use and manipulation of data sources will also be discussed in this chapter.

It is possible to run a partial analysis without entering all the data that are required for a complete projection, providing that the START.* files have been copied correctly (see Chapter II, Section B, *Installing HOST*).

NOTE:

Each stage of the Model should be analyzed in order. Data for subsequent stages should *not* be entered until the previous stages are satisfactorily completed.

A. CALCULATING BASELINE FERTILITY

Calculation of baseline fertility requires 17 variables, eight of which are input variables. Three of the input variables have universal values and five have user-defined values. The values of the output variables are calculated by the Model during the projection. The universal values should be used without modification, exactly as they are specified in the \STARTUP files.

Input Variables with Universal Values

Variable Name	*Brief Description*	*Valid Range*
$EFFECT_{[method]}$	Contraceptive Effectiveness by Method	0 < EFFECT < 1
$FECUND_{[age]}$	Proportion Fecundable	0 < FECUND < 1
$MAXFERT_{[age]}$	Biological Maximum Fertility	0 < MAXFERT < 1

Input Variables with User-Supplied Values

Variable Name	*Brief Description*	*Valid Range*
$BBIRTHS_{[age]}$	Base Period Number of Births	0 < BBIRTHS
$BCONPREV_{[age]}$	Base Period Contraceptive Prevalence	0 < BCONPREV < 1
$BFEMRISK_{[age]}$	Base Period Number of Women at Risk	0 < BFEMRISK
$BMETHMIX_{[age]}$	Base Period Contraceptive Method Mix	0 < BMETHMIX < 1
$BREAST_{[age]}$	Average Length of Breastfeeding (Months)	0 < BREAST
DIRECTPP	Input Postpartum Amenorrhea Directly	0 , 1
$POSTPART_{[age]}$	Average Length of Postpartum Amenorrhea	1.50

Output Variables

Variable Name	*Brief Description*
$BABORT_{[age]}$	Base Period Number of Abortions
$BAVEFFCT_{[age]}$	Base Period Contraceptive Effectiveness
$BBAA_{[age]}$	Base Period Births Averted by one Abortion
$BMASAR_{[age]}$	Base Period Marital Age-Specific Abortion Rate
$BMASFR_{[age]}$	Base Period Marital Age-Specific Fertility Rate
$BMTHPREV_{[age, method]}$	Base Period Contraceptive Prevalence by Method
$BPOTFERT_{[age]}$	Base Period Potential Fertility
$BUSERS_{[age, method]}$	Base Period Number of Contraceptive Users
$LACTINDX_{[age]}$	Lactation Index
$POSTPART_{[age]}$	Average Length of Postpartum Amenorrhea

1. Input Variables with Universal Values

$EFFECT_{[method]}$ (Contraceptive EFFECTiveness by method)

Effectiveness (of contraceptive methods) in preventing pregnancy. EFFECT ranges between 0 (completely ineffective) and 1 (completely effective) and is a non-periodic real variable with one dimension [METHOD].

$FECUND_{[age]}$ (Proportion FECUNDable)

The percentage of women (by 5-year age groups) who are fecundable. FECUND is a non-periodic real variable with one dimension [AGE].

$MAXFERT_{[age]}$ (Biological MAXimum FERTility)

Estimates of maximum biological fertility rates by 5-year age groups. MAXFERT is a non-periodic real variable with one dimension [AGE].

2. Input Variables with User-Supplied Values

BBIRTHS$_{[age]}$ (Base period number of BIRTHS)

The number of births occurring to women in each age group (BFEMRISK) during the 12 months preceding the base period. Zero values may be entered where there are no women in the age group. BBIRTHS is a non-periodic real variable with one dimension [AGE].

BCONPREV$_{[age]}$ (Base period CONtraceptive PREValence)

Overall contraceptive prevalence rates for all methods for each age group of women (BFEMRISK) during the base period. BCONPREV can take any fractional value between 0 and 1. Zero values should be entered where there are no women in the age group. BCONPREV is a non-periodic real variable with one dimension [AGE].

BFEMRISK$_{[age]}$ (Base period FEMales at RISK)

The number of women in union [by 5-year age groups] during the base period. If there are no women in an age group, a very small non-zero value (.0000001) must be entered. BFEMRISK is a non-periodic real variable with one dimension [AGE].

BMETHMIX$_{[age,\ method]}$ (Base period contraceptive METHod MIX)

Base period relative contraceptive prevalence (distribution of methods among contraceptive users) by 5-year age groups and method. The sum of the values across all methods within a given age group must equal 1.0. Check for rounding errors if an error message appears. If BCONPREV within a group is zero, or if there are no women in the age group, a value of 1.0 should be entered in "Traditional". This will prevent an error message from interrupting the calculation of base period fertility. The program will run if zero values are entered for all contraceptive methods, but error messages will appear. BMETHMIX is a non-periodic real variable with two dimensions [AGE, METHOD].

BREAST$_{[age]}$ (Mean length of BREAST-feeding)

The mean length of breast-feeding (by 5-year age groups) specified in months. Minimum value is 0 months; only whole numbers should be entered. BREAST is used when the researcher wants automatic calculation of postpartum amenorrhea (POSTPART) and has set DIRECTPP to 0 (automatic recalculation). BREAST is a non-periodic real variable with one dimension [AGE].

DIRECTPP (DIRECT input of PostPartum amenorrhea: 0 = no, 1 = yes)

The model allows the researcher to choose between entering the mean length of breast-feeding (BREAST) and entering the mean length of postpartum amenorrhea or abstinence. If DIRECTPP is set to 0 (DIRECTPP = 0), the researcher must enter mean length of breast-feeding (BREAST) and the computer calculates the length of postpartum amenorrhea.

WARNING!
If DIRECTPP = 0, the Model will override any
values of POSTPART that have been entered manually.

If DIRECTPP is set to 1 (DIRECTPP = 1), all values for postpartum amenorrhea (POSTPART) must be manually entered. The automatic calculation of postpartum amenorrhea is overridden, and the computer will ignore all values for BREAST. DIRECTPP has been set to 0 in the \STARTUP files. DIRECTPP is a control parameter with no dimensions.

POSTPART$_{[age]}$ (Average length of POSTPARTum infecundability)

An estimate of the average length of postpartum amenorrhea (by 5-year age groups) in months, or postpartum abstinence, whichever is longer. Minimum value is 1.5 (months), even where there are no women in the age group.

POSTPART is an input variable if the researcher does *not* wish automatic calculation of its value from breast-feeding and has set DIRECTPP to 1. POSTPART is an output variable if the researcher enters the mean length of breast-feeding (BREAST) and has set DIRECTPP to 0. POSTPART is a non-periodic real variable with one dimension [AGE].

3. Data Sources for User-Supplied Input Variable

$BBIRTHS_{[age]}$

Base period birth (BBIRTHS) data should come from company records. It is essential that the company know how many births occurred in its population during the last year; companies that do not have any record of total births are not good candidates for analysis. However, most companies will not have births listed by mother's age, so it will be necessary to derive the age distribution separately.

There are several ways to estimate the age distribution of the mothers. Survey data may be used if all births occurring in the last two years are included. For each birth, the mother's age at the time of the birth must be calculated; the age distribution is then computed on the basis of adjusted age (dividing the number of births in each 5-year age group by the total number of births). These fractions are then applied to the total number of births registered in the company records. Care must be taken to ensure that the survey sample is not biased by age; if age bias is detected, appropriate weighting procedures must be followed.

If company records list an employee identification number for each birth, the mother's age can be found in the employee record or estimated from her husband's age. It may be necessary to enter the entire employee roster into a computer data base to make the match. An experienced typist/data entry person using a commercial data base (such as dBase III) can enter information about several thousand employees in a week's time.

If there is no way to match births with employee records, a random sample of births can be drawn from the company clinic (80-100 births would be sufficient) and the mother's age determined. The resulting age distribution of the random sample can then be applied

to the total number of births. For example, if 30% of the births in the sample occurred to women 20-24, then 30% of the total number of births would be assigned to this age group. Care must be taken to have a truly random sample, and clinic records should not be used if a significant portion of the births occur outside the clinic.

If complete family records are kept *and kept up to date*, the number of births in a given calendar year can be estimated from the listings of children with birth dates in that year. These numbers must be corrected for estimated infant mortality. Again, it may be desirable to create a computer data base for the family record. Compute the mother's age at the time of the birth of the child to get the age distribution of births, and apply the correction for infant mortality uniformly across age groups (a slight simplification, since infant mortality should vary somewhat by mother's age).

BCONPREV$_{[age]}$

Base period Contraceptive Prevalence (BCONPREV) should be estimated from the sample survey. It may be possible to adapt data from local or national fertility or prevalence surveys; care must be taken to use similar strata (for example, if the company being studied is located in a city, an urban stratum must be used). If company employees tend to be better educated or have higher incomes than the general population, it is likely that their contraceptive prevalence may be higher as well.

See BMETHMIX for a discussion of valid contraceptive methods.

The Model requires that BCONPREV be entered by 5-year age groups. Regardless of sample size and total prevalence, BCONPREV should be calculated separately for each age group. The numerator consists of the number of women in the group who are currently using any method of contraception; all sterilized women, regardless of reason for sterilization, should be included. If hysterectomies are common, for example, the women with hysterectomies should be included. The denominator consists of *all* women in the age group, including pregnant, postpartum, and post-menopausal women.

BFEMRISK$_{[age]}$

Company records should be used as the source of BFEMRISK (Base period females at risk) data rather than the employee survey responses, to permit a smaller sample size for the survey and provide an external check for possible bias.

In theory, BFEMRISK should include all women who are entitled to company-provided or subsidized maternity-related benefits. In practice, since child-bearing is usually limited to women in union (including consensual unions) the Model considers only women in union and uses marital age-specific rates throughout.

Female beneficiaries may include two classifications: women employees and wives of male employees. In the early stages of analysis, it may be useful to keep the two groups separate, as they will probably show different patterns of fertility and contraceptive behavior. When both groups are combined for the overall company analysis, care must be taken that they are represented in proportions equal to their representation in the universe of employees and dependents.

Company records often do not give the age or birth date of spouses; if a wife's age is unavailable, it must be estimated from the husband's age. (Companies which do not maintain age or birth dates for employees are not suitable for analysis). Depending on local practices, a fixed number of years can be subtracted from the husband's age; however, the mean age difference between husband and wife often increases with husband's age due to remarriage to younger women.

Many companies do not update personnel records, which makes it difficult to determine actual marital status of employees. In this case, there is danger of underestimating the number of women in union, especially among the younger age groups. Underestimation of the number of women in union leads to an overestimate of marital fertility rates and may produce potentially anomalous results concerning abortion rates. These problems and possible corrections will be discussed in the following section on output variables.

BMETHMIX$_{[age, method]}$

Base period method mix (BMETHMIX) is calculated by classifying contraceptive users simultaneously by age and method. In theory, size should be large enough to provide an expected value of at least 5 (and preferably 10) in each cell (e.g., condom users ages 20-24, pill users ages 25-29, etc.). In practice, where prevalence rates are extremely low (below 15% total use), this would require enormous sample sizes. Therefore, it may be more convenient to group contraceptive methods of equal theoretical effectiveness; for example - traditional methods and periodic abstinence; barrier methods; pills; IUDs, injections and implants; sterilization. Women can also be classified by 10-year age groups (20-29, 30-39, 40-49) and the resulting rates entered for both of the component 5-year age groups. (The Model requires that BMETHMIX be entered by 5-year age groups.)

Contraceptive methods *do* include such "traditional" methods as withdrawal and rhythm. Contraceptive methods *do not* include such "other" methods as douching, herbal teas, etc.; women who state that they use these methods are coded as non-users. It is important to include the woman's current pregnancy status (pregnant, postpartum) in the event that the survey sample is biased (e.g., a clinic-based sample may include an over-representation of pregnant or postpartum women). If such bias is suspected, the sample size must be increased accordingly, to allow a 3-way breakdown (age by pregnancy status by contraceptive method), and the results weighted accordingly.

BREAST$_{[age]}$, DIRECTPP, and POSTPART$_{[age]}$

Estimates of mean length of breast-feeding (BREAST) and POSTPART (postpartum amenorrhea and/or postpartum abstinence) should be taken from secondary data sources (World Fertility Survey, Contraceptive Prevalence Survey, Demographic and Health Survey, etc.). The company survey sample size will be too small to calculate a reliable estimate. The appropriate stratum must be selected (e.g., capital, urban, rural).

Most of these secondary sources contain an estimate of mean length of breast-feeding, but the methodologies used may differ. If breast-feeding has been calculated using the next-to-last child born alive ("closed interval" method), the result obtained may be a bit too short. If the last child born alive ("open interval" or life-table method) is used, the result obtained may be a bit too long.

The methodology now being used considers all children born in the 3 years before the interview (last, next-to-last, etc.); it is called the "current status" method. The model does not expect the researcher to recalculate mean length of breast feeding; however, he/she should know what method was used in the secondary data source, in case anomalous output values occur.

Postpartum amenorrhea (POSTPART) is seldom included with national survey results, although it is often found in secondary analyses of those data. Therefore, the researcher should begin by choosing automatic calculation of postpartum amenorrhea (POSTPART) by setting DIRECTPP to 0 and entering the mean length of breast-feeding (BREAST). In general, the same value of BREAST should be entered for all 5-year age groups.
However, in some societies, women begin supplementary feeding before terminating breast-feeding, and this is especially common among urban working women. In these cases, automatic calculation may significantly over-estimate the length of postpartum amenorrhea. Since overestimation may bias the output results, the researcher may wish to set DIRECTPP to 1 and manually enter postpartum amenorrhea (POSTPART) values.

4. Output Variables

BABORT$_{[age]}$ (Base period number of ABORTions)

The estimated yearly number of induced abortions during the base period (BABORT) is estimated as the product of base period abortion rates (BMASAR) and base period number of women at risk (BFEMRISK).

BAVEFFCT$_{[age]}$ (Base period AVerage contraceptive EFFeCTiveness)

Average contraceptive effectiveness is estimated as the product of base period contraceptive method mix (BMETHMIX) and contraceptive effectiveness by method (EFFECT). The higher the proportion of more effective contraceptive methods in the

method mix, the higher the average effectiveness. The product of effectiveness and prevalence determine the degree of fertility reduction in the population: low prevalence combined with high effectiveness can avert as many births as high prevalence combined with low effectiveness.

$BBAA_{[age]}$ (Base period Births Averted by one Abortion)

BBAA refers to the number of live births averted by one induced abortion. While an abortion terminates the pregnancy, it averts less than one live birth because the woman returns immediately to the fecundable state where, unless she uses contraception, she can conceive a new pregnancy which will result in a live birth.

In the absence of post-abortal contraception, each induced abortion averts, on the average, 0.4 live births. Women who adopt contraception after abortion avert more than 0.4 live births because their contraceptive method further extends the interval before the next pregnancy. Assuming that the probability of a woman's adopting contraception after an abortion is equal to the probability of contracepting in the population at large, births averted by one abortion (BBAA) is a function of base period contraceptive prevalence (BCONPREV) and base period contraceptive effectiveness (BAVEFFCT).

Births averted by one abortion are usually not reported as a fertility index. Rather, they are used by the Model to estimate age-specific abortion rates.

$BMASAR_{[age]}$ (Base period Marital Age-Specific Abortion Rate)

It is almost impossible to estimate abortion rates (BMASAR) from survey data because many women deny using this method of fertility control. The Model estimates abortion rates indirectly, by comparing potential fertility in the absence of contraception (BPOTFERT) with maximum biological fertility (MAXFERT) adjusted for lactation (LACTINDX).

If potential fertility without contraception (BPOTFERT) is less than maximum fertility (MAXFERT), the difference must be made up by induced abortion. The base period marital age-specific abortion rate (BMASAR) is estimated by dividing this difference ((MAXFERT * LACTINDX) - BPOTFERT) by the number of births averted by one abortion (BBAA).

BMASFR$_{[age]}$ (Base period Marital Age-Specific Fertility Rates)

The marital age-specific fertility rate (BMASFR) is defined as the number of observed births (BBIRTHS) to women in union during the preceding 12 months divided by the number of women in union (BFEMRISK). The sum of all marital fertility rates from ages 15 to 49, multiplied by 5, gives the *Total Marital Fertility Rate*, or the number of children a woman married at age 15 can expect to have in her lifetime.

BMTHPREV$_{[age, method]}$ (Base period absolute contraceptive MeTHod PREValence)

The Model makes use of relative contraceptive prevalence (BMETHMIX) in its internal calculations. For reporting purposes, it is often useful to have absolute prevalence by method, (for example, the percentage of all women ages 30-34 who are sterilized). Absolute prevalence (BMTHPREV) is calculated by dividing the number of users of a particular method (BUSERS) by the total number of women in the group. BMTHPREV is not used in any other operations of the Model.

BPOTFERT$_{[age]}$ (Base period POTential FERTility rates)

Base period potential fertility rates (BPOTFERT) refer to fertility levels in the absence of contraception. If contraceptive prevalence and/or effectiveness is very low, BPOTFERT will be only slightly higher than observed fertility (BMASFR). If there is little use of induced abortion (BABORT) and no breastfeeding (BREAST), BPOTFERT will approach biological maximum fertility (MAXFERT).

Potential fertility in the absence of contraception (BPOTFERT) is a function of observed fertility (BMASFR), contraceptive prevalence (BCONPREV), contraceptive effectiveness (BAVEFFCT), and age-specific fecundability (FECUND).

$BUSERS_{[age, method]}$ (Base period number of contraceptive USERS)

The estimated number of contraceptive users in each of the five-year age groups, by method of contraception used.

$LACTINDX_{[age]}$ (LACTation INDeX)

Breastfeeding is one of the principal proximate determinants of fertility. It reduces fertility by prolonging the period of postpartum amenorrhea and thereby increasing the intervals between pregnancies and births. The longer the interval between births, the fewer births a woman can have in her lifetime.

The lactation index (LACTINDX) measures the degree of fertility reduction which can be attributed to breastfeeding and is a function of the average length of postpartum infecundability (POSTPART). In societies practicing extended postpartum abstinence, POSTPART can serve as a proxy for this practice, and LACTINDX then measures the degree of fertility reduction which can be attributed to postpartum abstinence. LACTINDX is not reported as a fertility variable, but is used by the Model in the calculation of abortion rates.

POSTPART[age] (Average length of POSTPARTum infecundability)

See *Input Variables With User Supplied Variables*.

5. Interpretation of Base-Period Output Variables

$BMASAR_{[age]}$

In theory, all abortion rates should be greater than or equal to zero (i.e., there should never be a negative abortion rate). In practice, abortion rates are estimated indirectly from the residual difference between potential fertility and maximum fertility.

A negative abortion rate indicates that estimated potential fertility exceeded maximum biological fertility (corrected for lactation). A negative abortion rate reflects measurement error in one or more of the following indices: fertility rate (BMASFR), contraceptive use (BCONPREV or BMETHMIX), or lactation index (LACTINDX).

In general, negative abortion rates occur when observed fertility rates are too high for estimated contraceptive use. The values for several variables should be verified:

1. The first check should be for validity of the BMASFR values, for fertility (see above).

2. The second check should be for validity of the LACTINDX values, for the lactation index. If the company's population is more "modern" in attitudes and practices than the population at large, they may show a shorter interval of postpartum amenorrhea (POSTPART).

   If the length of postpartum amenorrhea has been automatically calculated from mean breast-feeding (BREAST), override this option by setting DIRECTPP = 1 and manually entering values of POSTPART lower than those originally computed by the model. (Use the [E]dit command to examine the results calculated by the model, which can be changed if necessary. Be sure to set DIRECTPP = 1, or the computer will ignore the changes. The original values of BREAST can be left, because they will be ignored the next time the model is run).

   If DIRECTPP = 1, decreasing POSTPART by one or two months may solve the problem (provided that it does not produce exaggerated high abortion rates in some age groups).

3. Finally, the estimate of contraceptive prevalence (BCONPREV) may be too high. If prevalence for the company sample is markedly higher than the population of the region at large, it may reflect selection bias in the sample. For example, if

husbands are interviewed first to give permission for their wives to be interviewed, the more "traditional" husbands (whose wives are less likely to use contraception) may refuse to give permission, or may give false addresses to prevent their wives from being interviewed. If sample bias is suspected, prevalence rates (BCONPREV) may be adjusted downwards, leaving method mix (BMETHMIX) unchanged.

In general, as long as the total abortion rate (summed across all age groups) is non-negative, small age-specific abortion rates (up to .100) can be tolerated without causing major problems in the Model.

If derived abortion rates are higher than observed fertility rates at all ages, this may reflect a different kind of measurement error. Either (a) the fertility rates are too low (under-counting of births or over-estimating the total number of women in union), or (b) the LACTINDX is too low. Unusually low fertility rates often arise when unmarried employees are not eliminated from the population pool. However, it is not uncommon to find abortion rates higher than birth rates in the older age groups, especially when ideal family size is low but women use less-effective contraceptive methods to limit their childbearing.

A potential problem arises if contraceptive prevalence among women over 40 is very high. The Model has an internal correction for this.

$BMASFR_{[age]}$

Base period marital fertility rates decline monotonically with age; that is, married women ages 15-19 show higher fertility than married women ages 20-24; married women ages 20-24 show higher fertility than married women ages 25-29, etc. This pattern should also be found in the company analysis. However, very small denominators, especially in the extreme age groups (15-19 and 45-49) can lead to unstable rates. Therefore, if the total number of married women in these age groups is very small, or if the number of observed births is very small, it may be advisable to eliminate them from the analysis.

The same holds true for an employee classification; for example, if there are only 50 managers in an entire company, and their fertility behavior appears markedly different from that of the manual laborers, they can be removed from the analysis without a marked impact on the results.

Fertility rates which do not show an inverse relationship with age, or fertility rates higher than maximum fertility, may be caused by denominator problems: specifically, underestimation of number of women at risk in some or all age groups.

B. PROJECTING FUTURE FERTILITY

Input Variables with Universal Values: None

Input Variables with User-Supplied Values

Variable Name	*Brief Description*	*Valid Range*
$ABORTWT_{[age]}$	Abortion Weight	0 < ABORTWT < 1
$DECAYDAT_{[age, method, decayper]}$	Time of Post-Program Decay	0 < = DECAYDAT
INTERP	Interpolate CONPREV and METHMIX	0 , 1
INTERPFM	Interpolate FEMRISK	0 , 1
$TCONPREV_{[age]}$	Target Contraceptive Prevalence	0 < TCONPREV < 1
$TFEMRISK_{[age]}$	Target Period Women at Risk	0 < TFEMRISK
$TMETHMIX_{[age, method]}$	Target Contraceptive Method Mix	0 < TMETHMIX < 1
YRSTOEND	Length of Program (No. of Periods)	1 < = YRSTOEND
YRSTOTFM	Years to reach Target Values (TFEMRISK)	1 < = YRSTOTFM
YRSTOTGT	Years to Target	1 < = YRSTOTGT

Output Variables

Variable Name	*Brief Description*
$ABORT_{[age, t]}$	Number of Abortions
$AVEFFECT_{[age, t]}$	Average Contraceptive Effectiveness
$AVERTABT_{[age, t]}$	Number of Abortions Averted
$AVERTBIR_{[age, t]}$	Number of Births Averted
$BAA_{[age, t]}$	Births Averted by One Abortion
$BIRTHS_{[age, t]}$	Number of Births
$CONPREV_{[age, t]}$	Contraceptive Prevalence
$EXPABORT_{[age, t]}$	Abortions Expected Without Family Planning Program
$EXPBIRTH_{[age, t]}$	Births Expected Without Family Planning Program
$FEMRISK_{[age, t]}$	Women at Risk
$MASAR_{[age, t]}$	Marital Age-Specific Abortion Rate
$MASFR_{[age, t]}$	Marital Ate-Specific Fertility Rate

Output Variables, Continued

Variable Name	*Brief Description*
$METHMIX_{[age,\ method,\ t]}$	Contraceptive Method Mix
$METHPREV_{[age,\ method,\ t]}$	Contraceptive Prevalence by Method
$POTFERT_{[age,\ t]}$	Potential Age-Specific Fertility Rate
$TOTAVABT_{[t]}$	Total Annual Abortions Averted
$TOTAVBIR_{[t]}$	Total Annual Births Averted
$USERS_{[age,\ method,\ t]}$	Number of Current Users

In order to project future fertility, the researcher must set contraceptive targets, estimate how long it will take to reach those targets, estimate the extent to which women who use abortion will adopt family planning, and determine how many years the family planning program will run.

Time (t) refers to the number of years elapsed since the base period, and is an integral part of any projection. The researcher does not establish the time directly by editing an input variable. When the Model is run (by selecting the GO option), the time is entered as the Run Screen parameter N (Number of Periods). See Chapter III, Section B, *Running a Projection.*

Separate calculations are made for each year of the projection from the baseline period (when t = 0) to the year following the limit specified by the researcher (when t = NUMBER OF PERIODS + 1). Variables dimensioned by time are periodic variables.

1. Input Variables With Universal Values

No variables with universal values are required by this phase of the analysis.

2. Input Variables With User-Supplied Values

$ABORTWT_{[age]}$ (Contraception for abortion substitution)

The Model allows the researcher to set the rate of contraception-for-abortion substitution expected during the family planning program.

ABORTWT may take values from 0 to 1.0. If ABORTWT = 0, no abortion users will switch to contraception. If ABORTWT = 1.0, the maximum number of abortion users permitted by the Model will switch to contraception.

The higher the value of ABORTWT, the lower the potential impact of the family planning program on future fertility levels. The researcher may set different values of ABORTWT for different age groups, according to baseline abortion rates (BMASAR). ABORTWT is a control parameter with one dimension [AGE].

$DECAYDAT_{[age,\ method,\ decayper]}$ (Post-program decay pattern of CONPREV and METHMIX)

The Model assumes that after the family planning program terminates, contraceptive prevalence (CONPREV) and contraceptive method mix (METHMIX) will return to baseline levels. The return to baseline levels may begin immediately or may be delayed, depending upon a number of local factors. The projection of the return to baseline depends on the values assigned to DECAYDAT.

The Model permits the time required to restore base period prevalence levels to vary both by age group and by method. Variation by method may result in anomalous output values under some circumstances, especially if the major goal of the family planning program is not to increase total contraceptive prevalence (TCONPREV), but to improve contraceptive method mix.

The *decayper* specifies when the return to baseline is expected to begin or end. $DECAYDAT_{[age,\ method,\ decayper\ =\ start]}$ specifies the number of years after program termination (YRSTOEND) that the decay to baseline levels begins. A decayper *start*

value of 0 means that decay begins immediately; 1 means that decay begins one year after YRSTOEND; 2 means it begins two years after YRSTOEND, etc.

$DECAYDAT_{[age,\ method,\ decayper\ =\ end]}$ specifies the number of years that it will take to complete the decay process, once decay has begun as specified by $DECAYDAT_{[age,\ method,\ decayper\ =\ start]}$. The minimum value for $DECAYDAT_{[age,\ method,\ decayper\ =\ end]}$ is one year.

For example, consider a family planning program that operates for five years (YRSTOEND = 5) and reaches target prevalence in year three (YRSTOTGT = 3). If decayper[*start*] = 1 and decayper[*end*] = 3, contraceptive prevalence will stay at target levels (TCONPREV, TMETHMIX) through year six (i.e., from YRSTOTGT through the fifth years of the program plus the specified *start* of one year) before beginning to decline to baseline levels. Prevalence will begin to decline to baseline levels in year seven, and complete the process in three years, reaching the baseline levels (BCONPREV, BMETHMIX) in the tenth year.

The decay process acts directly on absolute method prevalence (METHPREV), allowing different methods to show different patterns of decay. In principle, $DECAYDAT_{[age,\ method,\ decayper]}$ should vary by method. However, the model automatically interpolates between the target and baseline values for method-specific prevalence, and adjusts total prevalence accordingly. Therefore, if one method is allowed to decay faster than another, anomalous outputs may result.

The researcher should use the same values of decayper = [*start*] for all methods within an age group, and the same values for decayper = [*end*] for all methods within an age group, although different values of both can be assigned for different age groups.

$DECAYDAT_{[age,\ method,\ decayper]}$ is a non-periodic real variable with three dimensions [AGE, METHOD, DECAYPER].

INTERP (INTERPolation of CONPREV and METHMIX performed automatically? 0 = no, 1 = yes)

The Model allows the researcher to choose between automatic and manual interpolation of values between baseline and target years.

If INTERP is set to 1 (INTERP = 1), the computer automatically inserts linearly interpolated values for contraceptive prevalence (CONPREV) and contraceptive method mix (METHMIX) between baseline and target (YRSTOTGT).

If linearly interpolated values are not desired, INTERP should be set to 0 (INTERP = 0), and the researcher must manually enter all values for CONPREV[age, t] and METHMIX[age, t] for each of the time periods between baseline and YRSTOTGT. INTERP is a control parameter with no dimensions.

INTERPFM (INTERPolation of FEMRISK performed automatically? 0 = no, 1 = yes)

The Model allows the researcher to choose between automatic and manual interpolation of the number of women at risk during the years between the baseline and target years.

If linearly interpolated values are desired, INTERPFM should be set to 1. If INTERPFM = 1, the computer automatically inserts linearly interpolated values for women at risk during each year between the baseline period and the target (YRSTOTFM) period.

If linearly interpolated values are not desired (as in the case of an abrupt change in the work force), INTERPFM should be set to 0 (INTERPFM = 0). If INTERPFM = 0, and the researcher must manually enter all values for women at risk (FEMRISK [age, t]) for each time period between the baseline and and target years.

If TFEMRISK (target females at risk) = BFEMRISK (baseline females at risk), INTERPFM should be set to 1. (INTERPFM has a default value of 1 in the \STARTUP files.) INTERPFM is a control parameter with no dimensions.

TCONPREV$_{[age]}$ (Target CONtraceptive PREValence rate)

The assumption of the *TIPPS* Model is that the provision of family planning services will improve contraceptive use by increasing contraceptive prevalence and/or improving the contraceptive method mix. TCONPREV allows the researcher to set the prevalence rate to be achieved at the end of the target period (YRSTOTGT). Target prevalence (TCONPREV) should be at least as high as the baseline rates (BCONPREV), and generally should not exceed .800 or FECUND, whichever is lower. TCONPREV is a non-periodic real variable with one dimension [AGE].

TFEMRISK$_{[age]}$ (Target period FEMales at RISK)

If the company anticipates appreciable expansion or contraction of its work force during the target period, the number of women in union at the end of the projection period (TFEMRISK) will differ from the number of women in union during the baseline period (BFEMRISK). For example, contraction of the work force through natural attrition will result in an older population at the end of the target period. Their fertility rates would decline from baseline levels without any family planning intervention.

A value must be entered for TFEMRISK for each age group, regardless of whether or not a change in the work force is anticipated. If no change is anticipated, enter the same values as BFEMRISK (using a very small non-zero value such as .0000001 when there are no women in an age group).

If a change is expected in the work force, enter the expected values in TFEMRISK (observing the restrictions for non-zero values). TFEMRISK is a non-periodic real variable with one dimension [AGE].

TMETHMIX$_{[age, method]}$ (Target contraceptive METHod MIX)

Target contraceptive method mix (TMETHMIX) is set independently of contraceptive prevalence. The sum of values across methods, within each age group, must equal 1.0.

Check for rounding errors if an error message occurs. If TCONPREV within an age group is zero, or if there are no women in the age group, a value of 1.0 should be entered in "Traditional". TMETHMIX is a non-periodic real variable with two dimensions [AGE, METHOD].

YRSTOEND (YeaRS TO END of program)

In order to conduct the cost-benefit analysis, the researcher must also decide how many years the family planning program will be in operation. (YRSTOEND). For most applications, the minimum value of YRSTOEND will be YRSTOTGT (years to target). Depending on whether company managers prefer short- or medium-range planning schemes, the maximum useful value of YRSTOEND is between five and ten years. If YRSTOEND is greater than the length of the projection (YRSTOEND > "NUMBER OF PERIODS" or the "N =" parameter), it will have no effect. YRSTOEND is a control parameter with no dimensions.

YRSTOTFM (YeaRS TO Target FEMales at risk)

The researcher must specify how many years it will take to reach the new population. If no change in TFEMRISK (target period women at risk) is anticipated, the value of YRSTOTFM (years to target women at risk) should be set to 1, which is the default value in the \STARTUP files. If a continual change in the work force is anticipated throughout the projection period, YRSTOTFM should be set to YRSTOEND. If a one-time, abrupt change is anticipated (e.g., opening or closing a new factory), YRSTOTFM should be set to the year that the change is expected and the interpolate function (INTERPFM) should be disabled. YRSTOTFM is a control parameter with no dimensions.

YRSTOTGT (YeaRS TO TarGeT)

The researcher must decide how many years it will take for the family planning program to reach its designated targets (YRSTOTGT). The minimum permissible value is one year; but two years is a realistic lower limit, and five years is a reasonable upper bound. If baseline contraceptive prevalence (BCONPREV) is very low, it will probably be more useful to project a series of successive five-year targets instead of a single, more lengthy and ambitious program. YRSTOTGT is a control parameter with no dimensions.

3. Data Sources for User-Supplied Input Variables

ABORTWT$_{[age]}$

ABORTWT is a bit tricky to use, and several runs may be needed before final values are established for each age group. First, if current abortion rates are negative or very low (<.100), ABORTWT should be set to zero (0) for those age groups. Low or negative abortion rates may reflect measurement error, and indicate that for those age groups induced abortion is not a significant source of fertility control.

If a non-zero value of ABORTWT is desired, the first run should be made with a value of .500. Check the resulting fertility rates carefully: if they *increase* over the base period levels (MASFR > BMASFR), negative births averted (AVERTBIR < 0) will be produced. If this happens, ABORTWT is too high. Try again with a lower value.

If base period abortion levels exceed fertility, (BMASAR > BMASFR), especially among women under 40, induced abortion is probably an important method of fertility control, and some degree of contraception-for-abortion substitution should be expected. Non-zero values of ABORTWT should be used, or the projection will over-estimate the potential impact of improved contraception on future fertility. This is especially critical if large increases in contraceptive prevalence (TCONPREV) and/or improvements in method mix (TMETHMIX) are projected.

DECAYDAT$_{[age, method, decayper]}$

A complete cost-benefit analysis cannot be conducted unless the program is "terminated" at some point, and future benefits assessed. This does not imply that the company would or should contemplate only limited activities; this cut-off is needed for purely statistical reasons (e.g., to determine the return on the first 5 years of program operations).

The most conservative assumption is that women will return to base period contraceptive use patterns once the program terminates. This assumption is justified for supply methods of contraception (e.g., barrier methods, pills, and injections). However, acceptors of semi-permanent and permanent methods (IUDs, implants, voluntary sterilization) will continue using their method for some time after program termination.

The values assigned to DECAYDAT should reflect the change in method mix. If the majority of users adopt supply methods, the starting value of DECAYDAT for all methods (DECAYDAT[age, method, decayper = *start*]) should be set to zero (0) and the end value (DECAYDAT[age, method, decayper = *end*]) should be set to one (1) year. If the new method mix reflects a large increase in IUD and/or implant users, the starting value (decayper[*start*]) should be set to zero (0) and the end value (decayper[*end*]) should be set to 2 or 3 years.

Larger values of decayper[*end*] should be considered only if voluntary sterilization is the principal method of choice. In any case, the sum of decayper[*start*] and decayper[*end*] should not exceed 10 (e.g., *start* = 5 and *end* = 5). Remember to user the same values of [*start*] and [*end*] for all ages and methods, although a different value can be used for [*start*] than is used for [*end*].

INTERP, $\mathbf{TCONPREV}_{[age]}$, and $\mathbf{TMETHMIX}_{[age,\ method]}$

Data for the projections of future contraceptive use can either come from the survey of workers and/or spouses, or can be modeled as a series of "what if" simulations (e.g., "What would happen if prevalence increased by 50%?").

Assuming the estimates are to come from the survey, the estimates are derived from the questions, "Would you like to receive a method from the company?" and "What method would you like to receive?". Many women will not specify a method and some of these should be treated as non-users. The rest should be apportioned among the *temporary* methods, on the assumption that sterilization acceptors will specify that method during the interview, relative to current use patterns and/or medical considerations (e.g., no pill users older than 35 years old). Women who state that they would *not* like to receive a company-supplied method are assumed to continue using their current method (or not use any method at all).

As in the estimates of current contraceptive prevalence and method mix, all estimates of future use are broken down by age groups. The estimates are derived in 3 steps:

1. Cross current use with interest in receiving a company-provided method.

CURRENT INTEREST		CURRENT METHOD					
		NONE	TRAD	BARR	PILL	IUD	STER
WANT METHOD?	YES	A1	A2	A3	A4	A5	A6
	NO	B1	B2	B3	B4	B5	B6

2. Calculate the frequencies of desired method from those who want a method.

DESIRED METHOD					
TOTAL	TRAD	BARR	PILL	IUD	STER
SUM(A2 - A5)	C2	C3	C4	C5	C6 + A6

3. Calculate final future prevalence.

FUTURE PREVALENCE					
NONE	TRAD	BARR	PILL	IUD	STER
B1	B2+C2	B3+C3	B4+C4	B5+C5	B6+C6

Another way of projecting future contraceptive use is to consider future fertility intentions and to assign each woman a contraceptive method consistent with her intentions. This simulation is useful when both current contraceptive use and interest in

receiving contraceptive methods are low. If the first simulations, based on expressed interest in receiving contraception from the company, lead to a large increase in prevalence and/or a greatly improved method mix, the simulation based on future fertility intentions is not necessary.

The data for this simulation come from the questions "Would you like to have more children?" and "When would you like to have your next child?". Three groups of women at risk are distinguished: those who want to have another child in the near future, those who want to have another child, but not for at least 2 years from the time of the survey (spacers), and those who do not want to have any more children at all (limiters).

Fertility intentions are cross-tabulated with current contraceptive use and appropriately adjusted to derive future contraceptive use: specifically, women who wish to terminate child-bearing should be given a very secure method (but no pill use for women 35 or older), and spacers can be left with their current method or moved to a temporary method. Again, these estimates are made separately for each age group.

Regardless of the method of simulation employed, final contraceptive prevalence rates (TCONPREV) should show a curvilinear relationship with age (i.e., the youngest and the oldest women should show the lowest prevalence rates), with peak prevalence observed in the 30-39 year age groups. While target prevalence rates should not decrease from baseline rates, in general they should not be expected to increase to over 80% of the population or to exceed age-specific fecundability (FECUND).

Unless the family planning program design includes the introduction of contraceptive methods in a staggered fashion (e.g., no sterilization until the third year), intermediate levels of contraceptive use should be interpolated by the computer (INTERP = 1).

INTERPFM, TFEMRISK, and YRSTOTFM

Estimates of future population size and age composition are made after talking with high-level management about their plans for their work force. There are three possibilities: the number of employees will stay the same, the number of employees will decrease, or the

number or employees will increase. The impact of each of these scenarios depends on the age composition of the present labor force, the ages of those who will leave, and the ages of their replacements.

For example, many companies plan to maintain the current size of their labor pool and to replace those who retire with young workers. If the current labor force has approximately equal numbers of employees in each age group, the future population will be virtually identical to the present population.

However, if the company experienced a sudden expansion in the past, there may be one or two disproportionately large age groups. In this case, given company policy of replacing only retirees, the size of the population will remain constant, but its age structure will change. For example:

	AGE GROUP						
YEAR	20-24	25-29	30-34	35-39	40-44	45-49	TOTAL
1987	10	10	30	30	10	10	100
1992	10	10	10	30	30	10	100

It is unlikely that a company will have precise numerical goals for workforce expansion or contraction. The researcher will need to acquire a sense of the most likely scenario; or alternatively, may wish to Model family planning program impacts under different conditions of work force expansion or contraction.

The simplest procedure is to let the Model interpolate the intermediate values of FEMRISK by setting INTERPFM = 1. Manual interpolation (INTERPFM = 0) should be done only if there is reason to believe that the work force will change very abruptly or if the age distribution is extremely irregular.

YRSTOEND and YRSTOTGT

There are no fixed data sources for these two variables. Usually a minimum of two years and a maximum of five years is required for a family planning program to reach its target contraceptive levels. Similarly, for purposes of the cost-benefit analysis, the family planning program probably should not run for more than five to ten years. Company managers should be consulted prior to setting the number of years of program operations.

4. Output Variables

$ABORT_{[age,\ t]}$ (Number of ABORTions)

The Model projects the number of induced abortions (ABORT) as the product of the age-specific abortion rate (MASAR) and the number of women at risk (FEMRISK).

$AVEFFECT_{[age,\ t]}$ (AVerage contraceptive EFFECTiveness)

The average contraceptive effectiveness in each age group (AVEFFECT) is determined as the product of contraceptive method mix (METHMIX) and the assumed effectiveness of each method (EFFECT).

$AVERTABT_{[age,\ t]}$ (Number of AVERTed ABorTions)

Many health plans cover treatment for complications of induced abortions. Therefore, abortions averted by family planning (AVERTABT) may be *another* source of cost savings. Abortions averted are projected as the difference between the actual number of abortions projected in each period (ABORT) and the number of abortions that would have been projected from base period abortion rates (BMASAR).

AVERTBIR$_{[age,\ t]}$ (Net AVERTED BIRths)

One of the principal sources of benefits from family planning is births averted, or the reduction in unwanted births due to improved contraception. Net births averted (AVERTBIR) are projected as the difference between the actual number of births projected in each period (BIRTHS) and the number of births that would have been projected on the basis of base period marital age-specific fertility rates (BMASFR).

BAA$_{[age,\ t]}$ (Births Averted by one induced Abortion)

To complete the comparison between the base period and the years of the projection, the Model calculates the number of births averted by one abortion (BAA). As in the base period calculation (BBAA), BAA is a function of contraceptive use (CONPREV) and average contraceptive effectiveness (AVEFFECT). BAA is included for comparison purposes only, and does not enter into any other projections.

BIRTHS$_{[age,\ t]}$ (Number of BIRTHS)

BIRTHS represents the number of births occurring to each age group during each year of the projection. The number of births is projected as the product of the number of women at risk (FEMRISK) and the age-specific marital fertility rates (MASFR)

CONPREV$_{[age,\ t]}$ (CONtraceptive PREValence rates)

In the time it takes the program to achieve target contraceptive use (YRSTOTGT) contraceptive prevalence takes on intermediate values between baseline (BCONPREV) and target (TCONPREV) levels. Intermediate values of contraceptive prevalence (CONPREV) may be output by the Model (if INTERP = 1, above) or may be entered directly by the researcher (if INTERP = 0). CONPREV is a periodic real variable with one dimension [AGE].

EXPABORT$_{[age, t]}$ (EXPected annual ABORTions in the absence of family planning)

This variable is calculated by multiplying women at risk (FEMRISK) by base period abortion rates (BMASAR). It is a periodic variable with one dimension, (AGE).

EXPBIRTH$_{[age, t]}$ (EXPected annual BIRTHs in the absence of family planning)

This variable is calculated by multiplying women at risk (FEMRISK) by base period fertility (BMASAR). It is a periodic variable with one dimension, (AGE).

FEMRISK$_{[age, t]}$ (FEMales at RISK)

FEMRISK specifies the number of women in union during each year of the projection. If the size of the female population changes over time (BFEMRISK <> TFEMRISK), then in the time it takes to reach the target population (YRSTOTFM), FEMRISK takes on intermediate values between baseline and target levels. Intermediate values of FEMRISK may be output by the Model (if INTERPFM = 1, above) or may be entered directly by the user (if INTERPFM = 0). FEMRISK is a periodic real variable with one dimension [AGE].

MASAR$_{[age, t]}$ (Marital Age-Specific Abortion Rates)

Marital age-specific abortion rates (MASAR) are projected by subtracting the change in abortion rates due to improved contraceptive use from the base period abortion rates (BMASAR). The size of the abortion reduction depends on the improvement in contraception (CONPREV, AVEFFECT) and the degree of contraception-for-abortion substitution (ABORTWT).

MASFR$_{[age, t]}$ (Marital Age-Specific Fertility Rates)

Age-specific fertility rates (MASFR) are projected as the difference between potential fertility (POTFERT) and the births averted by the new contraceptive use patterns (CONPREV and AVEFFECT). These projected fertility rates are affected by the improvement in contraceptive use and substitution of contraception for abortion.

METHMIX$_{[age,\ method,\ t]}$ (Contraceptive METHod MIX)

In the time it takes the family planning program to achieve target contraceptive use (YRSTOTGT), contraceptive method mix takes on intermediate values between baseline (BMETHMIX) and target (TMETHMIX) levels. Intermediate values of contraceptive method mix (METHMIX) may be output by the Model (if INTERP = 1, above) or may be entered directly by the researcher (if INTERP = 0). METHMIX is a periodic real variable with two dimensions [AGE, METHOD].

METHPREV$_{[age,\ method,\ t]}$ (Absolute contraceptive METHod PREValence)

METHPREV measures absolute contraceptive prevalence by age and method. It is calculated by dividing the number of users (USERS) by the number of women at risk (FEMRISK).

POTFERT$_{[age,\ t]}$ (POTential FERTility rates)

Potential fertility in the absence of contraception (POTFERT) is projected as the difference between biological maximum fertility (MAXFERT) corrected for lactation (LACTINDX), less births averted by abortion (a function of abortion rate [MASAR], contraceptive prevalence [CONPREV], and contraceptive method mix [AVEFFECT]). POTFERT is used by the Model to project future fertility rates.

TOTAVABT$_{[t]}$ (TOTal annual ABorTions AVerted by family planning)

This variable is the sum of abortions averted by each age group AVERTABT. It is a periodic variable with no dimensions.

TOTAVBIR$_{[t]}$ (TOTal annual BIRths AVerted by family planning)

This variable is the sum of births averted by each age group, AVERTBIR. It is a periodic variable with no dimensions.

$USERS_{[age, method, t]}$ (Number of contraceptive USERS)

The number of contraceptive users (USERS) is projected as the product of the number of women (FEMRISK), contraceptive prevalence (CONPREV), and contraceptive method mix (METHMIX). USERS is a periodic variable.

5. Interpretation of Future Fertility Output Variables

The researcher should be aware of the idiosyncrasies of the Host programming environment. Specifically, the program will calculate fractional women (if TFEMRISK <> BFEMRISK), fractional contraceptive users, fractional births and abortions, and fractional births and abortions averted. This at times will lead to rounding errors in the summary tables; the user may wish to re-calculate totals by hand.

$ABORT_{[age, t]}$ and $MASAR_{[age, t]}$

If base period abortion rates were negative (BMASAR < 0), they will be left unchanged in the projection regardless of the assigned value of ABORTWT. If base period abortion rates were non-negative, the Model limits projected abortion rates (MASAR) to a value of zero (0), regardless of the assigned value of ABORTWT. Therefore, negative abortion rates (MASAR) and abortions produced (ABORT) should occur if and only if base period values were also negative. See interpretation of BMASAR, above, for more details.

$AVERTABT_{[age, t]}$

The Model does not allow the output of negative abortions averted. If negative values are produced (AVERTABT < 0), something has happened to the program (e.g., a premature end to the previous run). Re-run the projection, and if the problem persists, it may be necessary to re-install the *TIPPS* Model (see Chapter II, Section B, *Installing HOST*).

AVERTBIR$_{[age,\ t]}$

Births averted should show non-negative values. If negative values of AVERTBIR occur, ABORTWT was set too high. Check the output tables carefully; due to rounding errors, total births averted may not be equal to the sum of the age-specific births averted.

MASFR$_{[age,\ t]}$

Projected fertility rates should continue to decline with age (see interpretation of BMASFR, above). If projected contraception was based on fertility intentions, a sharp decrease may be found among women ages 30 and older. In no case should future fertility exceed base period levels. If this happens, ABORTWT was set too high.

METHPREV$_{[age,\ method,\ t]}$ and **USERS**$_{[age,\ method,\ t]}$

If projected future contraception shows significant alteration of method mix and little change in total prevalence, the number of users of a particular method and absolute prevalence of that method may decrease from base period estimates (USERS < BUSERS; METHPREV < BMTHPREV). This will occur primarily if users of traditional methods are switched to modern methods.

C. ESTIMATING THE COSTS OF DELIVERING FAMILY PLANNING SERVICES

Input Variables with Universal Values

Variable Name	*Brief Description*	*Valid Range*
$A_{[method]}$	Immediate Continuation Rate	0 - 1
$COMMCACC_{[method]}$	Commodities per Continuing Acceptor	1 - 13
$COMMCONT_{[method]}$	Commodities per Continuing User	1 - 13
$COMMDROP_{[method]}$	Commodities per Discontinuing Acceptor	1 - 13
$CONSCACC_{[method]}$	Consultations per Continuing Acceptor	1 - 6
$CONSCONT_{[method]}$	Consultations per Continuing User	1 - 6
$CONSDROP_{[method]}$	Consultations per Discontinuing Acceptor	1 - 6
$R_{[method]}$	Annual Discontinuation Rate	0 - 1

Input Variables with User-Supplied Values

Variable Name	*Brief Description*	*Valid Range*
$ACCSHARE_{[method]}$	Program Share of Acceptor Costs	0 < ACCSHARE < 1
$BCONSHRE_{[method]}$	Base Period Program Share, Cont. Acceptors	0 < BCONSHRE < 1
$COMMCOST_{[method]}$	Unit Costs of Commodities by Method	0 < COMMCOST < 1
CONSCOST	Consultation Cost	0 < CONSCOST < 1
$FIXCOSTS_{[t]}$	Fixed Annual Costs	0 < = FIXCOSTS
IMSUBSTN	Immediate Source/Method Substitution	0 < IMSUBSTN < 1

Intermediate Output Variables

Variable Name	*Brief Description*
$CACC_{[method, t]}$	Annual Continuing Acceptors by Method
$CUSER_{[method, t]}$	Annual Continuing Users by Method
$DROP_{[method, t]}$	Annual Discontinuing Users by Method

Output Variables

Variable Name	*Brief Description*
$ACCPTRGT_{[age, method, t]}$	Annual Acceptor Targets
$COMMOD_{[method, t]}$	Number of Commodities by Method
$CONSHARE_{[method, t]}$	Program Share of Continuing User Costs
$CONSULT_{[t]}$	Number of Program Consultations
$CONTUSER_{[age, method, t]}$	Continuing Users from Previous Years
$COSTCOMM_{[t]}$	Commodities Costs
$COSTCON_{[t]}$	Consultation Costs
$COSTS_{[t]}$	Total Annual Program Costs
$METHACPT_{[method, t]}$	New Program Acceptors by Method
$METHCONS_{[method, t]}$	Program Consultations by Method
$METHUSER_{[method, t]}$	Program Continuing Users by Method
TOTCOST	Total Program Costs (Life of Program)

In order to estimate the costs of delivering family planning services, the number of new and continuing contraceptors who will be served by the program must be estimated, as well as how much it will cost to serve them. In the first year of family planning program operations, some of the women who were contracepting during the baseline period may be motivated to change their method, or to switch to the in-house program for their supply. Similarly, some contraceptors will discontinue using their methods, pass out of the reproductive age range, or experience marital dissolution.

The Model projects the number of contraceptors who continue to use their methods, the number of new acceptors needed to reach the targets specified in the projection, and the costs to the family planning program of providing services to acceptors and continuing users in each period. Service costs include consultation costs, commodity costs, and fixed costs (salaries, utilities, etc.).

1. Input Variables with Universal Values

$A_{[method]}$ (Immediate continuation rates)

Acceptors of temporary methods usually eventually discontinue using their method. Method continuation rates can be described by a decay function:

$$C = A * \exp(-R * t)$$

where

C = Continuation rate

A = immediate continuation rate

exp = base of natural logarithm

R = annual discontinuation rate

t = time since acceptance, expressed in years

Some acceptors will discontinue the method immediately after acceptance, often without ever using the commodities received, and others will discontinue later on. The input variable, A (immediate continuation rate), defines the probability that a new acceptor will begin using the method. Values of A may range from 0 to 1.0; values of 1 are reserved for sterilization, implants, and injections. All other methods show immediate continuation rates of less than 1: IUDs because of immediate expulsion, and supply methods because the acceptor may never begin using the method.

Universal values of A are included in the \STARTUP files. They were taken from published studies of continuation rates. A is a non-periodic real variable with one dimension [METHOD].

$COMMCACC_{[method]}$ (COMModities needed per Continuing ACCeptor)

All temporary contraceptive methods involve commodities; the number of commodities consumed varies by method (e.g., IUD - one device per insertion; pills - 13 cycles per year; etc.). COMMCACC specifies the number of commodities consumed by a continuing contraceptive acceptor who uses the method for at least one year.

Universal values for COMMCACC are included in the \STARTUP files. The number of commodities required for tubal ligation and vasectomy acceptors has been set at 1.0.

While voluntary sterilization acceptors do not require contraceptive commodities as such, this allows the researcher to include special costs for sterilization (e.g., use of operating room, surgical fees, etc.) which are not associated with the temporary methods. COMMCACC is a non-periodic real variable with one dimension [METHOD].

COMMCONT$_{[method]}$ (COMModities needed per CONTinuing users)

Continuing users of supply methods (pills, barrier methods) need resupply to continue using their method. COMMCONT specifies the quantity of commodities consumed by continuing users. Universal values of COMMCONT are included in the \STARTUP files. COMMCONT is a non-periodic real variable with one dimension [METHOD].

COMMDROP$_{[method]}$ (COMModities needed per discontinuing [DROPping] acceptor)

Commodities delivered to method drop-outs (discontinuing users) are considered to be "wasted" from the standpoint of family planning program administration; that is, they incur costs to the program without generating benefits. COMMDROP specifies the quantity of commodities delivered on the first consultation to discontinuing acceptors. Universal values for COMMDROP are included in the \STARTUP files. COMMDROP is a non-periodic real variable with one dimension [METHOD].

CONSCACC$_{[method]}$ (CONSultations per continuing ACCeptor)

Users of different methods require different numbers of consultations with family planning service providers. For example, an IUD user should receive a follow-up examination soon after insertion and again after 6 months, while a tubal ligation user needs only one post-surgery follow-up visit. International family planning organizations such as IPPF have established norms for the different contraceptive methods. CONSCACC (consultations per continuing acceptor) specifies the number of consultations generated by a new acceptor who continues using his/her method for at least the next 12 months.

International service norms are provided in the \STARTUP files. The number of consultations for continuing users of natural family planning methods (periodic abstinence) is set as 4: this reflects one one-hour consultation (the equivalent of four 15-minute consultations) to teach the method. Family planning programs which use non-medical staff to teach natural methods may wish to use a smaller value for periodic abstinence. CONSCACC is a non-periodic real variable with one dimension [METHOD].

CONSDROP$_{[method]}$ (CONSultations per discontinuing [DROPping] acceptor)

All new contraceptive acceptors generate at least one consultation, even if they subsequently discontinue using the method. CONSDROP defines the number of consultations generated by an acceptor who stops using the method during the first year. For the sake of simplicity, we will assume that all method discontinuation occurs in the first month after acceptance. While on the one hand, this assumption drives down costs (by limiting the number of consultations and commodities received before dropping out), on the other hand it increases costs by increasing the acceptor targets (see section on acceptor targets, below).

Universal values of CONSDROP are included in the \STARTUP files. The researcher may wish to change the value assigned to natural family planning methods (periodic abstinence; see explanation of CONSCACC, above). Values have also been specified for voluntary sterilization; since this method is considered to have 100% continuation in the first year, the CONSDROP values for voluntary sterilization have no impact on total program cost. CONSDROP is a non-periodic real variable with one dimension [METHOD].

CONSCONT$_{[method]}$ (CONSultations per CONTinuing user)

Continuing contraceptive users, those who accepted their method in a previous time period and continue to use it throughout the current year, may also need some contact with service providers. For example, IUD users should return for annual pelvic examinations and PAP smears, while pill users should return every six months. CONSCONT specifies the number of consultations per year generated by a continuing user.

Universal values of CONSCONT are included in the \STARTUP files. If natural family planning users are seen by non-medical staff, a lower value may be used. CONSCONT is a non-periodic real variable with one dimension [METHOD].

$R_{[method]}$ (Annual discontinuation Rate)

The annual discontinuation rate, R, defines the probability that an acceptor who begins using his/her method will use that method for the next 12 months; the same value defines the probability that a contraceptive user who began use in a previous time period will continue using the method for the next 12 months. Universal values of R are included in the \STARTUP files. They were taken from published studies of continuation rates. R is a non-periodic real variable with one dimension [METHOD].

2. Input Variables with User-Supplied Values

$ACCSHARE_{[method]}$ (Program SHARE of ACCeptors)

In order to replace method drop-outs and raise contraceptive prevalence, new acceptors must be recruited every year. ACCSHARE specifies the proportion of all new acceptors of each method who will be served by the family planning program. ACCSHARE can assume any value from 0 to 1.0, and depends on method availability from other sources and company policy. For example, if the company program were the only local source of IUDs, ACCSHARE for that method would be 1.0. If company policy prohibits offering voluntary sterilization, absolute target prevalence for that method should not increase, and ACCSHARE would be 0. ACCSHARE is a non-periodic real variable with one dimension [METHOD].

BCONSHRE$_{[method]}$ (Base period program SHARE of CONtinuing users)

Because of source substitution, it is expected that some continuing users who accepted their method from another source will prefer to switch over to the company program for follow-up. BCONSHRE represents source substitution rates; that is, the percentage of current users who would like to continue using their method, but to obtain it from the company instead of their former source.

BCONSHRE may take any value from 0 to 1. Company and non-company sources will show the same drop-out rates, so that over time the proportion of continuing users served by the company will equal the company share of new acceptors (see ACCSHARE, below).

Since continuing user and acceptor shares apply mainly to supply methods, the Model calculates a new variable, CONSHARE (see output variables), as the linear interpolation between BCONSHRE and ACCSHARE over a 3-year period. BCONSHRE is a non-periodic real variable with one dimension [METHOD].

COMMCOST$_{[method]}$ (Unit COSTs of contraceptive COMModities)

If the family planning program design includes supplying contraceptive methods (pills, IUDs, condoms, etc.), the costs of these commodities must be included in the total cost of service delivery. COMMCOST represents the unit cost to the program of each contraceptive method (one cycle of pills, one IUD, one condom, one tube of spermicide, etc.). COMMCOST should reflect actual local market costs; if the program buys in bulk, the unit cost should be based on wholesale prices.

If commodities are included in the consultation price, or if the user is expected to purchase his/her own supplies, COMMCOST should be set to zero (0). COMMCOST for methods not included in the program should also be set to zero. COMMCOST is a non-periodic real variable with one dimension [METHOD].

CONSCOST (COST per family planning CONSultation)

Family planning acceptors and users require consultations and commodities. CONSCOST represents the cost to the company of one family planning consultation, regardless of method. In most cases, this will be a 15-minute outpatient visit to a service provider. If family planning consultations will be provided by third-party providers on a fee-for-service basis, CONSCOST represents the fee paid by the company for the consultation. If family planning is to be integrated into the company clinic utilizing existing staff, CONSCOST would be an opportunity cost equal to 15 minutes' worth of salary and benefits. Disposable materials (cotton, gloves, etc.) consumed during a consultation should also be included in CONSCOST. If the company hires special staff exclusively for family planning, their salaries should be considered fixed costs. CONSCOST should include only consumable supplies.

CONSCOST must be assigned a non-zero value. In the event that there are no per-consultation costs, a very small value (.000001) should be entered. CONSCOST is a non-periodic variable with no dimensions (i.e., a scalar).

FIXCOSTS$_{[t]}$ (FIXed COSTS)

The Model projects the cost of delivering family planning services as the sum of fixed costs, consultation costs, and commodity costs. FIXCOSTS represents fixed costs. Fixed costs do not depend on the number of users to be served: they may include startup costs such as purchase of equipment, remodeling, and establishing a basic inventory of commodities. Other fixed costs may include salaries, administration, and maintenance.

FIXCOSTS is a periodic input variable. The Host environment requires that a non-zero value be entered in every year for which a projection will be made. If the family planning program design does not include fixed costs, a very small value (.0000001) should be entered. The model will ignore any fixed costs entered for years after the family planning program has terminated (years beyond YRSTOEND).

IMSUBSTN$_{[method]}$ (Immediate Method SUBsTitutioN rate)

It is well-documented that many of the first acceptors of subsidized family planning services are women who are already using a method obtained from another source. These women may change over to the company supported program for supplies and continue using their old method (source substitution), or they may adopt a different method when they switch to the company supported program (method substitution).

IMSUBSTN is a measure of method substitution; it specifies the percentage of current users of each method who would like to use a different method. Theoretically, method substitution can vary from 0 to 100%. Even when method substitution is equal to 0, as in the case of voluntary sterilization, we can expect to lose some current users in the first period, due to aging, mortality, and marital dissolution.

Therefore, the minimum value of IMSUBSTN for each method should be equal to its annual discontinuation rate (R) or method substitution, whichever is greater. IMSUBSTN is a non-periodic real variable with one dimension [METHOD].

3. Data Sources for User-Supplied Input Variables

ACCSHARE$_{[method]}$

The program's share of new users should reflect local conditions including other potential sources of supply and company policies. The higher ACCSHARE, the greater will be program costs and the more conservative will be the cost-benefit analysis. In cases where total current prevalence is very low, it may be most convenient to treat all future users as company users. In areas where current prevalence is very high (50% or more), family planning program managers may wish to increase the company share of new acceptors gradually over time. ACCSHARE may be redefined as a *periodic* variable (see Chapter V, Section D, *Editing Labels and Defining New Graphs and Tables*), and yearly ACCSHARE targets entered.

Caution: if ACCSHARE is redefined as a periodic variable, values of ACCSHARE must be entered for every year (Number of Periods) for which a projection is to be made; for years following the end of the program (YRSTOEND), very small non-zero values (.000001) should be entered.

BCONSHRE$_{[method]}$ and IMSUBSTN

BCONSHRE and IMSUBSTN are one-time variables and are used to project the behavior of base-period contraceptive users during the first year of family planning program operation. These variables are derived from the workers' survey by cross tabulating current method with desired method. Current users of each method are divided into 3 groups: those who do not wish to switch to company sources, those who would switch to company sources but maintain their old method (source substitution), and those who would accept a different method from the company (method substitution). The percentage of method substitution should be entered as IMSUBSTN. BCONSHRE is calculated by dividing the number of continuing users who would switch to the company (source substitution) by the total number of continuing users (those who would switch to the company plus those who would not).

COMMCOST$_{[method]}$, CONSCOST, and FIXCOSTS$_{[t]}$

All costs should reflect local market conditions and be established jointly with company management and local family planning agencies. Salaries for in-house company family planning personnel should be commensurate with the salaries for other, comparable staff.

There are two basic approaches to family planning services delivery: either the company decides to offer these services directly through its own facilities and its own staff, or it decides to contract the services out to third-party providers. Third-party providers may be individual physicians, practitioners or family planning agencies.

Service delivery costs can be conceptualized as fixed (capital) costs, start-up costs, and operating costs. In the Model, fixed and start-up costs are combined into a single variable, FIXCOSTS, which can vary from year to year. Operating costs which do not depend on client volume (salaries of special personnel, rent, etc.) are also included in the FIXCOSTS category. Operating costs which are related to client volume are divided into two categories: consultation costs (CONSCOST) and commodities cost (COMMCOST).

FIXED COSTS:

- Facility (construction of new consulting rooms, etc.)
- Equipment (examining tables, instruments, etc.)

START-UP COSTS:

- Training - usually a one-time cost
- IE&C - may be on-going for several years.
- Salaries (promoters, social workers, etc.)
- Materials (posters, pamphlets, films, etc.)

OPERATING COSTS:

- Consultations (provider's time, consumable materials - cotton, alcohol, etc.)
- Commodities (pills, IUD's, etc.)
- Maintenance (sterilizing instruments, etc.)

It is often helpful to contract a local family planning program expert who can survey existing company facilities, determine the need for training, etc., and assist the researcher in estimating costs.

4. Intermediate Output Variables

Intermediate output variables are calculated by the Model in the process of deriving the final output variables. They are not accessible for examination of their values.

CACC$_{[method,\ t]}$ (Continuing ACCeptors)

This variable counts the number of continuing acceptors by method, summed across age groups.

CUSER$_{[method,\ t]}$ (Continuing USERs)

This variable counts the number of continuing users from previous periods by method, summed across age groups.

DROP$_{[method,\ t]}$ (Discontinuing (DROPping) acceptors)

This variable counts the number of discontinuing acceptors by method, summed across age groups.

5. Output Variables

ACCPTRGT$_{[age,\ method,\ t]}$ (Annual ACCeptor TaRGeTs)

The Model produces annual acceptor targets (ACCPTRGT) to make up the difference between continuing users from the previous period and the user target for the present period. ACCPTRGT is projected as the difference between the number of target users (USERS) and the number of continuing users (CONTUSER), divided by the first-year continuation rate (A * exp[-R]).

COMMOD$_{[method, t]}$ (Number of COMMODities by method)

Users of temporary methods consume commodities, depending on the total interval of use. The Model projects the number of commodities (COMMOD) that will be needed to supply the family planning program's share of acceptors and users. COMMOD is projected as the sum of the number of commodities needed by the program share of continuing acceptors (CACC), discontinuing acceptors (DROP) and continuing users (CUSER). Commodity quantities needed for each acceptor/user category are specified by COMMCACC, COMMDROP, and COMMCONT.

CONSHARE$_{[method, t]}$ (Program SHARE of CONtinuing user costs)

It is not necessarily the case that all contraceptive acceptors and users will be served by the company program; for reasons of personal preference or restrictions on program methods, some women may prefer to use private sources. The higher the company share of contraceptors, the greater the program costs. The company share is determined by its share of new acceptors (ACCSHARE) and continuing users (BCONSHRE, CONSHARE).

Since continuation rates for all sources are assumed to be equal, over time, the company share of continuing users should become equal to its share of new acceptors. While the program's share of acceptors (ACCSHARE) is assumed to remain constant, its share of continuing users (CONSHARE) is linearly interpolated between base period values (BCONSHRE) and ACCSHARE from periods t=1...3, after which they are assumed to be equal.

CONSULT$_{[t]}$ (Number of family planning program CONSULTations)

Contraceptors require periodic consultations with family planning service providers, depending on the interval of use. The number of consultations (CONSULT) that will be needed to service the program's share of acceptors and users is a function of the number of consultations needed by the program share of continuing acceptors (CACC), discontinuing acceptors (DROP) and continuing users (CUSER), and the consultations generated by each acceptor/user category as specified by CONSCACC, CONSDROP, and CONSCONT.

The computer program does not calculate CONSULT directly, but rather by dividing total consultation costs (COSTCON) by the average cost per consultation (CONSCOST).

CONTUSER$_{[age,\ method,\ t]}$ (CONTinuing USERs)

Depending on drop-out (discontinuation) rates, a portion of the women who accept contraception in one period will continue to use the method in future periods. The number of continuing users (CONTUSER) from previous periods is projected in the first period as a function of base period users (BUSERS) and method substitution (IMSUBSTN) rates. In subsequent periods, CONTUSER is projected as the product of the number of users in the preceding period (USERS) and the annual method-specific continuation rate [exp(R)].

COSTCOMM$_{[t]}$ (COMModity COSTs)

Total commodity costs paid out by the family planning program (COSTCOMM) are projected as the product of the number of commodities (COMMOD) needed by acceptors and users, and the unit cost to the program of those commodities (COMMCOST). If contraceptors are expected to purchase their own commodities, COSTCOMM will be zero.

COSTCON$_{[t]}$ (CONsultation COSTs)

Total consultation costs (COSTCON) paid out by the program are projected as the product of the number of consultations needed by its continuing acceptors (CACC), discontinuing acceptors (DROP), and continuing users (CUSER), and the average cost per consultation (CONSCOST).

COSTS$_{[t]}$ (Total family planning program COSTS)

Total program service delivery costs (COSTS) are projected as the sum of fixed costs (FIXCOSTS), consultation costs (COSTCON), and commodity costs (COSTCOMM). After program termination (t > YRSTOEND), COSTS = 0.

$METHACPT_{[method, t]}$ (new contraceptive ACcePTors, by METHod)

The number of new acceptors for each contraceptive method (METHACPT) variable is calculated by multiplying the annual acceptor targets ACCPTRGT by the proportion of acceptors who will use the family planning program ACCSHARE. It is a periodic variable with one dimension (METHOD).

$METHCONS_{[method, t]}$ (annual CONSultations required by users of each METHod)

The number of annual consultations required by the users of each contraceptive method (METHCONS) is calculated by multiplying consultations per user by the proportion of users served by the program ACCSHARE, CONSHARE. It is a periodic variable with one dimension (METHOD).

$METHUSER_{[method, t]}$ (annual continuing USERs served by the program, by METHod)

The number of continuing users served by the program (METHUSER) is calculated by multiplying the total continuing users CONTUSER by the proportion of users who will use the family planning program CONSHARE. It is a periodic variable with one dimension (METHOD).

TOTCOST (TOTal undiscounted program COSTs over the life of the program)

The total cost of the family planning program (TOTCOST) is the sum of the annual family planning program costs (COSTS). It is a non-periodic variable with no dimensions.

6. Interpretation of Cost Output Variables

ACCPTRGT$_{[age, method, t]}$ and CONTUSER$_{[age, method, t]}$

Contraceptive prevalence is based on users (see USERS, in Section B of this chapter). In order to maintain the number of users at target levels, the family planning program must continually recruit new acceptors to replace old users who have stopped using their method. The acceptor (ACCPTRGT) target itself must allow for first-year discontinuation. Therefore, the sum of ACCPTRGT and CONTUSER (continuing users from previous periods) is always larger than USERS.

The researcher may notice that over time, the cumulative number of acceptors who must be recruited exceeds 100% of the target population. This is fairly common in situations with high contraceptive prevalence. The same woman may start and stop contracepting many times, and she is counted as a "new" acceptor each time she begins using a method or switches to another method. However, if the cumulative number of acceptors exceeds the total population within the first few years of program operations, this may suggest that the discontinuation rates (R) are too high for the projected prevalence. The problem probably lies in the less secure methods (periodic abstinence and barrier methods), which have the highest discontinuation rates. If program managers wish to raise prevalence of these methods (for example, promoting the use of condoms to also control AIDS), they will need to take measures to improve continuation rates.

COMMOD$_{[method, t]}$ and CONSULT$_{[t]}$

These two output measures are very useful to family planning program administrators. The projected number of consultations (CONSULT) that will be needed for family planning program users can be used to determine staffing needs - whether existing clinic capacity can absorb the demands of the program, how many new staff may need to be hired, etc. Projection of commodities (COMMOD) can be used for inventory control, especially in areas that experience frequent shortages of imported supplies.

$METHACPT_{[method, t]}$, $METHCONS_{[method, t]}$, and $METHUSER_{[method, t]}$

These output measures allow the family planning program administrator to project program demands broken down by contraceptive methods, including acceptors (METHACPT), consultations (METHCONS), and users (METHUSER). This is especially useful if different service providers have responsibilities for different methods.

D. ESTIMATING FAMILY PLANNING PROGRAM BENEFITS

Input Variables with Universal Values: None

Input Variables with User-Supplied Values

Variable Name	*Brief Description*	*Valid Range*
BENAVABT	Benefits per Averted Abortion	0 < = BENAVABT
BENCOND1	Benefits per Averted Health Condition	0 < = BENCOND1
$BENSTRM_{[horizon,\ benefits]}$	Benefit Stream	0 < BENSTRM
$HLTHCON1_{[t]}$	Health Condition 1 Averted	0 < HLTHCON1

Intermediate Variables

Variable Name	*Brief Description*
$FUTUREBENEFITS_{[tt]}$	Benefits in Years Following Conclusion of Program

Output Variables

Variable Name	*Brief Description*
$BENABAVT_{[t]}$	Benefits per Averted Abortion
$BENEFITS_{[t]}$	Total Annual Program Benefits
$BENEWBRT_{[t]}$	Benefits from New Births Averted
$BENHCAVT_{[t]}$	Benefits from Health Conditions Averted
$BENPVBRT_{[t]}$	Benefits from Previous Births Averted
TOTBEN	Total Program Benefits (Life of Program)

The principal sources of benefits or cost savings from family planning services delivery are births and abortions averted, which are outputs of the second stage (projecting future fertility) of the Model. The Model allows the researcher to include other health conditions that can be improved by family planning (e.g., reduction of caesarian section delivery by provision of postpartum minilaparotomy). Unlike births and abortions averted, health conditions are not calculated by the Model and must be input manually for each period.

Benefits from births averted may accrue from several sources and may be distributed over a number of years. Benefits from abortions averted and other health conditions are assumed to occur only in the year in which the abortion or health condition is averted.

1. Input Variables with Universal Values

None are required for this stage of the analysis.

2. Input Variables with User-Supplied Values

BENAVABT (Benefits per AVerted ABorTion)

The benefits per abortion averted (BENAVABT) is the average monetary savings for each abortion averted by the family planning program. Zero values may be entered if there are no benefits from abortions averted. BENAVABT is a non-periodic real variable with no dimensions.

BENCOND1 (BENefits per health CONDition)

This variable contains the average monetary savings for each health condition averted by the program. Zero values may be entered if there are no benefits for health conditions averted. BENCOND1 is a non-periodic real variable with no dimensions.

BENSTRM$_{[horizon,\ benefits]}$ (BENefit STReaM)

Benefits from a birth averted can be characterized by sources of cost savings and years in which savings occur. BENSTRM describes the cost matrix quantifying the cost savings arising from births averted. Six cost savings categories (benefits) are included: three pertaining to employees and/or spouses (salary supplement, medical care, other) and three pertaining to children (medical care, welfare, other). Each line represents a year of the child's life (year 0 represents the birth year). The total number of years of the child's life for which cost savings can be realized determines the *HorizonLevel* for the projection of future benefits from present births averted.

BENSTRM allows for up to 25 years of child-related benefits. Zero values may be used for benefit categories which do not apply and for years in which there are no child-related costs. BENSTRM is a non-periodic real variable with two dimensions [HORIZON, BENEFIT], the first referring to the number of periods elapsed since the birth was averted, and the second to benefit categories.

HLTHCON1$_{[t]}$ (HeaLTH CONdition averted)

This variable summarizes the number of other health conditions averted by the program. The researcher must manually enter values for every year of the projection; if no other health conditions are expected to be affected by the program, a very small non-zero value (.0000001) must be entered. HLTHCON1 is a periodic real variable with no dimensions.

3. Data Sources for User-Supplied Variables

BENAVABT

Not all induced abortions result in complications and costs to the company; however, where abortion is not permitted by law and is performed in unsanitary conditions, complication rates may be relatively high. In Brazil, it is estimated that 18-20% of all induced abortions result in complications requiring hospitalization; the mean hospital stay for a dilation and curettage is 1.4 days plus the surgical procedure.

The estimation of BENAVABT should prorate the cost to the company of treating an abortion complication according to the probability of complication. For example, if the company pays medical costs, and 20% of all abortions require follow-up medical attention, BENAVABT would equal 20% of the cost of treating one complication. If female employees take sick leave for abortions and 15% of all women at risk are employees (the rest are spouses who are not entitled to sick leave), BENAVABT would equal 15% of the sick leave associated with abortions.

BENCOND1

The monetary value of a health condition averted may be a marginal cost or a total cost, depending on the type of health condition. In the case of a caesarian section delivery averted, the value of BENCOND1 would be a marginal cost, the difference between a vaginal delivery and a caesarian section. Since a postpartum tubal ligation is cheaper than an interval procedure, the researcher may also wish to prorate the cost of delivering a tubal ligation (CONSCACC[tubal ligation], COMMCACC[tubal ligation]) according to the relative proportions of postpartum and interval sterilization projected.

BENSTRM$_{[horizon,\ benefits]}$

Benefits included in the Model are those paid directly by the company (either to the employee or to a service-provider on the employee's behalf) and which are *not* paid by other providers, such as social security (the company pays a fixed social security tax, regardless of whether or not its employees use the social security service, and social security pays the benefit).

Company-paid benefits include many items; not all companies pay all these benefits, and some may pay benefits not included in the list. The cost items listed below are associated with births averted. Costs associated with abortions averted and other health conditions are considered separately. The data tables supplied with the \STARTUP files include six broad categories of birth-related benefits, three of which are associated with the employee and/or spouse, and three with the dependent child. These categories may be modified if necessary.

1. Employee/Spouse Medical Care
   Maternity care (prenatal, delivery, post-natal)

2. Employee Salary Supplements
   Maternity leave (usually only for female employees)
   Lactation leave/salary supplement (may include wives)
   Salary supplement for dependent children (all employees)

3. Employee Other
   Death benefits for dependent children (all employees)

4. Child Medical Care
   Preventative and curative care, hospitalization

5. Child Welfare
   Housing (including water, electricity, gas/kerosene)
   Schooling (matriculation fees, tuition, uniforms, supplies)
   Recreation
   Social services

6. Child Other
   Miscellaneous (layettes, Xmas gifts and parties, etc.)

If medical care is provided in a company clinic, the operating budget for the last calendar year (and monthly exchange rates, to convert into constant dollars) must be included in BENSTRM. Line items should include salaries, consumable supplies, maintenance, administration, and capital improvements. In addition, the total number of services provided during the same interval, ideally broken down by specialty area (ob/gyn, pediatrics, etc.) must be provided. Finally, some estimate must be made of utilization of the available benefits by patient age and sex.

If medical care is provided by third parties (fee-for-service), data requirements are the actual expenditures for total payments, by physician and/or specialty, and the total number of services provided. It is helpful to have access to the actual bills paid, to track services generated by individual maternity and pediatric cases.

For leave benefits and salary adjustments, it is better to use the normative figures stipulated by the company contract, etc., rather than payments actually made. These normative figures are easier to obtain, and they do not open the potentially troublesome question of whether or not the company is giving their employees all of the benefits to which they are entitled.

If company schools are used, try to get actual operating and fixed costs. If subsidies are provided by the company, either directly to the worker or to the school, use normative figures if possible.

HLTHCON1$_{[t]}$

There is no single reliable method of estimating the number of other health conditions which will be averted or alleviated by family planning. One common health benefit, especially in Latin America, is reduction of caesarian section deliveries. Providing postpartum minilaparotomy may reduce the number of unnecessary caesarian sections which were being performed only to carry out a simultaneous tubal ligation.

In this case, the researcher should estimate what percentage of all tubal ligations would be postpartum minilaparotomies and would replace caesarian section deliveries. For example, 50% of all tubal ligations might be assumed to be postpartum, and half of these can be assumed to replace caesarian sections (25% of all tubal ligations). The number of caesarian sections averted each year is the product of the number of tubal ligation acceptors (ACCPTRGT[tubal ligation]) multiplied by both the company share of acceptors (ACCSHARE[tubal ligation]) and the probability that the ligation replaces a caesarian section delivery (.25).

4. Intermediate Output Variables

FUTUREBENEFITS$_{[tt]}$

The Model calculates future benefits which do not occur during the projection period but which occur in the years following it (tt), as the result of births averted during the projection period.

The Model assumes that by the end of the projection period, contraceptive prevalence has returned to baseline levels and no further abortions or health conditions will be averted. Therefore, FUTUREBENEFITS does not include benefits from abortions averted or health conditions averted. FUTUREBENEFITS is an intermediate variable used to calculate the cost-benefit measures; its values are not available for examination.

5. Output Variables

BENABAVT$_{[t]}$ (annual BENefits from ABortions AVerTed during the projection period)

This variable is calculated by multiplying the total number of abortions averted by the benefits per abortion averted. It is a periodic variable with no dimensions.

BENEFITS$_{[t]}$ (annual program BENEFITS)

For every year of the projection, the Model calculates total benefits accrued, as the sum of benefits arising from births averted, abortions averted, and other health conditions averted. Benefits arising after the end of the projection period are calculated separately, in FUTUREBENEFITS.

BENEWBRT$_{[t]}$ (annual BENefits from NEW BiRThs averted)

BENEWBRT is calculated by multiplying the total number of births averted in the period by the benefit stream from the first year (year 0) of the benefit horizon. It is a periodic variable with no dimensions.

BENHCAVT$_{[t]}$ (annual BENefits from Health Conditions AVerTed)

Calculated by multiplying the number of health conditions averted by the benefits per health condition averted. It is a periodic variable with no dimensions.

BENPVBRT$_{[t]}$ (annual BENefits from BiRThs averted prior to the Projection period)

Calculated by multiplying the total number of births averted in each year prior to the projection period by the benefit stream from the corresponding year of the benefit horizon. It is a periodic variable with no dimensions.

TOTBEN (TOTal undiscounted program BENefits over the life of the program)

This variable calculates the total non-discounted program benefits over the entire life of the family planning program YRSTOEND and its benefit horizon (DECAYDAT, BENSTRM). It is the sum of the annual program benefits BENEFITS. It is a non-periodic variable with no dimensions.

6. Interpretation of Benefits Output Variables

BENABAVT$_{[t]}$, BENEWBRT$_{[t]}$, BENHCAVT$_{[t]}$, and BENPVBRT$_{[t]}$

These variables allow the program administrator to distinguish among the various sources of cost savings, including abortions averted (BENABAVT), health conditions averted (BENHCAVT) and new and previous births averted (BENEWBRT, BENPVBRT).

BENEFITS$_{[t]}$ and TOTBEN

These variables present "bottom line" program benefits, both by year (BENEFITS) and for the entire benefit horizon (TOTBEN).

E. CALCULATING COST-BENEFIT MEASURES

Input Variables with Universal Values. None

Input Variables with User-Supplied Values

Variable Name	*Brief Description*	*Valid Range*
DISCRATE	Discount Rate (Percentage)	0 < DISCRATE < 100

Output Variables

Variable Name	*Brief Description*
BCRATIO	Benefits to Costs Ratio
$CASHFLOW_{[t]}$	Annual Cash Flow (Benefits less Costs)
$CUMBNFIT_{[t]}$	Cumulative Program Benefits
$CUMCOSTS_{[t]}$	Cumulative Program Costs
DISBNFIT	Discounted Benefits
DISCOSTS	Discounted Costs
IRR	Internal Rate of Return (Percentage)
PAYBACK	Cost Recovery (CUMBNFIT - CUMCOSTS)
$TBCRATIO_{[t]}$	Truncated Benefits to Costs Ratio
TIRR	Truncated Internal Rate of Return

The Model calculates various summary measures of program costs and benefits based on the projections of costs (COSTS) and benefits (BENEFITS) in each period. These include the stream of current benefits and costs (used to determine the break-even point), cumulative benefits and costs, benefits-to-costs ratios, and the internal rate of return.

1. Input Variables with Universal Values

None are required for this stage of the analysis.

2. Input Variables with User-Supplied Values

DISCRATE (Discount rate)

The researcher must specify an annual discount rate to be used for company investments. This variable contains the discount rate which is used to calculate the present value (T=0) of benefits and costs. DISCRATE is entered as a percentage. For most developing countries applications, we recommend a minimum value of 10%. DISCRATE is a non-periodic real variable with no dimensions (i.e., a scalar).

3. Output Variables

BCRATIO (Benefits-to-Costs RATIO)

The benefits-to-costs ratio is defined as the ratio of the discounted stream of benefits to the discounted stream of costs (DISCOSTS). BCRATIO is based on the entire stream of future discounted benefits (DISBNFIT)

CASHFLOW(t) (annual CASH FLOW)

Calculated by subtracting total annual program costs from total annual program benefits. The year in which CASHFLOW goes from negative to positive is defined as the *breakeven point*. CASHFLOW is a periodic variable with no dimensions.

CUMBNFIT[t] (CUMulative BeNeFITs)

Cumulative benefits are computed as the sum of non-discounted benefits (BENEFITS) from the first year of the program to the current year of the projection (t).

CUMCOSTS[t] (CUMulative COSTS)

Cumulative costs are computed as the sum of non-discounted costs (COSTS) from the first year of the program to the current year of the projection (t). The period in which CUMBNFIT first exceeds CUMCOSTS defines the length of the "pay-back" period.

DISBNFIT (DIScounted BeNeFITs)

This variable represents the present discounted value of program benefits (BENEFITS) up to and including the last projection period (T).

DISCOSTS (DIScounted COSTS)

Generally speaking, the projection period should extend at least until the end of the program (t >= YRSTOEND) in order to capture all program costs. DISCOSTS represents the present discounted value (i.e., at t=0) of program costs up to and including the last projection period (T). Annual costs (COSTS) after program termination (t > YRSTOEND) are set at zero.

IRR (Internal Rate of Return)

IRR presents the internal rate of return on all program benefits, including those accrued after the projection period (BENEFITS, FutureBenefits).

PAYBACK(t) (PAYBACK period)

PAYBACK measures the recovery of program costs. It is calculated by subtracting cumulative non-discounted program costs from cumulative non-discounted program benefits. The year in which PAYBACK goes from negative to positive is defined as the PAYBACK period. PAYBACK is a periodic variable with no dimensions.

TBCRATIO(t) (Truncated Benefits-to-Costs RATIO)

TBCRATIO is calculated by dividing annual cumulative discounted benefits by annual cumulative discounted costs. It is an alternative measure of the payback period: the year in which TBCRATIO achieves a value of 1.00 or higher is the *discounted payback period*. TBCRATIO is a periodic variable with no dimensions.

TIRR (Truncated Internal Rate of Return)

TIRR presents the internal rate of return limited to benefits occurring during the projection period (BENEFITS).

V. ADVANCED TOPICS

The *TIPPS* Model can conduct sensitivity analyses, generate tables of both input and output variables, create graphs, and be manipulated to better present a particular scenario. This chapter presents instructions for using these advanced capabilities.

A. SENSITIVITY ANALYSIS

Sensitivity analyses enable the researcher to compare two or more data sets which contain different assumptions. The researcher can evaluate the impact of an increase in the cost of a family planning consultation by creating two data sets, each of which contains a different value for CONSCOST, running projections with each data set, and comparing the results.

Two different scenarios can be compared by creating a comparison file, running a projection, and comparing the results. It is possible to compare the results of projections which use different values for a particular variable and to contrast scenarios based upon different assumptions. For example, the researcher can see the results of different assumptions concerning contraceptive substitution for abortion by comparing the results of two projections, each using a different value of ABORTWT.

The researcher can also compare the increase in births averted (AVERTBIR) resulting from a higher contraceptive prevalence (TCONPREV) by creating two files with different values for TCONPREV, running a projection, and using the Graphics Module to view graph #5 of AVERTBIR as it was calculated in the two scenarios.

There are five steps to conducting sensitivity analyses:

1. Creating the comparison file.
2. Editing the comparison file.
3. Specifying the comparison file in the Configure file.
4. Running a projection with the Model module.
5. Viewing the results with the Graphics Module or the Tabulate option.

1. Creating the Comparison File

First, a copy must be made of the original data files. This can be done by backing up the data files before running a projection (see Chapter III, Section B) or by backing up the data files with the Manage option (see below).

a. Prior to Running a Projection

When running a projection as discussed in Chapter III, Section B, after the "GO" command is given, the Model asks whether a backup copy of the original data file is desired. The researcher can respond [**Y**]es, specify the name of the file to be backed up, and then specify the name of the new file to be created. The new file will be the Comparison file.

For example, if the original data file is named **COMPZ**, and the researcher wants to create a comparison file named **COMPZ1**, the following commands are required:

```
Module: MODEL [ENTER]
Create backup of Data File COMPZ before proceeding? Y
Copy COMPZ to? C:\HOST\TIPPS\COMPZ\COMPZ1 [ENTER]
```

b. Using the Manage Option

A comparison file can also be created using the [M]anage Option from the Main Menu. From the Manage Menu, select the [D]ata option, then the [B]ackup option to create a copy of the data file for use as a comparison file.

```
[M]ANAGE
[D]ATA
[B]ACKUP
DATA FILE TO BACKUP? C:\HOST\TIPPS\COMPZ\COMPZ [ENTER]
COPY COMPZ TO: C:\HOST\TIPPS\COMPZ\COMPZ1 [ENTER]
```

2. Editing the Comparison File

Once a comparison file has been created, the researcher can change the assumptions made in the original data file by editing the copy (COMPZ1) and changing the variable values to reflect the new assumptions (see Chapter III, Section A).

3. Specifying the Comparison File

From the Main Menu, select the [C]onfigure Menu and the [F]iles Option to enter the name of the Comparison file into the Configure file:

```
FILES

Data          :  COMPZ [ENTER]
Comparison    :  COMPZ1 [ENTER]
Instruction   :
```

4. Running the Projection

After [S]aving the new Configure File, [R]un a projection using first the MODEL Module and then the GRAPH Module (See Chapter III, Section B).

5. Viewing the Results

Graphic comparisons created by the GRAPH Module can be viewed by entering the *number of the variable* to be graphed followed by [, c]. The graph will display the different values of the same variable as computed in the two different scenarios. If the Comparison file has not been specified in the Configuration file, an error message will be displayed indicating that the comparison file cannot be found.

6. Example

To illustrate the use of the comparison option, we will compare the impact of two levels of target contraceptive prevalence (TCONPREV) on the number of births averted (AVERTBIR). In this example, COMPZ will be the original data file, and it will be compared with COMPZHI, a comparison file which contains higher values for TCONPREV.

a. Create a Backup of the COMPZ Data Set

Select [M]anage from the Main Menu, then the [**D**]ata option and the [**B**]ackup option. The name of the original data file will be displayed on the screen. When the program prompts, "COPY COMPZ TO:" type **COMPZHI**, the name of the comparison file.

```
[M]ANAGE
[D]ATA
[B]ACKUP
DATA FILE TO BACKUP? C:\HOST\TIPPS\COMPZ\COMPZ [ENTER]
COPY COMPZ TO: COMPZHI [ENTER]
```

b. Edit the Data Set

Return to the Main Menu by pressing the [/] key, and select the [**E**]dit option to edit the data set COMPZHI. Since there are now two files available, both filenames will be displayed, and you can select the COMPZHI file by moving the cursor until that filename is highlighted, then pressing the [**ENTER**] key.

```
[E]dit
Data File to Edit? COMPZHI [ENTER]
Variable Name? TCONPREV [ENTER]
```

Input the new values for each age group, then save the changes.

c. Specify the Comparison File

Return to the Main Menu, select the [**C**]onfigure Menu and the [**F**]iles option, then specify **COMPZHI** as the new comparison file. Press the [**/**] key to return to the Configure Menu, and [**S**]ave the changes.

d. Run the Projection Using Two Data Files

Return to the Main Menu, select the [**R**]un option and the MODEL Application Module. Specify the *starting period* as 1 and the *number of periods* as 5. The sequence of commands is:

```
[R]un
Application Module: MODEL
Data file C:\HOST\COMPZ\COMPZ [ENTER]
Starting period 1 [ENTER]
Number of periods: 5 [ENTER]
```

When the projection is complete, the program will asl if you wish to run another application. Answer [**Y**]es, and in response to the prompt, specify the **GRAPH** Application Module. When asked which variables to graph, specify **5,c.**

```
Do you wish to run another application? Y
Application Module:  GRAPH [ENTER]
Variables to graph:  5,c [ENTER]
```

The program will graph the two scenarios on the same axis to compare their results.

The only way to simultaneously view the results of the two files is with the GRAPH application module under the Run option. Individual tables and graphs of the two separate files can be created and viewed with the Tabulate and Graph options from the Main Menu.

B. INSTRUCTION FILES

Instruction files simplify and automate the execution of the Model. They are similar to batch files in the DOS system. Instruction files can be used to automatically generate projections, tables, graphs, Lotus import files, print-ready files, and **Host** graph files.

Instruction files contain the same commands used to run a projection, create a table, or use some other capability of the Model. They simplify processing by allowing the researcher to enter the entire sequence of commands in advance.

For example, the INPUTS instruction file automatically prints all of the input variables, giving the researcher a printed record of all of the assumptions related to a particular projection. Rather than use the Tabulate option to generate the seven input tables one at a time, the researcher can [**P**]rocess the Instruction file *INPUTS* to print all seven tables at once. Three Instruction files are included with the Model: *PROJECT* to run a projection, *INPUTS* to print all the input tables, and *OUTPUT* to print the output tables.

1. Commands and Parameters

The researcher can create his/her own Instruction files using these Instruction parameters to define the projection module, the output device and the time horizon:

g	graph application module
m	model application module
n	number of periods
o	output device
p	number of periods
s	starting period
t	table

The *TIPPS* Model offers interactive prompting to write instruction files. These function keys provide assistance in writing the commands listed above.

Function Key	HOST Instruction	Explanation of Instruction
F3	RUN	Run an application module
F4	SUSPEND	Suspend processing of an instruction file
F5	TABLE	Generate a table
F6	GRAPH	Generate a graph
F7	BASE	Set the base year for the dimension period
F8	INCR	Set the increment between levels of period
F9	PERIOD	Set the current levels of dimension period
F10	REM	Comment line (not executed by Host)

2. Creating an Instruction File

To create an Instruction file which will run a projection for 10 years, the researcher selects [I]nstruct from the Main Menu. When the Instruct Menu is displayed, the researcher selects the [C]reate option, and enters the following lines:

```
run m - model s - 1 n - 9
run m - graph s - 1 n - 9
```

The researcher can also enter the [I]nstruct Menu, select the [C]reate option, specify a filename, and use the function keys as described at the bottom of the screen.

```
                                                          EDIT FILE
 Instruction File Name : RUNIT      Line Number: 1
 Application Module Name? _____________________

 ]to point to a line, enter text to edit or press a function key.
F3-RUN F4-TABLE F5-SUSPEND F6-GRAPH F7-BASE F8-INCR F9-PERIOD F10-REM
```

3. Save and Process

After the Instruction file is created, it should be [**S**]aved. The researcher can [**P**]rocess it from the Instruct Menu to execute the instructions in the file.

To generate four tables and send them to the printer, Select [**I**]nstruct from the Main Menu, select [**C**]reate from the Instruct Menu, then enter the following lines:

```
table t = bencosts o = prn p = all [ENTER]
table t = fert o = prn p = all [ENTER]
table t = fertl o = prn p = all [ENTER]
table t = inputl o = prn p = all [ENTER]
```

Press [/] to leave the Creation sequence, [**S**]ave the file, verify the name of the Instruct File, select [**Q**] to return to the Instruct Menu, then [**P**]rocess it.

NOTE: Some computers require the printer specification to be LPT1 instead of PRN. If the screen displays an error message (`Printer not ready or out of paper`), check to be sure that the printer is loaded and turned on. If it is, return to the Instruct Menu [E]dit option and change the o = prn statements to o = lpt1. See Appendix D for a full list of Editing Commands.

4. Print-Ready Files

Instruction files can be used to create Lotus import files and print-ready files of the tables generated by the Model. These files can be used to manipulate the data from within Lotus or other software packages. The following example will create two Lotus files:

```
table t = bencosts o = bencosts.prn p = all [ENTER]
table t = fert o = fert.prn p = all [ENTER]
```

The filename extension **.prn** designates a Lotus 1-2-3 import file. Any other extension can be used to create a print-ready file which can be used with other software packages. The information generated by the *TIPPS* Model can be used with a variety of word-processing programs and Lotus 1-2-3.

5. DOS Interaction

Instruction files can include DOS commands, permitting the **Host** system to interact with other software packages. For example, the following lines will permit the researcher to automatically leave the **Host** system and enter Storyboard, located in the *PCSCMD* subdirectory on the **C:** drive:

```
C:> cd \PCSCMD [ENTER]
```

To import the file *bencosts.prn* into 1-2-3 from within 1-2-3, press **[/]**, followed by the first letters of the following series of Lotus commands, then type the filename of the datafile to be imported:

```
/
[F]ile
[I]mport
[N]umber
File to import:  C:\host\tipps\bencosts.prn
```

After executing these commands, the researcher can perform calculations upon the data in the file *bencosts.prn* from within Lotus 1-2-3.

C. THE MANAGER LEVEL

The *TIPPS* Model is designed for two levels of utilization: USER and MANAGER. The User level is sufficient for most operations of the Model, but Manager level is required to add or delete variables. This capability should be used only to change the periodicity of a variable.

The researcher must change the variable type from *non-periodic* to *periodic* when different values are to be assigned to the variable over time. For example, the fixed costs of offering family planning services may change from year to year, or they may remain the same over the life of the project. If the fixed costs are the same for each period of family planning operations, then the variable type of the variable FIXCOSTS can be changed from *periodic* to *non-periodic*.

This change permits the researcher to enter a single value for FIXCOSTS which will be used for each year of the family planning program rather than requiring the researcher to input the same value repeatedly for each year. In order to change the periodicity, the variable must be deleted from the data set and then re-defined. (See Chapter V, Section E).

1. Gaining Access to Manager Level

There are two ways of gaining access to the Manager level:

a. Manager level can be selected when the researcher first enters the **Host** system by selecting the [M]anage option at the Access Menu.

b. The researcher can select the [A]ccess option from the Main Menu.

2. Passwords

The password required to enter the Manager level is **HOST**. *It must be typed entirely in upper-case letters.* The researcher has the option to change this password if he/she so chooses.

To change the password, the researcher should select the [**M**]anager at the Access menu, then enter the current password. The system will prompt:

```
"Change the System Password?:"
```

The researcher should answer [**Y**]es and type in the new password. When the program requests that the password be entered a second time for verification, the new password should be entered in exactly the same form as it was the first time. The new password must thereafter be used each time access to the Manager Level is needed.

3. Manager Level Options

At the Manage Menu, there are four options available:

```
| DATA LIBRARY UTILITY QUIT |
```

a. The Data Option

The [**D**]ata option enters the Data Menu, from which the researcher can create, rename, backup, delete, verify, or pack a data file.

```
                                                DATA
| Create, Rename, Backup, Delete, Verify, Pack
| Create a new data file
```

The [**D**]ata [**C**]reate option is not used in the *TIPPS* Model application. It does **NOT** create a new *TIPPS* Model data set, and the researcher will not be able to create new data *TIPPS* files using this command. There are two ways to create a new data set for the *TIPPS* Model.

1. The researcher can [**B**]ackup an existing data set (e.g., START). The START files contain all the variables for the application as well as the universal values for those variables which are international standards. (See Chapter III, Section B or Chapter V, Section A).

2. The researcher can also [**R**]ename an existing *TIPPS* Model data file. However, if an existing data set is renamed, it is important to remember which data are contained in that file and which variables will need to be edited.

The [**D**]ata [**V**]erify option checks the data files for any structural damage which may have been caused by improper termination of the **Host** system or physical damage to the diskette.

[**D**]ata [**D**]elete marks a label, variable, or graph for deletion, and [**D**]ata [**P**]ack physically removes them. Variables should not be deleted except when changing their periodicity.

b. The Library Option

The [**L**]ibrary option enters the Library Menu, from which the library files can be [C]reated, [**V**]erified, or [**P**]acked. Three library files are included in the *TIPPS* Model: GRAPH.LIB, LABEL.LIB, and TABLE.LIB. The researcher should *NOT* delete or alter the Library files, nor should the researcher create a new Library file.

c. The Utility Option

The [**U**]tility option allows the researcher to read the contents of an ASCII file. After selecting Read, and specifying the name of an ASCII file, the contents of that file will be sent to the screen or the printer.

D. EDITING LABELS AND DEFINING NEW GRAPHS AND TABLES

The researcher can change the labels used with the *TIPPS* Model from one language to another, and can generate additional tables and graphs in order to facilitate his/her work.
These capabilities are available from the [**D**]efine Menu. From the Main Menu, select the [**D**]efine Menu.

```
DEFINE
Labels Dimensions Variables Tables Graphs Quit
```

1. Labels

TIPPS \STARTUP files are provided in English, French, and Spanish. The researcher who wishes to translate the labels into another language should consult the **Host** manual.

2. Dimensions

This command is not used in the *TIPPS* Model application.

3. Variables

There are occasions when it is appropriate to alter the form of variables in the *TIPPS* Model: to change the unit of measurement describing a variable (such as changing dollars to pesos) or to change the periodicity of a variable.

a. Changing the Unit of Measurement

To change the unit of measurement of the benefits from dollars to another currency, enter the [**D**]efine Menu from the Main Menu, select the [**V**]ariable Menu, and then select the [**E**]dit option. Press the [**ENTER**] key repeatedly, until it is positioned at the *d* in *dollars*. Type in the name of the new currency unit. If the new name is shorter than the word *dollars*, delete the remaining letters by pressing the [**DEL**] key. Return to the Variables Menu by pressing the [**/**] key, select [**S**]ave to save the changes, and press [**Q**] to quit (or press the [**ESC**] key) to return to the Main Menu.

b. Changing Periodicity

The values of periodic variables change with time. For example, FIXCOSTS, the cost of offering family planning services, will change over time when there is a high start-up cost to establish the service and low recurrent operating costs.

The values of non-periodic variables are the same for each period of time. For example, the fixed costs of offering family planning services may be the same every year; and if this is the case, then FIXCOSTS should be redefined as a non-periodic variable.

In order to more precisely simulate reality in the application of the *TIPPS* Model, the researcher may want to change the periodicity of the following variables:

ACCSHARE	CONSCOST
BENAVABT	FIXCOSTS
BENCOND1	HLTHCON1
COMMCOST	

To change the periodicity of a variable, the variable must be deleted from the data set, recreated, and added back to the data set with its new periodicity. From the Main Menu, select the [**M**]anage Menu, the [**D**]ata option, then the [**V**]ariables option. When the program requests the name of the variable to be edited, type **FIXCOSTS** and press the [**ENTER**] key. The variable parameters are displayed on the screen:

```
Variable Name:   FIXCOSTS                        Data File:  COMPZ
  Description:   Fixed Annual Costs              Size (bytes):   8

         Type:   Real
Minimum Value:   0.000000000       Unit of Measurement: dollars
Maximum Value:   1.7976E+308       Scaling Exponent:  0

    Edit Mask:   !!!!!!!!!!!!      Periodic:  Yes
 Display Mask:   ##### ###         Number of Dimensions:  0
```

The researcher should make note of the following parameters so they can be entered into the definition of the new variable:

Variable Name	Minimum Value	Display Mask
Description	Maximum Value	Unit of Measurement
Type	Number of Dimensions	Scaling Exponent
Dimensions	Edit Mask	Periodic

These parameters are required when the variable is recreated as a *non-periodic* variable.

Press the [/] key to return to the Variables Menu, and then [Q]uit.

c. Deleting Variables

To delete the variable, enter the [D]efine Menu from the Main Menu, select the [V]ariable option, and then select the [D]elete option. The program will ask for the name of the variable to be deleted. Type in **FIXCOSTS** and press the [**ENTER**] key. The program will ask you to verify your decision by prompting

"Delete variable FIXCOSTS from file?"

Answer **Yes** and press the [**ENTER**] key.

d. Adding Variables

When the variable has been deleted, select the [A]dd option to Add a new variable. After the variable to be added has been specified, the parameters must be entered exactly as they had been defined before except for *Periodic*. The screen should look like this:

```
Variable Name:   FIXCOSTS                        Data File:  COMPZ
  Description:   Fixed Annual Costs              Size (bytes):   8

         Type:   Real
Minimum Value:   0.000000000        Unit of Measurement: dollars
Maximum Value:   1.7976E+308        Scaling Exponent:  0

    Edit Mask:   !!!!!!!!!!!!       Periodic:  No
 Display Mask:   ##### ###          Number of Dimensions:  0
```

Press the [/] key to return to the Variable Menu, [S]ave the changes, and [Q]uit to return to the Main Menu.

WARNING!

If a deleted variable is not recreated
(added) and saved, the MODEL will not run.

4. Tables

New tables can be created, and existing tables can be edited and altered. There are twenty-five predefined tables, which are listed in Appendix B. To create a new table, use the following commands:

```
[D]EFINE
[T]ABLE
[A]DD
TABLE NAME:   NEW TABLE NAME [ENTER]
Title 1:      Table Description or Title [ENTER]
DIMENSION:    Period [ENTER]
USE:          Row
LABEL:        None
```

As an example, examine the definition of the table *bencosts*:

```
Table Name:  Bencosts                    Data File: COMPZ
Title 1:     Benefits and Costs Projected by the Model

DIMENSION  USE  LABEL  FORMAT  COMBINE  TOTAL  PERCENT
Period     Row   None
```

For a complete description of how to use these options, refer to the **Host** manual.

APPENDICES

Appendix A. GLOSSARY OF TECHNICAL TERMS

Abortion — Termination of a pregnancy before the stage of viability, i.e., between the twentieth and twenty-eighth week of gestation.

Abortion, averted — An abortion which does not occur because a woman used contraception to prevent pregnancy rather than abortion to end it.

Abortion complication — A health or medical problem brought on as a consequence of an abortion or retention of part of the product of conception in the uterus. Complications include hemorrhage, perforation of the uterus, infection, etc.

Abortion, induced — An abortion brought on intentionally by use of instruments or drugs.

Acceptor — A person who accepts and begins to use a specified contraceptive method.

Acceptor, continuing — A person who accepts and begins to use a specified contraceptive method and continues using the same method for at least one year.

Acceptor, discontinuing — A person who accepts a contraceptive method but who stops using that method within the first year.

Additive model — A mathematical model in which the final outcome is equal to the sum of its parts, in contrast to a multiplicative model in which the outcome is equal to the product of its parts.

Age structure The number of people in a given population, by 5-year age groups (i.e., 15-19, 20-24, 25-29, 30-34, 35-39, etc.).

Amenorrhea Absence or suppression of menstruation, normally before puberty, after menopause, during pregnancy and lactation.

Backup (noun) A copy of a HOST data file.

(verb) To create a copy of a HOST data file by using the BACKUP command.

Base period The period of a cost benefit analysis in which representative data are collected from surveys, company records, and other sources; also, the year prior to the first year of family planning service delivery.

Baseline Information pertaining to initial conditions, collected during the base period, and used as the basis for contraceptive prevalence and contraceptive method mix projections.

Batch (.BAT) file A computer program file which automates and simplifies the execution of a series of computer commands, often used to automate routine procedures such as running a projection or generating print files of tables.

Benefits-to-costs ratio The comparison of benefits to costs. When the value of this ratio is greater than one, the benefits generated by the investment exceed the costs. When the ratio is less than one, the costs of the investment exceed the benefits.

Births averted Those births that a healthy, sexually active woman should have had, but did not have because she either avoided conceiving or terminated the pregnancy prior to birth.

Break-even point The first year in which the annual benefits exceed the annual costs.

Capital investment An investment in (long-term) assets which will generate benefits for more than a year, such as equipment, buildings, or land.

Cash flow Benefits less costs, for a given period.

Commodity Contraceptive supplies (e.g., pills, condoms, injections, etc.) required for family planning service delivery.

Continuation rate The probability that a contraceptive user or acceptor will continue to use his/her contraceptive method.

Continuation rate, immediate The probability that an acceptor will begin using the contraceptive method he/she has accepted.

Contraceptive Mechanical, chemical, or surgical methods of preventing conception.

Contraceptive effectiveness The probability that a given contraceptive will protect a woman from getting pregnant.

Contraceptive effectiveness, theoretical The probability that a woman who is properly using a given method will **not** become pregnant.

Contraceptive effectiveness, use The average protection provided by a given contraceptive method, often less than theoretical effectiveness because the method may not be used properly.

Contraceptive Methods

Condom	A device usually made of latex, designed to fit over the penis and prevent the flow of semen into the vagina.
Diaphragm	A device made of latex, designed to be inserted into the vagina to fit over the cervix and prevent the flow of semen into the uterus.
Implant	Silicon rods containing progestin and inserted under the skin of the arm.
Injection	A contraceptive method in which synthetic progestin hormones are injected into a muscle, from which they are slowly released.
IUD	A small plastic device inserted into the uterus to prevent conception.
Long-lasting	A contraceptive method which confers protection for several years or more; includes IUD, implant, and voluntary sterilization (tubal ligation or vasectomy)
Minilaparotomy	A surgical technique of female sterilization which does not require hospitalization and is often performed under local anesthesia.
Periodic abstinence	Prevention of pregnancy by refraining from sexual intercourse during the estimated time of ovulation. Methods to determine times of ovulation include calendar, basal temperature, cervical mucous, and sympto-thermal.
Permanent	Non-reversible contraceptive methods; voluntary sterilization (tubal ligation and vasectomy).

Pill	Pills combine synthetic forms of the hormones progesterone and estrogen to prevent ovulation.
Semi-permanent	Reversible, long-lasting contraceptives, including IUD and implant.
Spermicide	A contraceptive which comes as a foam, cream, jelly, tablet or suppository and which is inserted into the vagina before intercourse. Spermicides inactivate sperm and mechanically keep them from entering the uterus.
Sterilization	Permanent methods of contraception such as tubal ligation and vasectomy.
Traditional	Non-scientific contraceptive methods, including withdrawal, some forms of abstinence, breast-feeding, and "folk" remedies.
Tubal ligation	A method of female sterilization in which the fallopian tubes are surgically closed.
Vasectomy	A method of male sterilization in which the vas deferens are surgically closed.
Withdrawal	A contraceptive method in which the man removes his penis from the woman's vagina before ejaculation.
Contraceptive method mix	The proportion of contraceptive users in a population using each of the available contraceptive methods.
Contraceptive prevalence	The proportion of women in a given population who are using some contraceptive method. Breastfeeding, postpartum abstinence, and "folk remedies" (herbal teas, rings, etc.) are *NOT* included as contraceptive methods.

Contraceptive prevalence, absolute
The proportion of all women at risk who are using a specific contraceptive method.

Contraceptive prevalence, relative
The proportion of contraceptive users who are using a specific contraceptive method.

Contraceptive user A person practicing some recognized method of contraception.

Cost-benefit analysis A comparison of the benefits generated by an investment with the costs incurred by that investment.

Costs The expenses associated with providing family planning services.

Costs, commodity The cost of contraceptives supplies provided to a user of the family planning service.

Costs, consultation The cost of providing one consultation to a family planning client. Does not include the commodity costs.

Costs, fixed The annual expenses associated with providing family planning services, which are independent of the number of clients served.

Costs, start-up One-time fixed costs incurred at the beginning of the the family planning program.

Costs, variable The costs directly associated with the number of clients served, including consultation and commodity costs.

Cross-tabulation A matrix composed of two or more variables.

Default Values used by the computer program for projection modeling if no alternative values are supplied.

Dilation and curettage A surgical procedure often performed following abortion complications.

Dimension A set of attributes or categories used to describe a single value of a variable. For example, the set of attributes describing the target contraceptive mix consists of two dimensions: women's age groups and contraceptive methods.

Discontinuation rate The probability that a contraceptive user will stop using his/her contraceptive method within a 12-month period.

Discount rate The interest rate used to account for the time value of money.

Family planning The use of contraception to regulate the number and spacing of children.

Fecund Biologically capable of conceiving and bearing children.

Fertility rate, general The number of live births per 1000 women aged 15-49 in a given population.

Fertility rate, marital age-specific The number of live births per 1000 married women of a given age group in a given population.

Fertility rate, maximum biological The annual probability of live births among sexually active women who neither breastfeed nor use contraception or abortion.

Fertility rate, potential — The number of live births which would have been expected per 1000 women, had they not been using contraception.

Fertility rate, total marital — The total number of births a married woman can expect to have during her lifetime.

Hysterectomy — A surgical procedure in which the uterus is removed from a woman's body.

Internal rate of return (IRR) — The discount rate that sets the present discounted value of costs equal to the present discounted value of benefits.

Interpolation — An estimate of intermediate values occurring between two known values.

Interpolation, linear — The estimate of the values occurring on a straight line constructed between two known values.

Lactation — Breastfeeding.

Level — The number of rows or columns in a matrix composed of one or more dimensions; e.g., the dimension *AGE* has 7 levels, one for each age group: 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, 45-49. Also, a specific row or column; e.g., AGE level *one* is 15-19 and AGE level *seven* is 45-49.

Live birth — An infant showing evidence of life (breathing, heart action, voluntary movement) at birth.

Matrix — A rectangular array of mathematical elements having any number of rows and columns, often used interchangeably with *table*.

Monotonic — A variable which shows a steady increase or decrease.

Non-program source of contraceptives
A source of contraceptive supplies other than the company-supported family planning program.

Parameter A variable with a constant value.

Payback period The elapsed time between expenditures and the revenues which match them.

Period A unit of time; in the *TIPPS* Model, one year.

Postpartum The period immediately following childbirth.

- **Postpartum abstinence** Refraining from intercourse following childbirth.
- **Postpartum amenorrhea** Absence of menstruation following childbirth, often lengthened by breast-feeding.
- **Postpartum infecundability** Biological inability to conceive due to postpartum amenorrhea.
- **Postpartum sterilization** Sterilization procedures performed at the time of childbirth or before a woman is discharged from the hospital following childbirth.

Present discounted value The value of a future investment or return expressed in today's currency adjusted to reflect expected loss from inflation.

Proximate determinant of fertility Biological or behavioral factor which directly affects fertility. Four proximate determinants are usually defined: percent of women married or in union, breast-feeding practices, use of contraception, and use of induced abortion.

Universal estimate	A value derived from scientific studies or international practices and procedures.
User	A person who uses a contraceptive method.
User, continuing	A person who began using a contraceptive method in a previous time period and continues to use that method throughout the present time period.
Variable	A factor to be considered in planning.
Variable, non-periodic	Variables whose values do not vary with time.
Variable, periodic	A variable whose values vary with time.
Women at risk	Those women exposed to pregnancy and childbirth because they are either married or in a stable sexual union.

Appendix B. TABLES AND VARIABLES

Appendix B presents the 94 variables used in the *TIPPS* Model and the 25 tables in which the variables are found. The tables serve two purposes: first, to guide the researcher as she/he enters the necessary data, and second, to present the projection results.

The tables are organized into six groups; one set of input tables and five sets of output tables.

VARIABLE DESCRIPTIONS

Variable Name	*Description*
A	Immediate Continuation Rate
ABORT	Number of Abortions
ABORTWT	Abortion weight
ACCPTRGT	Annual Acceptor Targets
ACCSHARE	Program Share of Acceptor Costs
AVEFFECT	Average Contraceptive Effectiveness
AVERTABT	Number of Abortions Averted
AVERTBIR	Births Averted
BAA	Births Averted by One Abortion
BABORT	Base Period Number of Abortions
BAVEFFCT	Base Period Average Contraceptive Effectiveness
BBAA	Base Period Births Averted by 1 Abortion
BBIRTHS	Base Period Number of Births
BCONPREV	Base Period Contraceptive Prevalence
BCONSHRE	Base Period Program Share of Contraceptive Acceptors
BCRATIO	Benefit-Cost Ratio
BENABAVT	Benefits from Abortions Averted
BENAVABT	Benefits per Averted Abortion
BENCOND1	Benefits per Health Condition Averted
BENEFITS	Total Program Benefits
BENEWBRT	Benefits from New Births Averted
BENHCAVT	Benefits from Health Conditions Averted
BENPVBRT	Benefits from Previous Births Averted
BENSTRM	Benefit Stream
BFEMRISK	Base Period Women at Risk
BIRTHS	Number of Births
BMASAR	Base Period Marital Age-Specific Abortion Rate
BMASFR	Base Period Marital Age-Specific Fertility Rate
BMETHMIX	Base Period Contraceptive Method Mix
BMTHPREV	Base Period Contraceptive Prevalence by Method
BPOTFERT	Base Period Potential Fertility
BREAST	Average Length of Breastfeeding (Months)
CASHFLOW	Annual Cash Flow (Benefits Less Costs)
COMMCACC	Commodities per Continuing Acceptor
COMMCONT	Commodities per Continuing User
COMMCOST	Unit Costs of Commodities by Method
COMMDROP	Commodities per Discontinuing Acceptor
COMMOD	Number of Commodities by Method
CONPREV	Contraceptive Prevalence
CONSCACC	Consultations per Continuing Acceptor
CONSCONT	Consultations per Continuing User
CONSCOST	Consultation Cost
CONSDROP	Consultations per Discontinuing Acceptor
CONSHARE	Program Share of Continuing User Costs
CONSULT	Number of Program Consultations
CONTUSER	Continuing Users from Previous Years
COSTCOMM	Commodities Costs

Variable Name	*Description*
COSTCON	Consultation Costs
COSTS	Total Annual Program Costs
CUMBNFIT	Cumulative Program Benefits
CUMCOSTS	Cumulative Program Costs
DECAYDAT	Data on Time Path of Post-Program Decay
DIRECTPP	Input Postpartum Amenorrhea Directly
DISBNFIT	Discounted Benefits
DISCOSTS	Discounted Program Costs
DISCRATE	Discount Rate (percentage)
EFFECT	Contraceptive Effectiveness by Method
EXPABORT	Abortions Expected Without Family Planning Program
EXPBIRTH	Births Expected Without Family Planning Program
FECUND	Proportion Fecund
FEMRISK	Women at Risk
FIXCOSTS	Fixed Annual Costs
HLTHCON1	Health Condition 1 Averted
IMSUBSTN	Immediate Source/Method Substitution
INTERP	Interpolate CONPREV and METHMIX (0=No, 1=Yes)
INTERPFM	Interpolate FEMRISK (0=No, 1=Yes)
IRR	Internal Rate of Return (%)
LACTINDX	Lactation Index
MASAR	Marital Age-Specific Abortion Rates
MASFR	Marital Age-Specific Fertility Rates
MAXFERT	Biological Maximum Fertility
METHACPT	New Program Acceptors by Method
METHCONS	Program Consultations by Method
METHMIX	Contraceptive Method Mix
METHPREV	Contraceptive Prevalence by Method
METHUSER	Program Continuing Users by Method
PAYBACK	Cost Recovery (cumulative benefits - cumulative costs)
POSTPART	Average Length of Postpartum Amenorrhea
POTFERT	Potential Age-Specific Fertility Rates
R	Annual Discontinuation Rate
TBCRATIO	Truncated Benefits to Cost Ratio
TCONPREV	Target Contraceptive Prevalence
TFEMRISK	Target Period Values of Women at Risk
TIRR	Truncated Internal Rate of Return
TMETHMIX	Target Contraceptive Method Mix
TOTAVABT	Total Annual Abortions Averted
TOTAVBIR	Total Annual Births Averted
TOTBEN	Total Program Benefits (Life of Program)
TOTCOST	Total Program Costs (Life of Program)
USERS	Number of Current Users
XDSBNFIT	Extended Discounted Benefits
YRSTOEND	Length of Program (Number of Periods)
YRSTOTFM	Years to Reach Target Values (TFEMRISK)
YRSTOTGT	Years to Target

TABLE LISTING

Table Name	*Variable Name*	*Dimension Names*	*Periodic/ Non/Periodic*	*I/O Type*	
1 ACCEPTOR	USERS	age, method	P	OUTPUT	
	ACCPTRGT	age, method	P	OUTPUT	
	CONTUSER	age, method	P	OUTPUT	
2 AVERT	AVERTABT	age	P	OUTPUT	
	AVERTBIR	age	P	OUTPUT	
3 BASEFERT	BFEMRISK	age	N	INPUT	User-defined
	BBIRTHS	age	N	INPUT	User-defined
	BABORT	age	N	OUTPUT	
4 BASERATE	BCONPREV	age	N	INPUT	User-defined
	BAVEFFCT	age	N	OUTPUT	
	BMASFR	age	N	OUTPUT	
	BMASAR	age	N	OUTPUT	
5 BENBREAK	BENEWBRT		P	OUTPUT	
	BENPVBRT		P	OUTPUT	
	BENHCAVT		P	OUTPUT	
	BENEFITS		P	OUTPUT	
	BENABAVT		P	OUTPUT	
6 BENCOSTS	BENEFITS		P	OUTPUT	
	COSTS		P	OUTPUT	
	CUMBNFIT		P	OUTPUT	
	CUMCOSTS		P	OUTPUT	
	TBCRATIO		N	OUTPUT	
7 BENSTRM	BENSTRM	horizon, benefits	P	INPUT	User-defined

Table Name	*Variable Name*	*Dimension Names*	*Periodic/ Non/Periodic*	*I/O Type*	
8 BMETHMIX	BMETHMIX	age, method	N	INPUT	User-defined
9 COSTBRK	COSTCOMM		P	OUTPUT	
	COSTCON		P	OUTPUT	
	FIXCOSTS		P	INPUT	User-defined
	COSTS		P	OUTPUT	
10 FUTFERT	ABORT	age	P	OUTPUT	
	AVERTABT	age	P	OUTPUT	
	AVERTBIR	age	P	OUTPUT	
	BIRTHS	age	P	OUTPUT	
	EXPABORT	age	P	OUTPUT	
	EXPBIRTH	age	P	OUTPUT	
	FEMRISK	age	P	OUTPUT	
11 FUTRATE	AVEFFECT	age	P	OUTPUT	
	CONPREV	age	P	OUTPUT	
	MASFR	age	P	OUTPUT	
	MASAR	age	P	OUTPUT	
12 IMPACT	HLTHCON1		P	INPUT	User-defined
	TOTAVABT		P	OUTPUT	
	TOTAVBIR		P	OUTPUT	
13 INPUT1	FECUND	age	N	INPUT	Universal
	MAXFERT	age	N	INPUT	Universal
14 INPUT2A	EFFECT	method	N	INPUT	Universal
	A	method	N	INPUT	Universal
	R	method	N	INPUT	Universal

Table Name	*Variable Name*	*Dimension Names*	*Periodic/ Non/Periodic*	*I/O Type*	
15 INPUT2B	CONSCACC	method	N	INPUT	Universal
	CONSDROP	method	N	INPUT	Universal
	CONSCONT	method	N	INPUT	Universal
	COMMCACC	method	N	INPUT	Universal
	COMMCONT	method	N	INPUT	Universal
	COMMDROP	method	N	INPUT	Universal
16 INPUT3	BFEMRISK	age	N	INPUT	User-defined
	BBIRTHS	age	N	INPUT	User-defined
	BCONPREV	age	N	INPUT	User-defined
	BREAST	age	N	INPUT	User-defined*
	ABORTWT	age	N	INPUT	User-defined
	TFEMRISK	age	N	INPUT	User-defined
	TCONPREV	age	N	INPUT	User-defined
	POSTPART	age	N	INPUT	User-defined**
17 INPUT4	IMSUBSTN	method	N	INPUT	User-defined
	BCONSHRE	method	N	INPUT	User-defined
	ACCSHARE	method	N	INPUT	User-defined
	COMMCOST	method	N	INPUT	User-defined
18 INPUT5	DISCRATE		N	INPUT	User-defined
	YRSTOTGT		N	INPUT	User-defined
	INTERP		N	INPUT	User-defined
	INTERPFM		N	INPUT	User-defined
	DIRECTPP		N	INPUT	User-defined
	YRSTOTFM		N	INPUT	User-defined
	YRSTOEND		N	INPUT	User-defined
	BENAVABT		N	INPUT	User-defined
	BENCOND1		N	INPUT	User-defined
	CONSCOST		N	INPUT	User-defined

* If DIRECTPP = 0 ** If DIRECTPP = 1, POSTPART is an output variable.

Table Name	*Variable Name*	*Dimension Names*	*Periodic/ Non/Periodic*	*I/O Type*	
19 INPUT6	DECAYDAT	age, method decayper	N	INPUT	User-defined
20 INPUT7	HLTHCONI		P	INPUT	User-defined
	FIXCOSTS		P	INPUT	User-defined
21 METHMIX	METHMIX	age, method	P	OUTPUT	
22 PROGINPT	METHACPT	method	P	OUTPUT	
	METHUSER	method	P	OUTPUT	
	COMMOD	method	P	OUTPUT	
	METHCONS	method	P	OUTPUT	
23 SUMMARY	YRSTOEND		N	INPUT	User-defined
	TOTCOST		N	OUTPUT	
	TOTBEN		N	OUTPUT	
	DISCRATE		N	INPUT	User-defined
	DISCOSTS		N	OUTPUT	
	DISBNFIT		N	OUTPUT	
	BCRATIO		N	OUTPUT	
	IRR		N	OUTPUT	
24 SUMMARY2	CASHFLOW		P	OUTPUT	
	PAYBACK		P	OUTPUT	
25 TMETHMIX	TMETHMIX	age, method	N	INPUT	User-defined

TABLE ORGANIZATION

Input Tables

INPUT1:	Universal Age-Specific Data Inputs
INPUT2A:	Universal Method-Specific Data Inputs
INPUT2B:	Universal Method-Specific Data Inputs, Continued
INPUT3:	User-Supplied Age-Specific Data Inputs
INPUT4:	User-Supplied Method-Specific Data Inputs
INPUT5:	User-Supplied Scalar Data Inputs
INPUT6:	User-Supplied Data Input for prevalence decay after program termination.
INPUT7:	User-Supplied Periodic Data Inputs

Output Tables

Current Fertility Behavior

BASEFERT:	Current women at risk, number of births, and number of abortions; by age group.
BASERATE:	Base period contraceptive prevalence, contraceptive effectiveness, fertility, and abortion rates; by age group.
BMETHMIX:	Base period contraceptive method mix; by age group

Projected Fertility after Family Planning Program

TMETHMIX:	Target contraceptive method mix; by age group.
METHMIX:	Contraceptive method mix, showing the transition from base period to target period; by age and period.
FUTFERT:	Projected women at risk, births, births averted, abortions, and abortions averted; by age group.
FUTRATE:	Projected contraceptive prevalence, contraceptive effectiveness, fertility, and abortion rates; by age group.

Family Planning Program Impact

IMPACT: Impact of family planning on total births, abortions, and health conditions averted; by projection period.

AVERT: Births and abortions averted by family planning.

Costs Associated with Family Planning

ACCEPTOR: Total new acceptors and continuing users from all program and non-program sources; by method and period.

PROGINPT: Family planning program requirements for acceptors and continuing users: commodities to be distributed and consultations; by contraceptive method.

COSTBRK: Breakdown of family planning costs into commodity costs, costs for consultations, and fixed costs; by projection period.

Benefits Associated with Family Planning

BENSTRM: Annual benefits paid out for mother- and child-related services over the horizon of the company benefits plan; by year.

BENBREAK: Breakdown of program benefits into benefits from births averted (new and previous), abortions averted, and health conditions averted; by period.

Cost-Benefit Analysis

BENCOSTS: Annual and cumulative costs and benefits of family planning, showing break-even and payback periods.

SUMMARY: Total costs and benefits of family planning program, showing annual discount rate, benefit-to-cost ratio (present discounted value), and internal rate of return.

SUMMARY2: Cashflow and Payback Period

ALPHABETICAL LISTING OF VARIABLES AND THE TABLES IN WHICH THEY APPEAR

INPUT

Variable	Table
A	INPUT2A
ABORTWT	INPUT3
ACCSHARE	INPUT4
BBIRTHS	BASEFERT, INPUT3
BCONPREV	BASERATE, INPUT3
BCONSHRE	INPUT4
BENAVABT	INPUT5
BENCONDI	INPUT5
BENSTRM	BENSTRM
BFEMRISK	BASEFERT, INPUT3
BMETHMIX	BMETHMIX
BREAST	INPUT3
COMMCACC	INPUT3
COMMCONT	INPUT3
COMMCOST	INPUT4
COMMDROP	INPUT4
CONSCACC	INPUT2B
CONSCONT	INPUT2B
CONSCOST	INPUT5
CONSDROP	INPUT2B
DECAYDAT	INPUT6
DIRECTPP	INPUT5
DISCRATE	INPUT5, SUMMARY
EFFECT	INPUT2A
FECUND	INPUT1
FIXCOSTS	COSTBRK
HLTHCON1	IMPACT, INPUT7
IMSUBSTN	INPUT4
INTERP	INPUT5

OUTPUT

Variable	Table
ABORT	FUTFERT
ACCPTRGT	ACCEPTOR
AVEFFECT	FUTRATE
AVERTABT	FUTRATE, AVERT
AVERTBIR	FUTRATE, AVERT
BAA	
BABORT	BASERATE
BAVEFFCT	BASERATE
BBAA	
BCRATIO	SUMMARY
BENABAVT	BENBREAK
BENEFITS	BENBREAK, BENCOSTS
BENEWBRT	BENBREAK
BENHCAVT	BENBREAK
BENPVBRT	BENBREAK
BIRTHS	FUTFERT
BMASAR	BASERATE
BMASFR	BASERATE
BMTHPREV	
CASHFLOW	BENCOSTS, SUMMARY2
COMMOD	PROGINPT
CONPREV	FUTRATE
CONSHARE	
CONSULT	
CONTUSER	ACCEPTOR
COSTCOMM	COSTBRK
COSTCON	COSTBRK
COSTS	BENCOSTS, COSTBRK
CUMBNFIT	BENCOSTS

INPUT		OUTPUT	
Variable	*Table*	*Variable*	*Table*
INTERPFM	INPUT5	CUMCOSTS	BENCOSTS
MAXFERT	INPUT1	DISBNFIT	SUMMARY
POSTPART	INPUT3	DISCOSTS	SUMMARY
R	INPUT2A	EXPABORT	FUTFERT
TCONPREV	INPUT3	EXPBIRTH	FUTFERT
TFEMRISK	INPUT3	FEMRISK	FUTFERT
TMETHMIX	TMETHMIX	IRR	SUMMARY
YRSTOEND	INPUT5, SUMMARY	LACTINDX	
YRSTOTFM	INPUT5	MASAR	FUTRATE
YRSTOTGT	INPUT5	MASFR	FUTRATE
		METHACPT	PROGINPT
		METHCONS	PROGINPT
		METHMIX	METHMIX
		METHPREV	
		METHUSER	PROGINPT
		PAYBACK	BENCOSTS, SUMMARY2
		POTFERT	
		TBCRATIO	BENCOSTS
		TIRR	
		TOTAVABT	IMPACT
		TOTAVBIR	IMPACT
		TOTBEN	SUMMARY
		TOTCOST	SUMMARY
		USERS	ACCEPTOR
		XDSBNFIT	

Appendix C. MATHEMATICAL EQUATIONS

BASE PERIOD FERTILITY ANALYSIS

1.1 Base period (t = 0) age-specific fertility rates (**BMASFR**) are calculated by dividing the observed number of births (**BBIRTHS**) during the preceding twelve months by the number of women at risk of becoming pregnant (**BFEMRISK**).

$$BMASFR_{(age)} = BBIRTHS_{(age)} \ / \ BFEMRISK_{(age)}$$

1.2 Base period average contraceptive effectiveness (**BAVEFFCT**) is estimated as the sum of the products of the base period contraceptive method mix (**BMETHMIX**) and contraceptive effectiveness (**EFFECT**).

$$BAVEFFCT_{(age)} = sum_{method} \ [BMETHMIX_{(age,\ method)} * EFFECT_{(method)} \ ]$$

1.3 The number of contraceptive users in the base period (**BUSERS**) is calculated as the product of the number of base period married women at risk (**BFEMRISK**), base period contraceptive prevalence (**BCONPREV**) and base period contraceptive method mix (**BMETHMIX**).

$$BUSERS_{(age,\ method)} = BFEMRISK_{(age)} * BCONPREV_{(age)} * BMETHMIX_{(age,\ method)}$$

1.4 Contraceptive prevalence in the base period (**BMTHPREV**) is calculated by dividing base period users (**BUSERS**) by the base period number of women at risk (**BFEMRISK**).

$$BMTHPREV(age,\ method) = BUSERS(age,\ method) \ / \ BFEMRISK(age)$$

1.5 Base period potential fertility rates (**BPOTFERT**) are estimated as a function of the observed marital age-specific fertility rates (**BMASFR**), base period prevalence rates (**BCONPREV**), base period average contraceptive effectiveness (**BAVEFFCT**), and fecundity rates (**FECUND**).

```
BPOTFERT(age) = BMASFR(age) / (1 - [ BCONPREV(age) * BAVEFFCT(age) /
                FECUND(age)])
```

where **FECUND**(age) = **BCONPREV**(age) if **BCONPREV**(age) > **FECUND**(age).

(Otherwise, negative potential fertility rates become possible in older age groups in high prevalence populations).

1.6 The base period average number of births averted by one abortion (**BBAA**) is a function of base period contraceptive prevalence (**BCONPREV**) and average contraceptive effectiveness (**BAVEFFCT**).

```
BBAA(age) = 0.4 * [1 + BCONPREV(age) * BAVEFFCT(age)]
```

1.7 Base period abortion rates (**BMASAR**) are estimated by dividing the difference between estimated maximum fertility rates and potential fertility rates (**BPOTFERT**) by the estimated number of births averted by one abortion (**BBAA**). Estimated maximum fertility is calculated as the product of maximum biological fertility (**MAXFERT**) and a lactation index (**LACTINDX**).

```
BMASAR(age) = [LACTINDX(age) * MAXFERT(age) - BPOTFERT(age)] /BBAA(age)
```

1.8 The lactation index (**LACTINDX**) is a function of the age-specific average length of postpartum infecundity (**POSTPART**).

LACTINDX(age) = 20 / (18.5 + POSTPART[age])

where **POSTPART** >= 1.5.

1.9 Postpartum infecundity (**POSTPART**) may be calculated from the mean length of breast-feeding time (**BREAST**).

POSTPART[age] = 1.753 * exp((0.1396 * BREAST) - (0.001872 * $BREAST^2$))

1.10 The number of abortions in each age group during the base period is estimated as the product of abortion rates (**BMASAR**) and the number of women at risk (**BFEMRISK**).

BABORT(age) = BMASAR(age) * BFEMRISK(age)

BIRTHS AVERTED

The births averted submodel utilizes a methodology analogous to that used for the base period fertility analysis. The Model assumes that the number of births averted in each period is determined by contraceptive practice in the preceding period, while the number of abortions averted is determined by contraceptive prevalence in the same period. Accordingly, no births are averted by the program until the second time period (t = 2).

The births averted submodel allows a certain number of periods (YRSTOTGT) for a family planning program to reach target prevalence (**TCONPREV**) and target method mix (TMETHMIX). During this period, while t < **YRSTOTGT**, levels of contraceptive prevalence (CONPREV) may be interpolated linearly between base period (**BCONPREV**) and target levels (TCONPREV), or they may be input manually. The same applies to contraceptive method mix (METHMIX).

2.1.1 Calculation of intermediate contraceptive prevalence (**CONPREV**):

a. When **INTERP** = 0, the researcher must manually calculate and input **CONPREV** for each time period t < **YRSTOTGT**.

b. When **INTERP** = 1, **CONPREV** is linearly interpolated.

```
CONPREV(age, t) = (t / YRSTOTGT) * TCONPREV(age) +
(1 - t / YRSTOTGT) * BCONPREV(age)
```

where t < **YRSTOTGT**.

2.1.2 Calculation of final contraceptive prevalence for both **INTERP** = 0 and **INTERP** = 1:

a. When the program has reached its targets (t > **YRSTOTGT**), and **CONPREV** is set equal to program target levels:

```
CONPREV(age, t) = TCONPREV(age)
```

where **YRSTOTGT** <= t <= **YRSTOEND**.

b. For t > **YRSTOEND**, contraceptive prevalence rates (**CONPREV**) are obtained from absolute contraceptive prevalence (**METHPREV**).

$$CONPREV(age, t > YRSTOEND) = sum_{method} [\ METHPREV(age, method, t)\ ]$$

2.2 Calculation of intermediate method mix (**METHMIX**):

2.2.1 When **INTERP** = 0, **METHMIX** must be manually calculated and input for each time period t < **YRSTOTGT**

2.2.2 When **INTERP** = 1:

a. **METHMIX** is linearly interpolated:

$$METHMIX(age, method, t) = (t / YRSTOTGT) * TMETHMIX(age, method) + (1 - t / YRSTOTGT) * BMETHMIX(age, method)$$

where t < **YRSTOTGT**

b. When the program reaches its targets, (t > **YRSTOTGT**), **METHMIX** is set equal to the program target levels.

$$METHMIX(age, method, t) = TMETHMIX(age, method)$$

where **YRSTOTGT** <= t <= **YRSTOEND**

c. For t > **YRSTOEND**, contraceptive method mix (**METHMIX**) is obtained from absolute contraceptive prevalence (**METHPREV**).

$$METHMIX(age, method, t > YRSTOEND) = METHPREV(age, method, t) / CONPREV(age, t)$$

2.3 Average contraceptive effectiveness (**AVEFFECT**) is determined as the product of method mix (**METHMIX**) and the effectiveness of each method (**EFFECT**).

$$AVEFFECT(age, t) = sum_{method} [METHMIX(age, method, t) * EFFECT(method)]$$

2.4 Calculation of Women at Risk (**FEMRISK**):

2.4.1 When **INTERPFM** = 0, the number of women at risk (**FEMRISK**) must be input manually for t while t < **YRSTOTFM**.

2.4.2 When **INTERPFM** = 1, the number of women at risk (**FEMRISK**) is linearly interpolated between base period (**BFEMRISK**) and target levels (**TFEMRISK**).

a. FEMRISK(age,t) = (t/YRSTOTFM) * TFEMRISK(age) + (1 - t/YRSTOTFM) * BFEMRISK(age)

where t < **YRSTOTFM**

b. FEMRISK(age,t) = TFEMRISK(age)

where t >= **YRSTOTFM**

2.5 The number of contraceptive users (**USERS**) in each time period is projected as the product of the number of women at risk (**FEMRISK**), contraceptive prevalence (**CONPREV**) and the method mix (**METHMIX**).

USERS(age, method, t) = FEMRISK(age, t) * CONPREV(age, t) * METHMIX(age, method, t)

2.6 Contraceptive prevalence (**METHPREV**) is calculated by dividing the number of users (USERS) by the number of women at risk (**FEMRISK**).

a. METHPREV(age,method,t) = USERS(age,method,t)/FEMRISK(age,t)

The Model permits the time required to restore base period prevalence levels to vary by age and by method, by considering a researcher-defined number of periods before program prevalence rates (**METHPREV**) begin to decay (**DECAYDAT**[age, method, decayper = *start*]). At that point, the Model assumes that prevalence rates decline linearly to base period levels (**BMTHPREV**) during a researcher-defined number of periods (**DECAYDAT**[age, method, decayper = *end*]).

b. METHPREV(age, method, t) = METHPREV(age,method,t = YRSTOEND)

where **YRSTOEND** < t < years-to-decay

c. METHPREV(age, method, years-to-decay < t < years to base) =
decay-weight(age, method, t) * BMTHPREV(age, method) +
(1 - decay-weight[age, method, t] * METHPREV(age, method, t = YRSTOEND)

d. METHPREV(age, method, t > years-to-base) = BMTHPREV(age, method)

2.7 The intermediate variable **years-to-decay** is defined as:

years-to-decay(age, method) = YRSTOEND +
DECAYDAT(age, method, decayper = start)

2.8 The intermediate variable **years-to-base** is defined as:

years-to-base(age, method) = YRSTOEND + years-to-decay(age, method) +
DECAYDAT(age, method, decayper = end)

2.9 The intermediate variable **decay-weight** is defined as:

```
decay-weight(age, method, t) = [t - years-to-decay(age, method) ] /
                                DECAYDAT(age, method, decayper = end)
```

2.10 Abortion rates (**MASAR**) are projected by subtracting the change in abortion rates due to increased contraceptive prevalence from the base period abortion rates (**BMASAR**).

a.
```
MASAR(age, t) = BMASAR(age) - ABORTWT(age) * 1.43 * [ ( [CONPREV(age, t)
                * AVEFFECT(age, t)] - [BCONPREV(age) * BAVEFFCT(age)] ) /
                FECUND(age) ]
```

where MASAR(age, t) > 0

b.
```
MASAR(age, t) = BMASAR(age) if BMASAR(age) <= 0
```

where **ABORTWT** is the proportion of base period abortions which are assumed to be eliminated by the contraceptive prevalence increase resulting from the program.

2.11 Age-specific fertility rates (**MASFR**) are projected as:

a.
```
MASFR(age, t > 1) = POTFERT(age, t - 1 ) * (1.0 - [CONPREV(age, t - 1) *
                    AVEFFECT(age, t - 1) / FECUND(age) ] )
```

b.
```
MASFR(age, t = 1) = BMASFR(age)
```

where potential fertility in the absence of contraception (**POTFERT**) is projected as in Equation 2.12.

2.12 Potential fertility in the absence of contraception (**POTFERT**) is calculated as:

```
POTFERT(age, t) = LACTINDX(age) * MAXFERT(age) - ( MASAR(age, t) * 0.4 *
                  [ 1.0 + CONPREV(age, t) * AVEFFECT(age,t) ] )
```

2.13.1 The number of births (**BIRTHS**) is projected as the product of the number of women at risk (**FEMRISK**) and the fertility rates (**MASFR**).

```
BIRTHS(age, t) = MASFR(age, t) * FEMRISK(age, t)
```

2.13.2 The number of births expected without the family planning program (**EXPBIRTH**) during each time period is calculated as the product of the number of women at risk (**FEMRISK**) and the base period fertility rate (**BMASFR**).

```
EXPBIRTH(age) = BMASFR(age) * FEMRISK(age, t)
```

2.14.1 Net births averted (**AVERTBIR**) are a function of the difference between base period (**BMASFR**) and current (**MASFR**) fertility rates.

```
AVERTBIR(age, t) = FEMRISK(age, t) * [BMASFR(age) - MASFR(age, t)]
```

2.14.2 The total annual number of births averted is projected as the sum of the births averted in each age group.

$$\text{TOTAVBIR} = \text{sum}_{age}\ [\text{AVERTBIR(age)}]$$

2.15 The number of births averted by one abortion (**BAA**) and the number of abortions (**ABORT**) are projected as in the base period.

BAA(age, t) = 0.4 * [1 + CONPREV(age, t) * AVEFFECT(age, t)]

2.16.1 The number of abortions (**ABORT**) are calculated as the product of the Marital age-specific abortion rate (**MASAR**) and the number of women at risk (**FEMRISK**).

ABORT(age, t) = MASAR(age, t) * FEMRISK(age, t)

2.16.2 The number of abortions which would have occurred had the program not been established (**EXPABORT**) is the product of the base period marital age-specific abortion rate (**BMASAR**) and the number of women at risk (**FEMRISK**).

EXPABORT(age, t) = BMASAR(age) * FEMRISK(age)

2.17.1 The number of abortions averted (**AVERTABT**) follows the same procedure as the number of births averted.

AVERTABT(age, t) = FEMRISK(age,t) * [BMASAR(age) - MASAR(age,t)]

2.17.2 The total annual number of abortions averted (**TOTAVABT**) is projected as the sum of the abortions averted in each age group.

TOTAVABT = sum_{age}[AVERTABT(age)]

ACCEPTOR TARGETS

The acceptor submodel projects the number of contraceptive acceptors on the basis of target users (**USERS**), immediate method substitution rates (**IMSUBSTN**), immediate continuation rates (**A**), and annual discontinuation rates (**R**).

3.1 The number of continuing users (**CONTUSER**) is projected in the first period as the proportion of base period users (**BUSERS**) who do not switch their method (1.0 - **IMSUBSTN**).

a.
```
CONTUSER(age, method, t = 1) = BUSERS(age, method) *
                               [1.0 - IMSUBSTN(method)]
```

where **IMSUBSTN** is the immediate method-substitution rate.

In succeeding periods, **CONTUSER** is projected as the product of the number of users in the preceding period (**USERS**) and the annual method-specific continuation rate, exp(-**R**).

b.
```
CONTUSER(age, method, t > 1) = USERS(age, method, t - 1) *
                               exp[-R(method)]
```

where the function *exp( )* refers to the exponential function.

3.2 Acceptor targets (**ACCPTRGT**) are projected as the difference between the number of target users (**USERS**) and the number of continuing users (**CONTUSER**), divided by the first-year continuation rate (**A***exp[-**R**]).

```
ACCPTRGT(age, method, t) = [ USERS(age, method, t) -
                             CONTUSER(age, method, t) ] /
                             ( A(method) * exp [-R(method) ] )
```

where **ACCPTRGT**(age, method, t) >= 0

3.3 The number of program acceptors by method (**METHACPT**) is calculated as:

$$METHACPT(method, t) = sum_{age} [ACCPTRGT(age, method, t)]$$

3.4 The number of continuing users (**METHUSER**) of the program by method is calculated as:

$$METHUSER(method, t) = sum_{age} [CONTUSER(age, method, t) + CONSHARE(method)]$$

SERVICE COSTS

4.1 The service cost submodel projects service costs (**COSTS**) as the sum of fixed costs (**FIXCOSTS**), consultation costs (**COSTCON**), and commodity costs (**COSTCOMM**).

a. `COSTS(t <= YRSTOEND) = FIXCOSTS(t) + COSTCON(t) + COSTCOMM(t)`

b. `COSTS(t > YRSTOEND) = 0`

4.2 Consultation costs (**COSTCON**) are projected as the sum of consultation costs for continuing acceptors, discontinuing acceptors, and continuing users.

```
COSTCON(t) = CONSCOST * ( sum [ ( ACCSHARE(method) * [ CACC(method, t) *
             CONSCACC(method) + DROP(method, t) * CONSDROP(method) ] ) +
             CONSHARE(method, t) * CUSER(method, t ) *
             CONSCONT(method) )
```

where **ACCSHARE** and **CONSHARE** are respectively the proportions of acceptors and continuing users of each method who are expected to be supplied by the program. **CONSCACC**, **CONSDROP**, and **CONSCONT** are respectively the number of consultations required per continuing acceptor, discontinuing acceptor, and continuing user. **CONSCOST** is the average cost per consultation.

The intermediate variables - **CACC**, **DROP**, and **CUSER** - refer to the number of continuing acceptors, discontinuing acceptors and continuing users by method (i.e., summed across age groups).

4.3 Consultations by method (**METHCONS**) is calculated as:

```
METHCONS(method, t) = sum [ ACCSHARE(method) * [ CACC(method, t) *
                      CONSCACC(method) + DROP(method, t) *
                      CONSDROP(method) ] + CONSHARE(method,t) *
                      CUSER(method, t) * CONSCONT(method) ]
```

4.4 Continuing acceptors (**CACC**) are projected as:

```
CACC(method, t) = sum [ A(method) * exp[ -R(method) ] *
                  ACCPTRGT(age,method,t) ]
```

4.5 Discontinuing acceptors (**DROP**) are projected as:

$$\text{DROP(method, t)} = \text{sum}_{age}\ [\ (\ 1.0 - \text{A(method)} * \exp[-\text{R(method)}]\ )\ *\ \text{ACCPTRGT(age, method, t)}\ ]$$

4.6 Continuing users (**CUSER**) are projected as:

$$\text{CUSER(method, t)} = \text{sum}_{age}\ [\ \text{CONTUSER(age, method, t)}\ ]$$

4.7 While the program's share of acceptor costs (**ACCSHARE**) is assumed to be constant, the program's share of continuing user costs (**CONSHARE**) is linearly interpolated between base period values (**BCONSHRE**) and **ACCSHARE** from periods t = 1...3, after which they are assumed to be constant.

a. CONSHARE(method, t < 4) = [1 - (t / 4.0)] * BCONSHRE(method) + (t / 4.0) * ACCSHARE(method) method

b. CONSHARE(method, t >= 4) = ACCSHARE(method) method

4.8 The number of commodities by method (**COMMOD**) is projected as the sum of the number of commodities required for continuing acceptors (**CACC**), discontinuing acceptors (**DROP**), and continuing users (**CUSER**).

$$\text{COMMOD(method)} = \text{sum}_{\text{method}} [\ \text{ACCSHARE(method)} * [\ \text{CACC(method, t)} * \text{COMMCACC(method)} + \text{DROP(method, t)} * \text{COMMDROP(method)}\ ] + \text{CONSHARE(method, t)} * \text{CUSER(method, t)} * \text{COMMCONT(method)}\ ]$$

where **COMMCACC**, **COMMDROP**, and **COMMCONT** are respectively the method-specific commodities required per continuing acceptor, discontinuing acceptor, and continuing user.

4.9 Commodity costs (**COSTCOMM**) are projected as the product of commodity costs (**COMMOD**) for continuing acceptors (**CACC**), discontinuing acceptors (**DROP**), and continuing users (**CUSER**) .

$$\text{COSTCOMM(t)} = \text{sum}_{\text{method}} [\ \text{COMMOD(method)} * \text{COMMCOST(method)}]$$

where **COMMCOST** is the method-specific unit cost of each commodity.

4.10 The total number of consultations provided by the program (**CONSULT**) is projected by dividing consultation costs (COSTCON) by the average cost per consultation (**CONSCOST**).

$$\text{CONSULT(t)} = \text{COSTCON(t)} / \text{CONSCOST}$$

PROGRAM BENEFITS

5.1.1 The benefits submodel projects current program benefits (BENEFITS) as the sum of benefits from births averted, abortions averted, and other ill-health conditions averted.

Benefits from births averted are projected as the product of the projected number of births averted (**AVERTBIR**) in all periods up to and including the current period (t) and a matrix of benefits over time (**BENSTRM**), the *n*th row of which represents the different categories of benefits obtained *n-1* years after a birth has been averted.

Benefits from births averted = sum_{age} [sum_{age} (AVERTBIR(age, t - (n-1))] * BENSTRM(n, benefits)

Benefits from abortions averted in each period are projected as the product of abortions averted (**AVERTABT**) in the current period and the average benefits per abortion averted (**BENAVABT**).

Benefits from abortions averted = sum_{age} [AVERTABT(age, t) * BENAVABT]

Benefits from abortions averted annually are projected as the product of the total number of abortions averted (**TOTAVABT**) and the average benefits per abortion averted (**BENAVABT**).

Benefits from abortions averted annually = TOTAVABT * BENAVABT

Benefits from other health conditions averted in each period are projected as the product of the number of other health conditions averted (**HLTHCON1**) in the current period and the average benefits per health condition averted (**BENCOND1**).

Benefits from other health conditions averted in each period =

sum_{age} [HLTHCON1(age, t) * BENCOND1]

Benefits from health conditions averted annually (**BENHCAVT**) are the product of the number of health conditions averted during the program and the average benefits per health condition averted.

$$\text{BENHCAVT}(t) = \text{sum}_t\ (\text{HLTHCON1} * \text{BENCOND1})$$

5.1.2 In other words, **BENEFITS** = sum (benefits from births averted) + sum (benefits from abortions averted) + sum (benefits from ill-health conditions averted).

$$\begin{aligned}\text{BENEFITS}(t) = \text{sum}_n\ (\ \text{sum}_{\text{benefit}}\ & [\ \text{sum}_{\text{age}}\ [\text{AVERTBIR}(\text{age},\ t - [n - 1])\ ] * \\ & \quad \text{BENSTRM}(n,\ \text{benefits})\ ]\ ) + \\ & \text{sum}_{\text{age}}\ [\text{AVERTABT}(\text{age},\ t) * \text{BENAVABT}\ ] + \\ & \text{sum}_{\text{age}}\ [\text{HLTHCON1}(\text{age},\ t) * \text{BENCOND1}\ ]\end{aligned}$$

where n = 1, 2, ..., t <= HorizonLevel, benefit = 1, ... , BenefitLevel. *HorizonLevel* refers to the number of periods for which an averted birth yields benefits and *BenefitLevel* refers to the number of different categories of benefits.

5.3 The Model also calculates future benefits (i.e., benefits which do not occur during the projection period but which occur in the future as the result of births averted during the projection period).

$$\text{FutureBenefits}(tt) = \text{sum}_n\ [\ \text{sum}_{\text{benefit}}\ (\ \text{sum}_{\text{age}}\ [\ \text{AVERTBIR}(\text{age},\ n) * \text{BENSTRM}(tt + 1 - n,\ \text{benefit})\ ]\ )\ ]$$

where tt = t + 1, ..., t + HorizonLevel; n = 1, ..., t; and benefit = 1, ..., BenefitLevel)

SUMMARY BENEFIT-COST MEASURES

The summary benefit-cost submodel calculates various summary measures of program benefits and costs based on projected benefits (**BENEFITS**) and costs (**COSTS**) in each period.

6.1 The annual cashflows (**CASHFLOW**) are calculated as the difference between the current benefits and costs:

CASHFLOW(t) = BENEFITS(t) - COSTS(t)

6.2 Cumulative benefits and costs (**CUMBNFIT** and **CUMCOSTS**) are computed as the sum of benefits and costs from the first year of the program to the current period (t).

a. $CUMBNFIT(t) = sum_n [BENEFITS(n)]$

where n = 1, ..., t

b. $CUMCOSTS(t) = sum_n [COSTS(n)]$

where n = 1 ,..., t

6.3 The **PAYBACK** is the difference between the cumulative costs (**CUMCOSTS**) and the cumulative benefits (**CUMBNFIT**).

PAYBACK = CUMBNFIT - CUMCOSTS

The benefit-to-cost ratio is defined as the ratio of the discounted stream of benefits to the discounted stream of costs. Two benefit-cost ratios are computed, using alternative measures of discounted benefits.

6.4.1 The truncated benefits-to-cost ratio (**TBCRATIO**) limits benefits to those occurring during the projection period (DISBNFIT).

TBCRATIO = DISBNFIT / DISCOSTS

6.4.2 The full benefits-to-cost ratio (**BCRATIO**) includes discounted future benefits (**XDSBNFIT**, i.e., benefits occurring after the projection period but which are due to births averted during the projection period)

BCRATIO = XDSBNFIT/DISCOSTS

6.5 **DISBNFIT** refers to the present value (i.e., at t = 0) of the benefit stream up to and including the last projection period (T).

DISBNFIT = sum_n (BENEFITS(n) / exp [n * ln (1.0 + DISCRATE)])

where n = 1, . . . , T

6.6 **DISCOSTS** refer to the present value (i.e., at t = 0) of the cost stream up to and including the last projection period (T).

DISCOSTS = sum_n (COSTS(n) / exp [n * ln (1.0 + DISCRATE)])

where n = 1, ..., T and **DISCRATE** is the current discount rate.

6.7 Extended discounted benefits (**XDSBNFIT**) include benefits occurring after the end of the projection period.

$$XDSBNFIT = sum_n \; (BENEFITS(n) \; / \; exp \; [n * ln \; (1.0 + DISCRATE) \;] \;)$$

where n = 1, . . . , T, . . . , (T + BenefitLevel). *BenefitLevel* refers to the number of periods for which an averted birth yields benefits.

The internal rate of return is the discount rate which equates the present values of the benefit and cost streams. Two alternative measures are computed.

6.8.1 The truncated internal rate of return (**TIRR**) is limited to benefits and costs occurring during the projection period. The Model solves for **TIRR** iteratively.

$$TIRR: \; n = sum_n \; (BENEFITS(n) \; / \; exp \; [\; n * (1.0 + TIRR) \;] \;)$$

$$sum_n \; (COSTS(n) \; / \; exp \; [\; n * (1.0 + IRR) \;] \;)$$

where n = 1, ..., tt

6.8.2 The full internal rate of return (**IRR**) includes benefits and costs which occur after the projection period, but which are due to births averted during the projection period. The Model solves for **IRR** iteratively.

$$IRR: \; n = sum_n \; (BENEFITS(n) \; / \; exp \; [\; n * (1.0 + IRR) \;] \;)$$

$$sum_n \; (COSTS(n) \; / \; exp \; [\; n * (1.0 + IRR) \;] \;)$$

where n = 1, ..., T, ..., T + HorizonLevel

Appendix D. HOST CURSOR MOVEMENT KEYS

CURSOR MOVEMENT AND EDITING COMMANDS

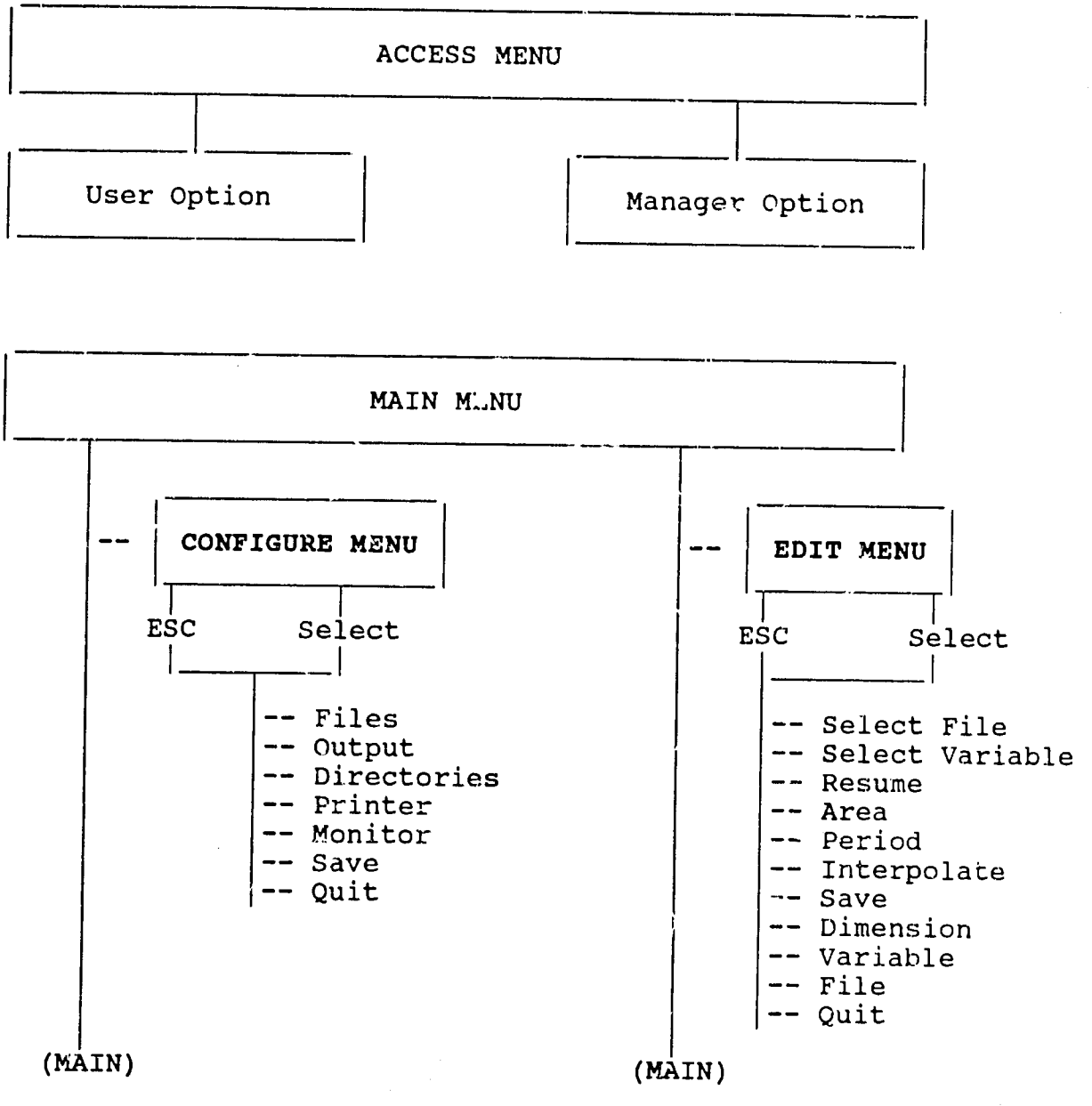
Host Command	*Function in The Host Editor*
[/]	Leave data field after saving changes.
[↑]	Move up one line.
[↓]	Move down one line.
[←]	Move left one character or field.
^[←]	Previous page of menu selections.
[→]	Move right one character or field.
^[→]	Next page of menu selections.
[BKSPC]	Delete character at left of cursor.
[DEL]	Delete character under cursor.
[END]	Move to right end of character or field.
^[END]	Move to bottom of screen.
[ESC]	Leave data field without saving changes. Interrupt printing.
[HOME]	Move to left end of line or field.
^[HOME]	Move to top of screen.
[INS]	Insert/Overwrite Toggle.
[PGUP]	Scroll up next screenful of data.
^[PGUP]	Move to top of data for this variable.

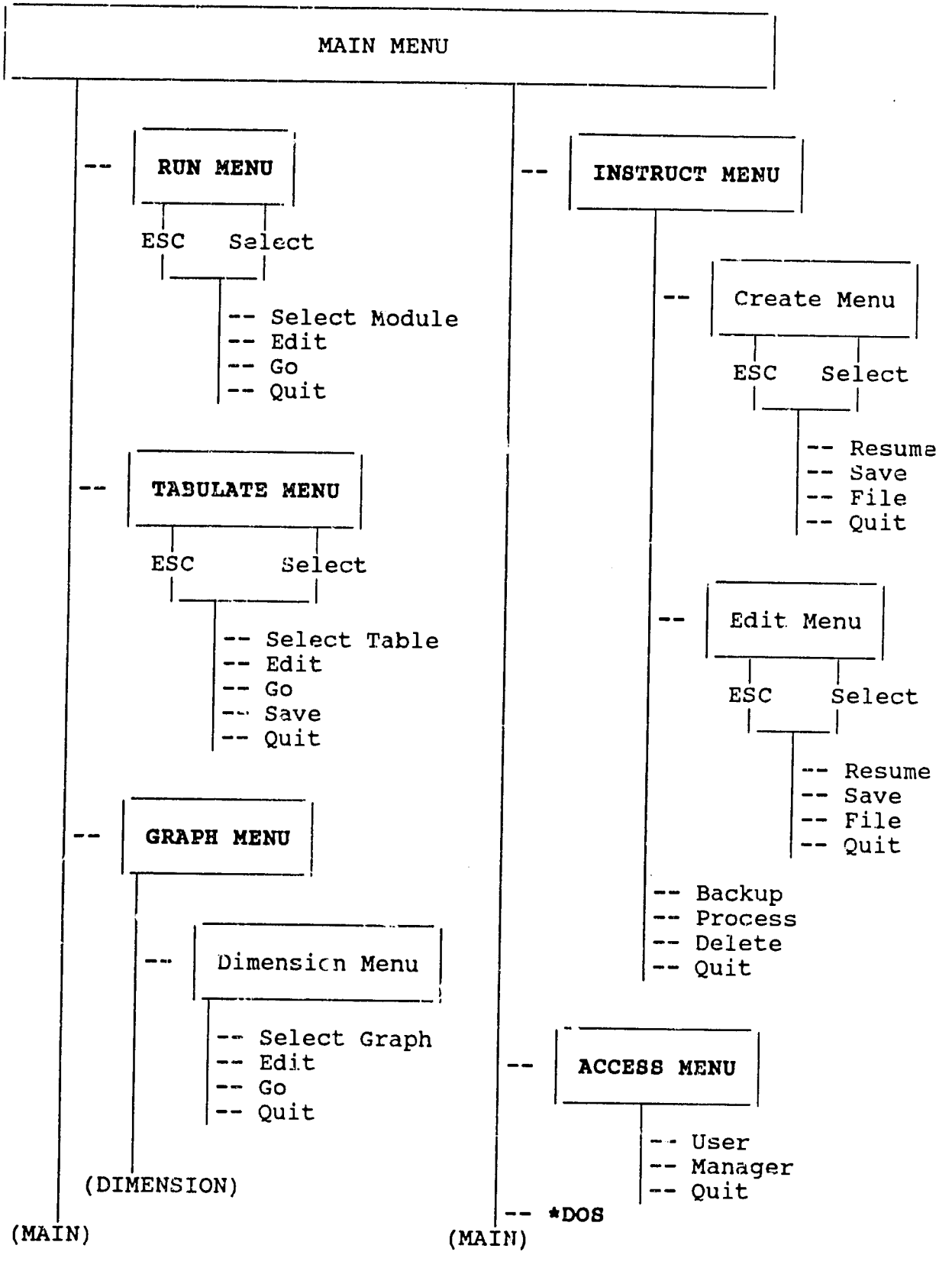
Host Command	*Function In The Host Editor*
[PGDN]	Scroll down previous screenful of data.
^[PGDN]]	Move to bottom of data for this variable.
[TAB]	Move right one screenful of data (Data Editor).
[SHFT]+[TAB]	Move left one screenful of data (Data Editor).
[ALT]+[D]	Delete line of data.
[ALT]+[E]	Delete current entry.
[ALT]+[I]	Insert line above current line.
[ALT]+[S]	Search for name or partial name (List Facility).
[ALT]+[U]	Restore previously deleted entry ("undo").

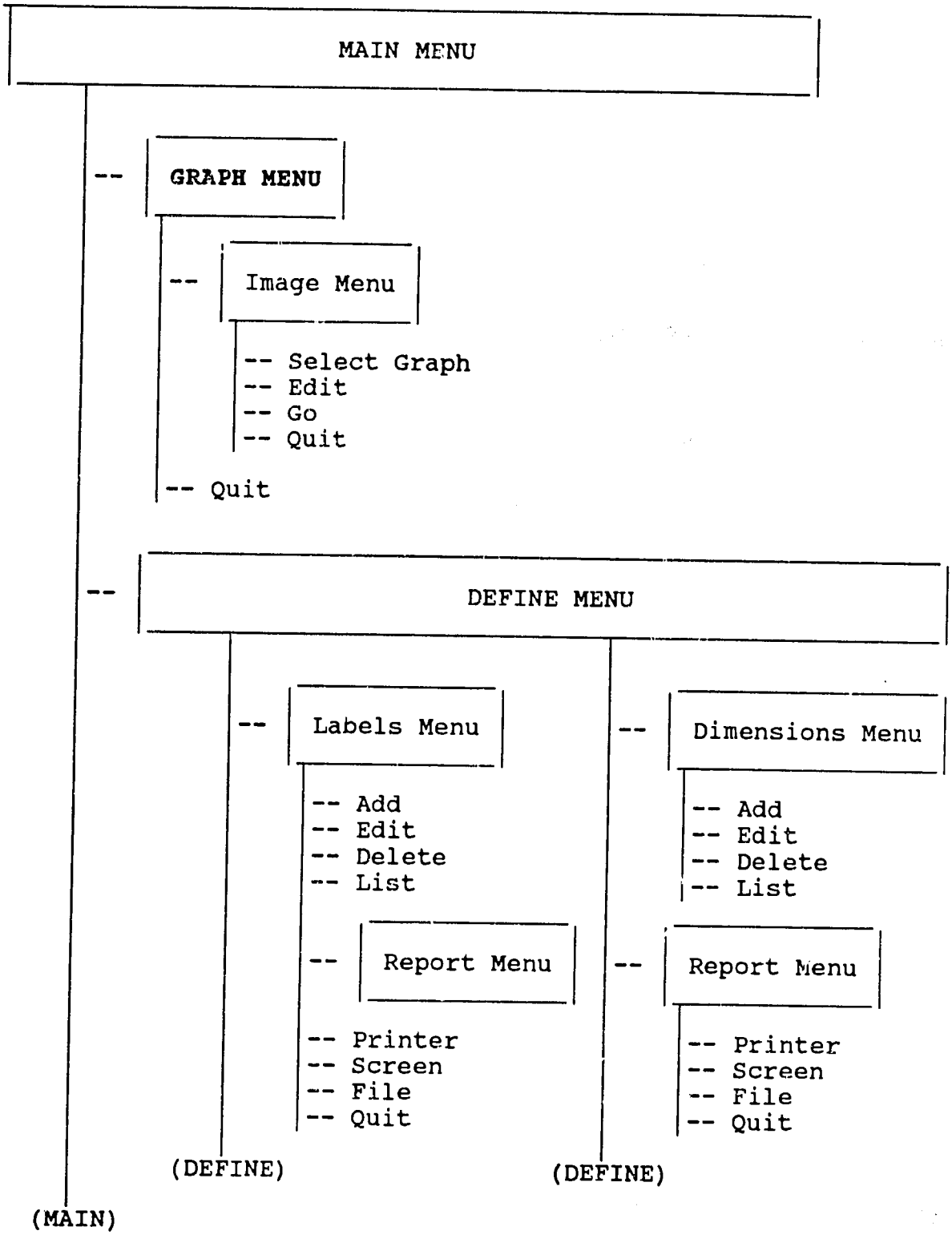
CURSOR MOVEMENT WITHIN THE MENUS

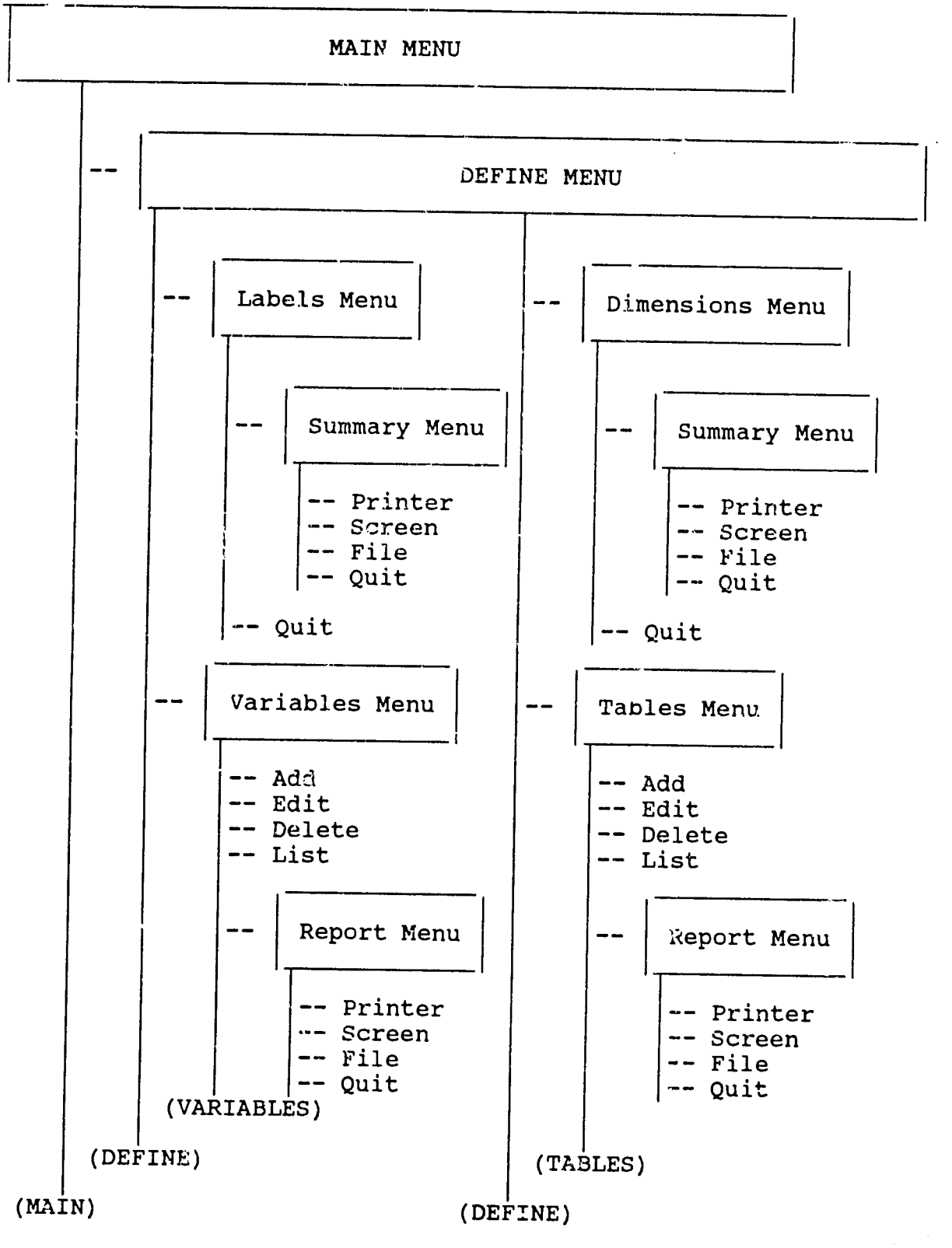
Host Command	*Function In Host Menus*
[←]	Move left one menu selection. Moves to last selection on menu if cursor is already on first selection
[→]	Move right one menu selection. Moves to first selection on menu if cursor is already on last selection.
[END]	Move to last selection on Menu.
[ESC]	Quit current Menu and return to previous Menu.
[HOME]	Move to first selection on Menu.

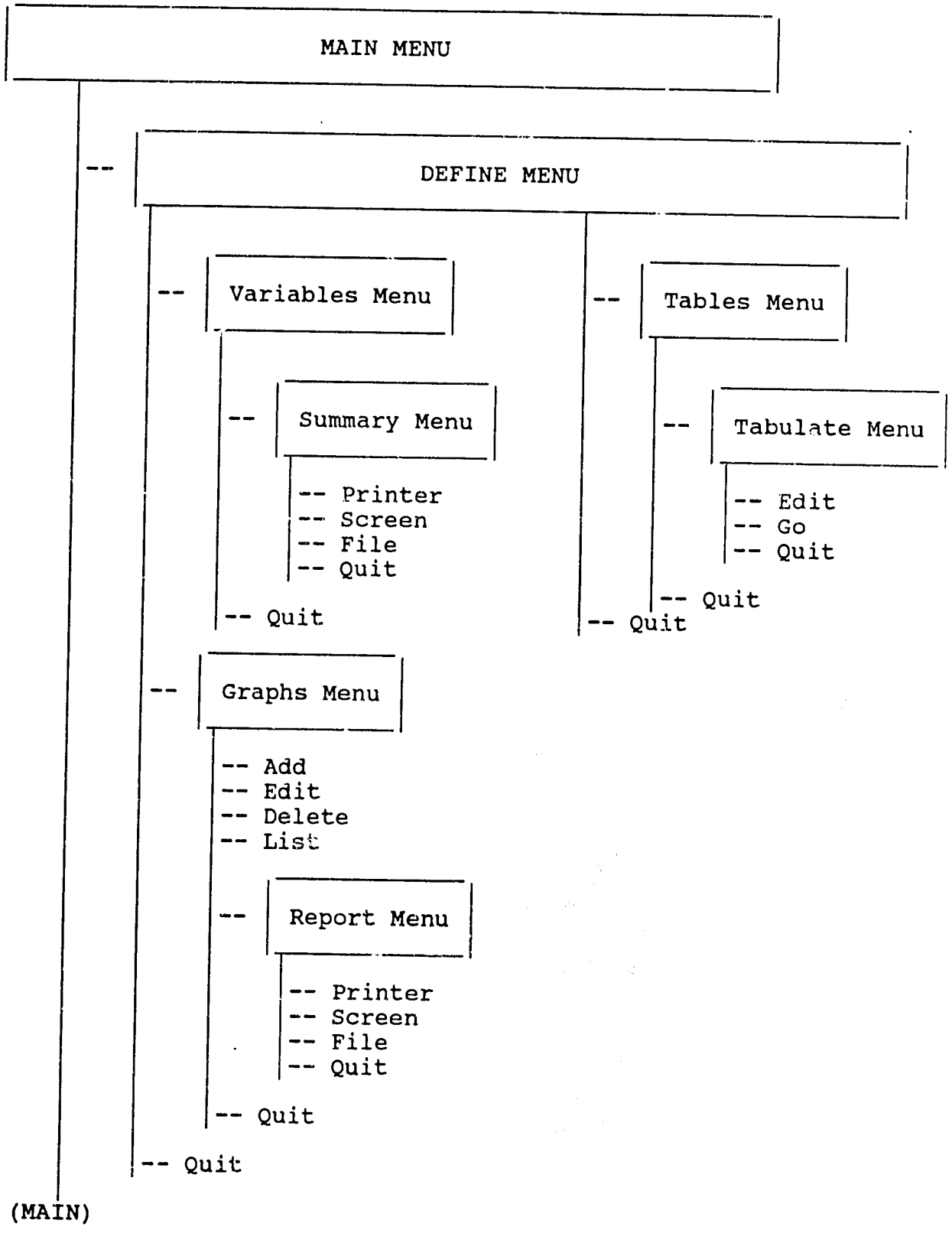
Appendix E. HOST/TIPPS MENU STRUCTURE




MAIN MENU
RUN MENU
ESC
Select
-- Select Module
-- Edit
-- Go
-- Quit
TABULATE MENU
ESC
Select
-- Select Table
-- Edit
-- Go
-- Save
-- Quit
GRAPH MENU
Dimension Menu
-- Select Graph
-- Edit
-- Go
-- Quit
(DIMENSION)
(MAIN)
INSTRUCT MENU
Create Menu
ESC
Select
-- Resume
-- Save
-- File
-- Quit
Edit Menu
ESC
Select
-- Resume
-- Save
-- File
-- Quit
-- Backup
-- Process
-- Delete
-- Quit
ACCESS MENU
-- User
-- Manager
-- Quit
-- *DOS
(MAIN)


MAIN MENU
GRAPH MENU
Image Menu
-- Select Graph
-- Edit
-- Go
-- Quit
-- Quit
DEFINE MENU
Labels Menu
-- Add
-- Edit
-- Delete
-- List
Report Menu
-- Printer
-- Screen
-- File
-- Quit
Dimensions Menu
-- Add
-- Edit
-- Delete
-- List
Report Menu
-- Printer
-- Screen
-- File
-- Quit
(DEFINE)
(DEFINE)
(MAIN)


MAIN MENU
DEFINE MENU
Labels Menu
Summary Menu
-- Printer
-- Screen
-- File
-- Quit
-- Quit
Variables Menu
-- Add
-- Edit
-- Delete
-- List
Report Menu
-- Printer
-- Screen
-- File
-- Quit
(VARIABLES)
(DEFINE)
(MAIN)
Dimensions Menu
Summary Menu
-- Printer
-- Screen
-- File
-- Quit
-- Quit
Tables Menu
-- Add
-- Edit
-- Delete
-- List
Report Menu
-- Printer
-- Screen
-- File
-- Quit
(TABLES)
(DEFINE)


MAIN MENU
DEFINE MENU
Variables Menu
Summary Menu
-- Printer
-- Screen
-- File
-- Quit
-- Quit
Tables Menu
Tabulate Menu
-- Edit
-- Go
-- Quit
-- Quit
-- Quit
Graphs Menu
-- Add
-- Edit
-- Delete
-- List
Report Menu
-- Printer
-- Screen
-- File
-- Quit
-- Quit
-- Quit
(MAIN)

```
MAIN MENU
|
|-- LEAVE HOST
|   |-- No (Return to Main)
|   |-- Yes
|       |-- Quit
|
|-- MANAGER MENU
|
|-- Data Menu
|   |-- Create
|   |-- Rename
|   |-- Backup
|   |-- Delete
|   |-- Verify
|   |-- Pack
|   |-- Quit
|
|-- Library Menu
|   |-- Create
|   |-- Verify
|   |-- Pack
|   |-- Quit
|
|-- Utility Menu
|   |-- Read
|   |-- Quit
|
|-- Quit
```

Appendix F. TIPPS MODEL TUTORIAL

This tutorial assumes that the reader has installed the **Host** system, the *TIPPS* Model, and the \STARTUP data files in the appropriate directories, according to instructions given in Chapter 2 of the User's Manual. Completion of the steps indicated in this tutorial will provide the user with hands-on experience in entering data, editing data, printing the input and output tables, and running a projection. The Tutorial will take you through the following steps:

1. Setting up a subdirectory for a COMPZ dataset, copying the \STARTUP files to the new subdirectory, and renaming the START.* data files.
2. Entering the **Host** system and gaining access to the *TIPPS* Model as a user.
3. Configuring the system for use with the tutorial application COMPZ.
4. Entering the data for the variables requiring User-Supplied Input.
5. Printing the Input Variables prior to running a projection.
6. Running a projection.
7. Printing the Output Variables after running a projection.

The tutorial does not explain the meaning of each variable and table because each of these are explained in the text. However, after having completed the tutorial examples, you should be familiar enough with the way the *TIPPS* Model functions to be able to develop your own projections with your own data.

The tutorial assumes that you have the necessary computer and peripheral equipment as specified in Chapter I of the text.

It is important to remember that the program will not run if there is insufficient memory available for data and file storage. Error messages will be displayed when the program does not find sufficient memory to store its information, and the program may be abruptly terminated. Should such an event occur, system control is returned to DOS. When **Host** is re-entered, you will be notified that the previous run had been abnormally terminated and that the data may have been altered.

In the course of the tutorial, you will be shown how to generate printed copies of the input data. Should the program terminate abnormally, you may use these printouts to check the values of the input data. In addition, you will be shown how and when to generate back-up copies of the data files. In the event of abnormal program termination, the backed up copy of the files can be used if the input data have been seriously damaged.

If at any time you wish to exit the Model program, the [**ESC**] key will get you out of whatever you are doing and return you to the menu in which you are working. From there, you can press [**ESC**] as many times as needed to make your way back up through the menu structure to the Main Menu, and then press [**Q**] to quit. The program will ask if you are certain you want to exit, and after receiving a "**YES**" response, returns control to the computer's operating system (PC-DOS).

When you are expected to press specific keys or type commands, variable names, file names, etc., the words to be typed and the keys to be pressed (presented within square brackets) are shown above a simulation of the display which will be shown on the screen after the words are typed or the key is pressed. For example,

[ESC]

indicates that you are to press the ESCAPE key, which is the key named within the brackets.

NOTE:

A backslash ([\]) precedes a subdirectory name
(e.g., \STARTUP or \COMPZ) but not a dataset name (e.g., START, START.*, or COMPZ).

Step 1: Create a new subdirectory, transfer all the \STARTUP files to it, rename all the START.* files, and enter the \HOST subdirectory

A. Create a \COMPZ subdirectory by entering the DOS **MKDIR** command and the pathname of the subdirectory:

```
C:> mkdir host\tipps\compz [ENTER]
```

B. Copy all the data files from the \STARTUP subdirectory to the \COMPZ subdirectory and rename the START.* files by entering the DOS **copy** and **ren** commands.

```
C:> copy \host\tipps\startup\* > host\tipps\compz\*.* [ENTER]
C:> ren \host\tipps\compz\start.* compz.* [ENTER]
```

C. Enter the \HOST subdirectory by typing the subdirectory pathname and pressing the [**ENTER**] key.

```
C:> cd \host [ENTER]
```

Step 2: Enter the **Host** system and gain access to the *TIPPS* Model as a User.

A. Execute the **Host** Program by typing the word **host** and pressing the [**ENTER**] key.

```
C:\HOST> host [ENTER]
```

The **Host** system logo will appear on your screen, with the status line highlighted at the top of the screen (shown here underlined).

```
Press [Esc] to leave, any other key to proceed.                    WELCOME

Funding for the development of this program has been provided by the
United States Agency for International Development through the
Integrated Population and Development Planning (INPLAN) Project.

                    Version 2.00

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ment must appear on all copies of this program.
```

B. Enter the *TIPPS* Model by pressing any key *except* the **[ESC]** key. The Access Menu will appear on the screen, with the User option highlighted.

[ENTER]

```
User Manager Quit                                                    ACCESS
Restrict Access to the normal user.
==========================================================================
        Use the arrow keys to highlight your menu choice then press
        [Enter], or press the key corresponding to the first letter
        of your menu choice.  Pressing the [Esc] key is the same as
        selecting the choice "Quit".
```

C. Gain access to the Model as a User by pressing the **[U]** key or the **[ENTER]** key. The Status line will display a brief acknowledgment of your selection.

[U] or **[ENTER]**

```
Access Restricted to the normal user.                                ACCESS

==========================================================================
        Use the arrow keys to highlight your menu choice then press
        [Enter], or press the key corresponding to the first letter
        of your menu choice.  Pressing the [Esc] key is the same as
        selecting the choice "Quit".
```

After a brief pause, the Main Menu will appear on the screen, with the [C]onfigure option highlighted:

```
                                                                     MAIN MENU
Configure Define Edit Run Tabulate Graph Instruct Manage Access *DOS Quit
Specify file names, directories, printer and monitor settings
==========================================================================
        Use the arrow keys to highlight your menu choice then press
        [Enter], or press the key corresponding to the first letter
        of your menu choice.  Pressing the [Esc] key is the same as
        selecting the choice "Quit".
```

Step 3: Configure the **Host** System for your application.

A. Select the Configure Menu by pressing the [**C**] key or the [**ENTER**] key. The Configure Menu will be displayed on the screen with the [F]iles option highlighted.

[**C**] or [ENTER]

```
|                                                                          |
|                                                                CONFIGURE |
| Files Output Directories Printer Monitor Save Quit                       |
| Edit Data, Comparison and Instruction file names.                        |
|==========================================================================|
| FILES                      PRINTER SETTINGS          MONITOR SETTINGS    |
|                                                                          |
| Data        : START        Left Margin   : 10        Monochrome : Yes    |
| Comparison  : none         Top Margin    :  6                          |
| Instruction : none         Bottom Margin :  6                          |
|                            Page Length   : 66                          |
| OUTPUT DEVICES             Line Length   : 65                          |
|                                                                          |
| Table : Printer            Page Eject    : Yes                         |
| Graph : Printer            Setup string  : None                        |
|                                                                          |
| DIRECTORIES                                                              |
|                                                                          |
| Data        : \HOST\TIPPS\STARTUP\                                       |
| Module      : \HOST\TIPPS\                                               |
| Library     : \HOST\TIPPS\STARTUP\                                       |
| Instruction : \HOST\TIPPS\STARTUP\                                       |
|__________________________________________________________________________|
```

B. Select the Files option by pressing the [**F**] key or the [**ENTER**] key. The display will not change, but the cursor will move to the Data: field in the Files Menu.

[**F**] or [**ENTER**]

Enter the names of the files you intend to use. For this tutorial, you will be using Data File COMPZ, Instruction file INPUTS, and no Comparison File.

COMPZ [**ENTER**]
None [**ENTER**]
INPUTS [**ENTER**]

```
|                                                                          |
|                                                                CONFIGURE |
| Files Output Directories Printer Monitor Save Quit                       |
| Edit Data, Comparison and Instruction file names.                        |
|==========================================================================|
| FILES                      PRINTER SETTINGS          MONITOR SETTINGS    |
|                                                                          |
| Data        : COMPZ        Left Margin   : 10        Monochrome : Yes    |
| Comparison  : none         Top Margin    :  6                          |
| Instruction : INPUTS       Bottom Margin :  6                          |
|                            Page Length   : 66                          |
| OUTPUT DEVICES             Line Length   : 65                          |
|                                                                          |
| Table : Printer            Page Eject    : Yes                         |
| Graph : Printer            Setup string  : None                        |
|                                                                          |
| DIRECTORIES                                                              |
|                                                                          |
| Data        : \HOST\TIPPS\STARTUP\                                       |
| Module      : \HOST\TIPPS\                                               |
| Library     : \HOST\TIPPS\STARTUP\                                       |
| Instruction : \HOST\TIPPS\STARTUP\                                       |
|__________________________________________________________________________|
```

Return to the Configure Menu by pressing the [**ESC**] key.

C. Select Output Devices.

From the Configuration Menu, press the [**O**] key or move the cursor to [**O**]utput and press the [**ENTER**] key. The cursor will move to the + sign next to the word "Table" in the OUTPUT DEVICES section of the screen. Press the [**+**] key or the [**SPACE**] bar to see the available output device options (console and printer for tables, console, printer, and plotter for graphs). If you wish to output the tables to the printer, press [**ENTER**] when "Printer" appears. If you wish to see the results on the computer screen, press [**ENTER**] at "Console." The cursor will move to the "Graph" line. Repeat the procedure to select the graphic output device.

After you have made your selections, press [**ESC**] to return to the Configure Menu.

D. Select the Directories option by pressing the [**D**] key or by moving the cursor to highlight [**D**]irectories and pressing [**ENTER**]. The cursor will move to the backslash preceding the DATA directory pathname.

Use the cursor keys to move the cursor to the word STARTUP, then press the [**INS**] key to toggle the overwrite function. Enter the name of the new dataset, COMPZ, and then press the [**ENTER**] key. Since \COMPZ contains fewer characters than \STARTUP, delete the extra letters using the [**DEL**] key or the [**SPACE**] bar. Then, move the cursor down to the INSTRUCTION Directory and replace STARTUP with COMPZ on that line.

Since the *TIPPS* Module is specified to be in the \TIPPS subdirectory, press the [**ENTER**] key without changing the specifications for MODULE and LIBRARY.

Return to the Configure Menu by pressing the **[ESC]** key.

[**ESC**]

The screen should appear as shown below:

```
| Files Output Directories Printer Monitor Save Quit                    CONFIGURE |
| Edit data, module, and library directory names.                                |
|=================================================================================|
| FILES                        PRINTER SETTINGS          MONITOR SETTINGS        |
|                                                                                 |
| Data        : COMPZ          Left Margin   : 10        Monochrome : Yes        |
| Comparison  : None           Top Margin    :  6                                |
| Instruction : INPUTS         Bottom Margin :  6                                |
|                              Page Length   : 66                                |
| OUTPUT DEVICES               Line Length   : 65                                |
|                                                                                 |
| Table : Printer              Page Eject    : Yes                               |
| Graph : Printer              Setup string  : None                              |
|                                                                                 |
| DIRECTORIES                                                                     |
|                                                                                 |
| Data        : \HOST\TIPPS\COMPZ\                                                |
| Module      : \HOST\TIPPS\                                                      |
| Library     : \HOST\TIPPS\COMPZ\                                                |
| Instruction : \HOST\TIPPS\COMPZ\                                                |
|_________________________________________________________________________________|
```

E. Select Monitor Settings.

Note that the MONITOR SETTINGS show that the system is configured for use with a monochrome display. If you are using a color monitor, select Monitor by pressing the [**M**] key or moving the cursor to highlight [**M**]onitor and pressing [**ENTER**]. Change the monitor setting from YES to NO by typing in the word **NO**, deleting the "S" in "YES," and pressing the [**ENTER**] key. Then return to the Configuration Menu by pressing the [**ESC**] key.

[**M**]onitor
NO [**DEL**] [**ENTER**]
[**ESC**]

F. Save the new configuration by pressing the [**S**] key or moving the cursor to highlight [**S**]ave and pressing [**ENTER**]. When the new Configuration File has been saved, leave the Configure Menu by pressing the [**Q**] key or moving the cursor to highlight [**Q**]uit and pressing [**ENTER**]. The Main Menu, as shown on page 185 of this Tutorial, will reappear on the screen.

[**S**]
[**Q**]

Step 4: Enter input data and perform Baseline Fertility Analysis

All the input data required for modeling the COMPZ Family Planning Project are included on the Tutorial diskette. Detailed instructions are provided here for entering and editing only two of the variables required for the Base Period analysis. The techniques are the same for the remaining variables, unless noted otherwise. Where special instructions are needed for other variables, they are provided when the variable is introduced.

A. Select Edit from the Main Menu by pressing the [**E**] key or moving the cursor to highlight [**E**]dit and pressing [**ENTER**]. The Select File Menu will be displayed.

[**E**]

```
|                                                                        |
|                                                          SELECT FILE |
| COMPZ Quit                                                             |
| Edit Data file Compz                                                   |
|========================================================================|
```

B. Select the data file COMPZ by pressing the [**ENTER**] key. The Select Variable Menu will appear on the screen.

[**ENTER**]

```
|                                                                          |
|                                                          SELECT VARIABLE |
| Variable name  ? _______                                                 |
|                                                                          |
|==========================================================================|
```

C. Select the Variables for the Base Period Fertility Analysis and Edit the Input Data

The Model has a list of all the available variables. To see the list, press the Query Keys ([**SHIFT**] and [**?**], pressed simultaneously). The first of the 95 variables will be shown on the screen. Press the down arrow ([↓] key) to look at the next variables, or press [**CTRL**] and [**END**] simultaneously to move the cursor to the last screen of variables. Use the [**PGUP**] and [**PGDN**] keys to scroll the data up and down one screen at a time.

Data for the following variables must be supplied for the Base Period Analysis:

BBIRTHS	BREAST (if DIRECTPP = 0)
BCONPREV	DIRECTPP
BMETHMIX	POSTPART (if DIRECTPP = 1)
BFEMRISK	

The tutorial will show you how to enter the data for BBIRTHS and BCONPREV, and then present the data for the remaining variables for you to enter on your own.

1. Move the cursor to highlight BBIRTHS and press the [**ENTER**] key. Or alternatively, press [**ESC**] to return to the "Variable Name?" question. Then type in BBIRTHS and press [**ESC**].

BBIRTHS [**ENTER**]

Because the initial data were copied from the \STARTUP files, the START.* values appear on the screen. BBIRTHS are set to 0.0000000000 for each age group.

```
EDIT DATA
Variable Name : BBIRTHS                    Data File : COMPZ
  Description : Base Period Number of Births (B)
AGE
15-19 0.0000000000
20-24 0.0000000000
25-29 0.0000000000
30-34 0.0000000000
35-39 0.0000000000
40-44 0.0000000000
45-49 0.0000000000
```

2. Enter the new data. Enter the value for each age group by typing over the START values and pressing the [**ENTER**] key after each value is entered.

If the data are inserted rather than overwriting the existing values, press the [**INS**] key to toggle the overwrite/insert feature and try again to enter the data.

NOTE:

The decimal point does not move automatically.

You must enter the decimal point manually for each value.

When the last value has been entered, the system sounds a short *beep* to warn you that you have finished.

```
00 [ENTER]
22.[ENTER]
77.[ENTER]
67.[ENTER]
38.[ENTER]
6. [ENTER]
2. [ENTER]
```

The screen will display the data as shown below:

```
|                                                                                |
|                                                                   EDIT DATA    |
| Variable Name : BBIRTHS                                     Data File : COMPZ  |
|   Description : Base Period Number of Births (B)                               |
|================================================================================|
| AGE                                                                            |
|================================================================================|
| 15-19 00.000000000                                                             |
| 20-24 22.000000000                                                             |
| 25-29 77.000000000                                                             |
| 30-34 67.000000000                                                             |
| 35-39 38.000000000                                                             |
| 40-44 6.0000000000                                                             |
| 45-49 2.0000000000                                                             |
|________________________________________________________________________________|
```

3. When all the data have been entered, press the [/] key to return to the menu.

WARNING!

Do not use the [**ESC**] key to return to the menu, or the data you have just entered will not be saved!

[/]

4. Save the new data. Press the [**S**] key or move the cursor to highlight [**S**]ave and press [**ENTER**] to save the data.

WARNING!

The data for each variable must be saved as it is entered.

5. Select another variable to edit.

Press the [**V**] key or move the cursor to highlight [**V**]ariable to select the next variable. The "Variable name?" question will be displayed again.

[**V**]

Type the name of the next variable, BCONPREV, and press the [**ENTER**] key. The STARTUP values for BCONPREV will be displayed.

BCONPREV [ENTER]

```
EDIT DATA
Variable Name : BCONPREV (proportion)                    Data File : COMPZ
  Description : Base Period Contraceptive Prevalence (U)
AGE
15-19 0.0000000000
20-24 0.0000000000
25-29 0.0000000000
30-34 0.0000000000
35-39 0.0000000000
40-44 0.0000000000
45-49 0.0000000000
```

The procedure for entering data for BCONPREV (and most other variables) is the same as the procedure for entering data for BBIRTHS. Enter the data for each age group by typing the COMPZ data over the START data and pressing the **[ENTER]** key after each value is entered.

0.00 [ENTER]
0.54 [ENTER]
0.80 [ENTER]
0.84 [ENTER]
0.83 [ENTER]
0.82 [ENTER]
0.90 [ENTER]

```
EDIT DATA
Variable Name : BCONPREV (proportion)                    Data File : COMPZ
  Description : Base Period Contraceptive Prevalence (U)
AGE
15-19  0.0000000000
20-24  0.5400000000
25-29  0.8000000000
30-34  0.8400000000
35-39  0.8300000000
40-44  0.8200000000
45-49  0.9000000000
```

When all the data are entered, press the [/] key to return to the menu. Remember not to use the [**ESC**] key to return to the menu, or the data you have just entered will not be saved. Then select [**S**] to save the data. Press the [**V**] key to select the next variable. The "Variable name?" question will be displayed again.

[/]
[**S**]ave
[**V**]ariable

D. The procedure for entering data is:

* Type the variable name. Alternatively, press the Query keys ([**SHIFT**] and [**?**] pressed simultaneously) to obtain the variables list; move the cursor until the desired variable is highlighted, and press [**ENTER**].

* Enter the data for the variable

* Press the [**ENTER**] key after each entry

* Press the [/] key when all the data for the variable have been entered

* Press the [**S**] key to save the data

* Press the [**V**] key to select another variable

* When all the variables are entered and saved, return to the Main Menu by pressing the [**Q**] key.

The START.* values will be shown when a variable first appears on the screen, and the new COMPZ data must be typed over them.

The User-Supplied values for the *Baseline Period Fertility Analysis* are explained in detail in Chapter IV, Section A, page 49 . Enter the COMPZ values as shown below, being sure to press the [/] key at the end of entering all the values for each variable. Save each variable before continuing to the next.

Table 1. INPUT VALUES FOR COMPΣ BASELINE FERTILITY ANALYSIS

AGE	BBIRTHS	BCONPREV	BFEMRISK	BREAST	POSTPART
15-19	0	0.00	0	0	1.5
20-24	22	0.54	61	10	1.5
24-29	77	0.80	436	12	3.0
30-34	67	0.84	603	14	3.0
35-39	38	0.83	562	16	3.0
40-44	6	0.82	424	18	3.0
45-49	2	0.90	348	20	3.0

BMETHMIX

Method / Age Group	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Withdrawal	0.000	0.000	0.008	0.015	0.016	0.000	0.100
Periodic Abstinence	0.000	0.061	0.254	0.295	0.285	0.207	0.400
Condom	0.000	0.061	0.046	0.035	0.032	0.034	0.000
Diaphragm	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spermicide	0.000	0.152	0.019	0.035	0.016	0.000	0.000
Pill	0.000	0.212	0.258	0.189	0.181	0.207	0.000
Injection	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000	0.000	0.000	0.000
IUD	0.000	0.515	0.322	0.287	0.138	0.069	0.200
Female Sterilization	0.000	0.000	0.094	0.144	0.332	0.483	0.300
Vasectomy	0.000	0.000	0.000	0.000	0.000	0.000	0.000

DIRECTPP	1

After the last variable for the Base Period Fertility Analysis has been entered and saved, return to the Main Menu by pressing the [Q] key.

E. Check the input data

The Tabulate option presents the variables in table form, and the tables can either be shown on the screen ("Console" option from the Configure Menu) or printed out ("Printer" option). Values cannot be changed from the Tabulate option.

To make corrections or change values, return to the Main Menu by pressing the [/] key, and then select [**E**]dit. If you have configured the program to output the tables to the printer, the printer must be turned on and be online at this point.

1. Enter the Tabulate option.

From the Main Menu, select the Tabulate option by pressing the [**T**] key or by moving the cursor until Tabulate is highlighted and then pressing the [**ENTER**]. The Table parameter screen will be presented, with the cursor on the question-mark next to the Table Name parameter.

[**T**]

```
|                                                                                |
|                                                                       TABULATE |
| Edit So Quit                                                                   |
| Edit specification of TABLE parameters.                                        |
|================================================================================|
| Table Name      ?                                                              |
| Data File       : C:\HOST\TIPPS\COMPZ\COMPZ                                    |
| Comparison File :                                                              |
| Output File     : PRN   or  CON                                                |
| Periods         : ALL                                                          |
|                                                                                |
```

2. Select the desired table.

If the Query keys ([**SHIFT**] and [**?**] pressed simultaneously), are pressed, a list of the Model's tables will be shown so you can select the table you want to see. When the table names are shown, the first table in the list, ACCEPTOR, will be highlighted. To display the contents of this table, press the [**ENTER**] key. Alternatively, type **ACCEPTOR** and press the [**ENTER**] key.

ACCEPTOR

```
TABULATE
Table Name      ? ACCEPTOR
Data File       : C:\HOST\TIPPS\COMPZ\COMPZ
Comparison File :
Output File     : PRN
Periods         : ALL
```

The user-supplied input data for the base period fertility analysis are summarized in three tables: INPUT3, INPUT5, and BFEMRISK. As you examine these tables, you will notice that some of the variables contain zero values. You have not yet entered data for these variables because they are not needed for the base period fertility analysis.

In addition to the variables you have entered manually, the base period fertility analysis uses other input variables with universal values. You do not need to enter these data because they are included in the \STARTUP file. They are presented in three tables: INPUT1, INPUT2A, and INPUT2B. Return to the Tabulate Menu by pressing the [/] key. Select the [E]dit option.

At the "Table Name" line, type the name of a Baseline Fertility Analysis table, **INPUT3**.

[/]
[E]dit
INPUT3 [ENTER]

```
TABULATE
Table Name      ? INPUT3
Data File       : C:\HOST\TIPPS\COMPZ\COMPZ
Comparison File :
Output File     : CON or PRN
Periods         : ALL
```

3. Select the remaining parameters.

When the table name has been selected, you will be able to select the other parameters needed by the Model. The Data File *COMPZ*, its pathname, and the number of periods for which data is to be tabulated have been filled in automatically; The default Output File is *PRN* (used when the table is to be printed on the printer, or *CON*, used when the data is to be output to the console or screen). Move the cursor past *Comparison File* to *Output File*, then enter **CON** or **PRN** and press the **[ENTER]** key. Finally, press the [/] key to return to the Tabulate Menu. The screen should look like the example shown below:

[ENTER]
CON [ENTER]
[/]

```
TABULATE
Table Name      ? INPUT3
Data File       : C:\HOST\TIPPS\COMPZ\COMPZ
Comparison File :
Output File     : CON
Periods         : ALL
```

As the Table is prepared for presentation, a continually updated status message will be displayed at the top of the screen. One of the status messages is shown below, and several more will be displayed as processing continues.

```
Reading label format information                    WAIT
Currently executing :
TABLE T=INPUT3 D=COMPZ O=CON P=ALL
Table Name      ? INPUT3
Data File       : C:\HOST\TIPPS\COMPZ\COMPZ
Comparison File :
Output File     : CON
Periods         : ALL
```

Table INPUT3 is shown at the end of the tutorial. The first page of the table includes the names of all the variables included in the table.

4. When you have examined the data, return to the Main Menu by pressing the [**ESC**] key. Repeat the procedure for each of the remaining Baseline Fertility Analysis input tables.

F. Run The Base Period Fertility Analysis

1. Select the Run option from the Main Menu by pressing the [**R**] key. The Run Screen Menu will be displayed.

[**R**]

```
| Edit Go Quit                                                          RUN |
| Edit specification of RUN parameters                                      |
|===========================================================================|
| Application Module ? _____________________________________________        |
| Data File          : C:\HOST\TIPPS\COMPZ\COMPZ                            |
| Starting Period    :    1                                                 |
| Number of Periods  :    1                                                 |
|                                                                           |
|                                                                           |
|   If no path is specified, Application Modules are assumed to be in the   |
|   C:\HOST\TIPPS\ directory.                                               |
|___________________________________________________________________________|
```

Notice that the Data File name is already correct. Since it was entered into the Configuration file, it is entered automatically as a Run parameter. The default starting period should not be changed, because it will provide data for the first year of the program.

2. Select the MODEL Application Module.

Enter the name of the desired Application Module and select the number of periods for which results are desired, Select Edit by pressing the [**ENTER**] key.

Two modules (MODEL and GRAPH) are available for use. The MODEL Module is used to run the projections, and the GRAPH module is used to graph the results after the MODEL has been run. To RUN the projection, type **MODEL** and press the [**ENTER**] key.

3. Set the Run Parameters.

Since at this point you only want to see the results of the base period fertility analysis, the Number of Periods should be left at one (1), so the Run parameters need not be changed.

[**ENTER**]
MODEL [**ENTER**]
[/]

```
RUN
Application Module ? MODEL
Data File          : C:\HOST\TIPPS\COMPZ\COMPZ
Starting Period    :   1
Number of Periods  :   1
```

4. Save the Run Parameters.

When the Run parameters have been set, press the [/] key to return to the Run Menu. If the [**ESC**] key is pressed, the new parameters will not be saved. Examine the Run Parameters after returning to the Run Menu to be sure they are as you set them.

5. Run the Projection

When the Run parameters are correct, press the [**G**]o key or move the cursor until [**G**]o is highlighted and then press the [**ENTER**] key. You will be offered an opportunity to save the data from a previous projection before running the analysis.

Each projection you save takes up disk space. To save space, we recommend that you back up projections only when necessary, usually only after the first satisfactory run has been performed. The backup option saves the *previous* projection, not the projection you are currently running. If you do not wish to save the previous projection, or if you are only beginning the process, press the [**ENTER**] or the [**N**] key. The program continues and the data from the previous projection will be replaced by the new projection. In this case, you do not need to save a previous projection, so answer "NO."

[**G**]
NO or [**ENTER**]

```
| No Yes                                                                  RUN |
| Create backup copy of Data File COMPZ before proceeding?                    |
|=============================================================================|
| Application Module ? MODEL                                                  |
| Data File          : C:\HOST\TIPPS\COMPZ\COMPZ                              |
| Starting Period    :    1                                                   |
| Number of Periods  :    1                                                   |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|                                                                             |
|  If no path is specified, Application Modules are assumed to be in the      |
|  C:\HOST\TIPPS\ directory.                                                  |
|_____________________________________________________________________________|
```

6. Save a previous projection.

If you wish to save the results of the previous projection in a disk file, move the cursor to highlight **Yes** and press the [**ENTER**] key, or press the [**Y**] key to backup the data. The *TIPPS* Model program will prompt you for the name of the file to which the data is to be copied. Select a name and enter it, then press the [**ENTER**] key again, as shown:

[**Y**]
ARCHIVE
[**ENTER**]

```
|                                                                          |
|                                                                    RUN   |
|                                                                          |
| Copy COMPZ to  :ARCHIVE_____________________________________________     |
|==========================================================================|
| Application Module ? MODEL_____________________________________________  |
| Data File          : C:\HOST\TIPPS\COMPZ\COMPZ                           |
| Starting Period    :    1                                                |
| Number of Periods  :    1                                                |
~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
```

The program will automatically enter the pathname of the specified file before copying the COMPZ data.

```
|                                                                          |
|                                                          COPYING COMPZ   |
| Data file COMPZ successfully copied to ARCHIVE                           |
| Copy COMPZ to  : C:\HOST\TIPPS\COMPZ\ARCHIVE_____________________        |
|==========================================================================|
| Application Module ? MODEL_____________________________________________  |
| Data File          : C:\HOST\TIPPS\COMPZ\COMPZ                           |
| Starting Period    :    1                                                |
| Number of Periods  :    1                                                |
~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
```

After the previous projection has been copied, the calculations are begun for the projections. With each step, a status message is displayed on the screen. When the calculation is complete, the status message is updated accordingly. In some cases, instead of a completion message, the status screen shows the beginning of a new phase of computation. The ellipses (. . .) in each of the status messages simulated below indicate the delay between the beginning and ending of the calculation.

```
|                                                                          |
|                                                                    RUN   |
| Currently executing :                                                    |
| RUN M=MODEL D=COMPZ S=1 N=1                                              |
|==========================================================================|
|                                                                          |
| Performing Base Period Fertility Analysis...completed                    |
|                                                                          |
~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
```

```
RUN
Currently EXECUTING :
RUN M=MODEL D=COMPZ S=1 N=1
==============================================================================
Projecting for period 1
     ...births averted...acceptors...costs...benefits
```

A status message similar to that shown above for Period 1 is shown for each period in the projection. The Model runs projections for one period more than the Number of Periods specified in the Run parameters, and then prepares a summary of the output measures for all periods. A status message is displayed when the summary is begun.

```
RUN
Currently executing :
RUN M=MODEL D=COMPZ S=1 N=1
==============================================================================
Projecting for period 2
     ...births averted...acceptors...costs...benefits
Summary measures for all periods
```

When the summary calculations are complete, no status message is shown. Instead, the program returns to the Run Menu. Press the [**Q**] key to leave the menu and return to the Main Menu.

7. Errors in BMETHMIX and/or TMETHMIX

If the sums of the values in BMETHMIX and/or TMETHMIX do not equal 1.00, you will see the following error messages:

```
**** WARNING ****
Column(s) of TMETHMIX do(es) not sum to one
Recommend you verify values before proceeding
Do you wish to halt further processing (Y/N)?
```

or

```
**** WARNING ****
Column(s) of BMETHMIX do(es) not sum to one
Recommend you verify values before proceeding
Do you wish to halt further processing (Y/N)?
```

If you do not wish to suspend processing, press the [**N**] key to continue. If you wish to check the values of the variable in question, press the [**Y**] key to stop the program. To return to the Main Menu, exit the projection by pressing the [**Q**] key, then select the Edit option from the Main Menu. Type the name of the variable in question, edit the variable, return to the Edit Menu, save the data, return to the Main Menu, and select Run to try another projection.

[**Y**]
[**Q**] uit [**ENTER**]
[**E**] dit [**ENTER**]
BMETHMIX or **TMETHMIX**
.
.
Enter the correct values
.
.
[/]
[**S**]ave
[/]
[**G**]o

After the run is complete and the summary measures have been calculated, the program returns to the Run Menu. Leave the Run Menu and return to the Main Menu by pressing the [**Q**]uit key.

[**Q**]uit

8. Check the results of the Base Period Analysis.

From the Main Menu, select the Tabulate option by pressing the [**T**] key or moving the cursor to Tabulate and pressing [**ENTER**]. The results of the Base Period Fertility Analysis are presented in the BASEFERT table.

[**T**]abulate
BASEFERT [**ENTER**]

This table is presented at the end of the Tutorial.

Step 5: Enter input data and perform Future Fertility Projection

A. Select Edit from the Main Menu, by pressing the [**E**] key, then select the COMPZ data file by pressing the [**ENTER**] key.

[**E**]dit
[**ENTER**]

B. Select the variable to be edited.

The following variables require User-Supplied values for *Projecting Future Fertility*:

ABORTWT	TCONPREV
$DECAYDAT_{[start]}$	TFEMRISK
$DECAYDAT_{[end]}$	TMETHMIX
INTERP	YRSTOEND
INTERPFM	YRSTOTFM
	YRSTOTGT

C. Enter the COMPZ values.

Enter the values as shown below, being sure to press the [**/**] key at the end of entering all the data for each variable. You will be returned to the Edit Menu. Press the [**S**] key to save the data, then press the [**V**] key obtain another variable.

Table 2. INPUT VALUES FOR PROJECTING COMPZ FUTURE FERTILITY

TMETHMIX METHOD / AGE	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Withdrawal	1.000	0.000	0.000	0.010	0.000	0.000	0.000
Periodic Abst	0.000	0.148	0.104	0.118	0.191	0.170	0.391
Condom	0.000	0.071	0.036	0.048	0.012	0.032	0.000
Diaphragm	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Spermicide	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Pill	0.000	0.044	0.247	0.122	0.047	0.170	0.000
Injection	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000	0.000	0.000	0.000
IUD	0.000	0.744	0.520	0.480	0.383	0.153	0.307
Female Ster	0.000	0.000	0.093	0.207	0.367	0.475	0.302
Vasectomy	0.000	0.000	0.000	0.016	0.000	0.000	0.000

INTERP	INTERPFM	YRSTOEND	YRSTOTFM	YRSTOTGT
1	1	5	1	3

D. Enter data for multi-dimensioned data.

Since the computer can show only two dimensions at a time, some variables, such as DECAYDAT, show data for only one period at a time. The [*start*] period is displayed first, and values are to be entered for each age group for each contraceptive method. What you will see on the screen is an array of numbers rather than a single value as shown in the data above. The same value for $\text{DECAYDAT}_{[start]}$ must be entered for every age group and every method.

After entering and saving the [*start*] values, press the [/] key to return to the Edit Menu, but instead of pressing the [**V**] key for another variable, press the [**D**] key to gain access to the next dimension, where the [*end*] values are to be entered. Enter the same value for DECAYDAT[end] in every cell, for each age group and each method. After entering the array of [*end*] values, press the [/] key to return to the Edit Menu. Save the [*end*] values, then press the [**V**] key to obtain access to the next variable.

AGE	ABORTWT	TCONPREV	TFEMRISK
15-19	0	0.000	0
20-24	0	0.750	61
25-29	0	0.800	436
30-34	0.50	0.840	603
35-39	0.20	0.830	562
40-44	0.20	0.830	424
45-49	0.00	0.900	348

DECAYDAT [start]
0

DECAYDAT [end]
2

E. Verify the Input Data (refer to Step 4-E).

F. Run the Future Fertility Projection.

1. Select the Run Option.

From the Main Menu, select the Run option by pressing the **[R]** key. The Run Screen Menu will be displayed.

[R]un

```
RUN
Edit Go Quit
Edit specification of RUN parameters
Application Module ?
Data File          : C:\HOST\TIPPS\COMPZ\COMPZ
Starting Period    :   1
Number of Periods  :   1

If no path is specified, Application Modules are assumed to be in the
C:\HOST\TIPPS\ directory.
```

2. Select the MODEL Application Module.

Select [**E**]dit from the Run Menu, then enter the name of the Module.

[**E**]
MODEL [**ENTER**] or **MODEL** [↓]

3. Edit the Run Parameters.

No changes are needed for the name of the data file or for the starting period. Press the [**ENTER**] or the down arrow ([↓]) key twice to move to Number of Periods, and set the number of Periods to 5.

[**ENTER**]
[**ENTER**]
5 [**ENTER**]

4. Run the Projection

Return to the Run Menu by pressing the [/] key, and then run the projection by pressing the [**G**]o key.

[/]
[**G**]

Since this is the first projection, it is not necessary to save the previous data set. When the program asks:

```
Create backup copy of Data File COMPZ before proceeding?
```

respond "NO" by pressing the [**N**] key or by moving the cursor until "No" is highlighted and pressing [**ENTER**].

An error message may occur if the Number of Periods are too low for the values of YRSTOEND and DECAYDAT.

```
|                                                                          |
|                                                                     RUN  |
| Currently executing :                                                    |
| RUN M=MODEL D=COMPZ S=1 N=1                                              |
|==========================================================================|
|                                                                          |
|   **** WARNING ****                                                      |
|   THE PROJECTION WILL UNDER-ESTIMATE EXTENDED PROGRAM BENEFITS           |
|   Recommend you verify values of YRSTOEND and DECAYDAT                   |
|   or increase the Number of Periods in the projection.                   |
|   Minimum Number of Periods in the projection should be   5              |
|   Do you wish to halt further processing (Y/N) ?                         |
```

Since you are not ready to calculate program benefits, it is safe to ignore this message while analyzing future fertility. Press the [**N**] key to continue processing.

5. Examine the Results.

After the run is complete and the program returns to the Run Menu, return to the Main Menu by moving the cursor until "Quit" is highlighted and pressing [**ENTER**] or by pressing the [**Q**] key. From the Main Menu, select the Tabulate option by pressing the [**T**] key. The future fertility projections are presented in tables FUTFERT and FUTRATE. To interpret the results of these tables, consult Chapter IV, Section B.

Note that each of these tables consists of several pages, one page for each projection year. The computer screen can present only one page at a time. To view the next page, follow the instructions at the bottom of the screen and press the [**PgDn**] key. When you finish examining the table, press the [**ESC**] key to return to the Tabulate menu.

```
|                                          |
|                                    TABLE |
| Currently executing                      |
|                                          |
| TABLE T=FUTRATE D=COMPZ O=CON P=ALL      |
|==========================================|
```

[**PgDn**]
[**PgDn**] (etc.)
[**ESC**]

The Future Fertility Projection tables are presented at the end of this Tutorial.

Step 6: Enter input data for Estimating the Costs and Benefits of Providing Family Planning Services.

A. Select [**E**]dit from the Main Menu, and then select data file COMPZ.

[**E**]
[**ENTER**]

1. Enter User-Supplied values for Program Costs

The following variables require User-Supplied values for *Estimating the Costs of Delivering Family Planning Services*:

ACCSHARE	CONSCOST
BCONSHRE	FIXCOSTS
COMMCOST	IMSUBSTN

Select the file, then enter the data as shown. Save each variable before going on to the next.

Table 3. USER-SUPPLIED VALUES FOR ESTIMATING COSTS OF COMPZ FAMILY PLANNING SERVICES

Method	ACCSHARE	BCONSHRE	COMMCOST	IMSUBSTN
Withdrawal	0.00	0.00	0.00	0.40
Periodic Abst	0.20	0.00	0.00	0.40
Condom	1.00	1.00	0.00	1.00
Diaphragm	0.00	0.00	0.00	0.00
Spermicide	0.00	0.00	0.00	1.00
Pill	0.80	0.80	0.00	0.49
Injection	0.00	0.00	0.00	0.00
Implant	0.00	0.00	0.00	0.00
IUD	0.85	0.00	2.50	0.17
Female Ster	0.08	0.00	75.0	0.00
Vasectomy	0.90	0.00	50.0	0.00

When entering data for periodic variables, such as FIXCOSTS, be sure to include enough periods to avoid premature termination of the program. After entering the value for the first period, press the [**F4**] key to gain access to the next period.

Period	FIXCOSTS
1	0.0000000001
2	0.0000000001
3	0.0000000001
4	0.0000000001
5	0.0000000001

CONSCOST	3.00

2. Enter User-Supplied values for Program Benefits.

The variables which require User-Supplied values for *Estimating Family Planning Program Benefits* are:

BENAVABT BENSTRM BENCOND1 HLTHCON1

These variables are explained in Chapter IV, Section D.

Enter the COMPZ values as shown below, being sure to press [**ENTER**] key after each entry within a variable, and the [/] key at the end of entering data for each variable. You will be returned to the Edit Menu. Save the data by pressing the [**S**] key. Then, press the [**V**] key after returning to the Edit Menu to obtain access to another variable. Be sure to include enough periods for HLTHCON1 to avoid terminating the program.

Table 4. USER-SUPPLIED VALUES FOR ESTIMATING BENEFITS OF COMPZ FAMILY PLANNING SERVICES

HLTHCON1	
Period	Value
1	0.000
2	0.000
3	0.000
4	0.000
5	0.000

BENAVABT	0.00

BENCOND1	0.00

BENSTRM Horizon	Maternity Care	Salary Suppl.	Other Employee	Child Medical	Child Welfare	Other Child
0	483.57	0.00	75.90	8.88	0.00	0.00
1	0.00	14.58	0.00	0.00	0.00	0.00
2	0.00	14.58	0.00	0.00	20.25	0.00
3	0.00	14.58	0.00	0.00	20.25	0.00
4	0.00	14.58	0.00	0.00	20.25	0.00
5	0.00	14.58	0.00	0.00	33.75	0.00
6	0.00	14.58	0.00	0.00	33.75	0.00
7	0.00	14.58	0.00	0.00	33.75	0.00
8	0.00	14.58	0.00	0.00	33.75	0.00
9	0.00	14.58	0.00	0.00	33.75	0.00
10	0.00	14.58	0.00	0.00	33.75	0.00
11	0.00	14.58	0.00	0.00	33.75	0.00
12	0.00	14.58	0.00	0.00	33.75	0.00
13	0.00	14.58	0.00	0.00	33.75	0.00
14	0.00	14.58	0.00	0.00	33.75	0.00
15	0.00	14.58	0.00	0.00	33.75	0.00
16	0.00	14.58	0.00	0.00	33.75	0.00
17	0.00	14.58	0.00	0.00	33.75	0.00
18	0.00	14.58	0.00	0.00	33.75	0.00
19	0.00	0.00	0.00	0.00	0.00	0.00
20	0.00	0.00	0.00	0.00	0.00	0.00
21-29	0.00	0.00	0.00	0.00	0.00	0.00

3. Enter input datum for Cost-Benefit Measures.

Only one variable requires a User-Supplied value for *Calculating Cost-Benefit Measures*: DISCRATE. Enter the COMPZ value as shown.

Table 5. USER-SUPPLIED VALUE FOR CALCULATING COMPZ COST-TO-BENEFIT MEASURES

DISCRATE	10.00

When this variable has been entered and saved, return to the Main Menu by pressing the [Q]uit key.

B. Examine the Input Data.

At this point, all the data needed for a complete cost-benefit analysis (base period fertility, future fertility projections, estimated costs and benefits) have been entered. If you would like to see all the input data in tabular form, select the Tabulate option and request the following tables:

INPUT1	INPUT4
INPUT2A	INPUT5
INPUT2B	INPUT6
INPUT3	INPUT7
BMETHMIX	TMETHMIX

C. Perform the Cost-Benefit Analysis.

After returning to the Main Menu, select the Run Option. Type the name of the Application Module.

```
[R]un [ENTER]
[E]dit [ENTER]
MODEL [ENTER]
[/]
```

```
|                                                                          |
|                                                                      RUN |
| Edit Go Quit                                                             |
| Edit specification of RUN parameters                                     |
|==========================================================================|
| Application Module ? MODEL_____________________________________________  |
| Data File          : C:\HOST\TIPPS\COMPZ\COMPZ                           |
| Starting Period    :    1                                                |
| Number of Periods  :    5                                                |
```

```
[S]ave [ENTER]
[G]o [ENTER]
```

It is not yet necessary to back up your previous projection, although after this projection has been performed, you may wish to save it before performing another projection. Respond "NO" when asked if you would like a copy made of the data file.

After the program has begun execution, you should see the warning message:

```
|                                                                          |
|                                                                     RUN  |
| Currently executing :                                                    |
| RUN M=MODEL D=COMPZ S=1 N=1                                              |
|==========================================================================|
|                                                                          |
|   **** WARNING ****                                                      |
|   THE PROJECTION WILL UNDER-ESTIMATE EXTENDED PROGRAM BENEFITS           |
|   Recommend you verify values of YRSTOEND and DECAYDAT                   |
|   or increase the Number of Periods in the projection.                   |
|   Minimum Number of Periods in the projection should be   5              |
|   Do you wish to halt further processing (Y/N) ?                         |
|                                                                          |
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
```

Follow the program's advice, and increase the number of periods to five (5) or more. To do this, respond [**Y**]. You will be returned to the Run Menu. Change the number of periods to five (5), save the parameters, and re-run the projection.

[**Y**]es [**ENTER**]
[**R**]un [**ENTER**]
[**E**]dit [**ENTER**]
MODEL [**ENTER**]]
[**ENTER**]
[**ENTER**]
[**5**] [**ENTER**]
[**/**]
[**S**]ave [**ENTER**]
[**G**]o [**ENTER**]

```
|                                                                          |
|                                                                     RUN  |
| Currently executing :                                                    |
| RUN M=MODEL D=COMPZ S=1 N=1                                              |
|==========================================================================|
```

D. Examine the results of the projection.

In addition to the base period fertility analysis (BASEFERT, BASERATE, BMETHMIX) and future fertility projections (FUTFERT, FUTRATE, TMETHMIX), the Model produces three other sets of results: tables presenting family planning costs (ACCEPTOR, PROGINPT, COSTBRK), tables presenting family planning benefits or cost savings (BENSTRM, BENBREAK), and summary cost-benefit economic indicators (BENCOSTS, SUMMARY, SUMMARY2). To view these tables, return to the Main Menu, select the Tabulate option, and specify the desired tables.

Step 7: Perform Sensitivity Analysis

You are now ready to explore the impact of changing the value of input variables on expected results. Do not change any of the variables associated with base period fertility or with family planning benefits. You may wish to modify your future fertility assumptions, for example, by raising or lowering target contraceptive prevalence (TCONPREV), or by modifying the target contraceptive method mix (TMETHMIX). or by changing the abortion weight (ABORTWT). Any one or more of these changes will alter the impact on future contraceptive use, fertility levels, and abortion levels, thereby also changing the expected costs and benefits of family planning.

You may also wish to experiment directly with family planning costs. For example, you might wish to examine the impact of a fee-for-service contract instead of a fixed-cost contract (COSTCON, FIXCOSTS), or raise or lower the proportion of family planning users to be served (BCONSHRE, ACCSHARE). These manipulations will alter the costs associated with family planning, but will leave the benefits unchanged.

Finally, if you change the discount rate (DISCRATE), the simple costs and benefits associated with family planning will remain unchanged, as will several summary economic indicators (IRR, TIRR, CASHFLOW, etc.). However, the discounted indicators (BCRATIO, DISCOSTS, DISBNFIT, etc.) will be modified.

We encourage you to experiment with the input variables. To help keep track of your manipulations, you should print out the values of the input variables that have been changed and the new results. You may also find it useful to back up the previous projection under a unique name before proceeding with a new run.

AUTOMATING THE PROJECTION PROCESS

The variables cannot be printed singly, although they can be displayed on the screen. The various tables in which the variables are usually presented can also be displayed on the screen for examination, by means of the Tabulate option, as already seen in the Tutorial. However, the tables can be printed with a single command by using an Instruction File after the projection has been Run.

A. Select the Instruct option from the Main Menu, by pressing the [**I**] key or moving the cursor until Instruct is highlighted, and then pressing the [**ENTER**] key. The Instruct Menu will be displayed on the screen:

[**I**]nstruct

```
|                                                                          |
|                                                          INSTRUCT MENU |
| Create Edit Backup Process Delete Quit                                   |
| Create a new Instruction File                                            |
|==========================================================================|
```

Since the *INPUTS* file has been provided with the distribution diskettes, there is no need to create a new one now. However, if you would like to see what an Instruction file looks like, press the [**E**] key. The screen will display the name of the default file. Press the [**ENTER**] key to see the contents of the *INPUTS* file.

The information presented on the screen is explained in detail in Chapter V, Section B, *Instruction Files*. When you are ready to continue with the Tutorial, press the [**ESC**] key to return to the Instruct Menu.

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B. Select the Process option from the Instruct Menu by pressing the [**P**] key. The Process File Screen will be displayed and the program will request the name of the instruction file to be processed. Since the *INPUTS* Instruction filename was specified when you configured the Model, **C:\HOST\TIPPS\COMPZ\INPUTS** will be displayed as the default name. You can change it if you wish, but there is no need to do so until you are ready to print the output variables.

[P]rocess

```
|                                                                          |
|                                                              PROCESS FILE |
| Instruction file to process ? C:\HOST\TIPPS\COMPZ\INPUTS_____________ |
|                                                                          |
|==========================================================================|
|   If no path is specified, Instruction files are assumed to be in the    |
|   C:\HOST\TIPPS\COMPZ\ directory.                                        |
```

The program will ask if you wish to backup the present file. Press the [**N**] key to answer No, since you will be making a backup of the file before running the Model. The program will process the input variables and print them. The input and output files are shown on the following pages.

If the files do not print as expected, it may be because your printer hardware configuration is set to respond to **lpt1** instead of **prn**. You may have to edit the Instruction file, changing all the **o=prn** to **o=lpt1**. See Chapter V, *Advanced Topics*, for details concerning how to edit Instruction Files.

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Table 6. INPUT TABLES

17 Nov 89 Table: INPUT1 Data File: COMPZ Page 1

Universal Age-specific Data Inputs

FECUND : Proportion Fecundable (f)
MAXFERT : Biological Maximum Fertility (mf)

AGE/	FECUND (proportion)	MAXFERT
20-24	0.980	0.667
25-29	0.970	0.628
30-34	0.960	0.538
35-39	0.890	0.406
40-44	0.750	0.201
45-49	0.480	0.058

17 Nov 89 Table: INPUT2A Data File: COMPZ Page 1

Universal Method-specific Data Inputs

EFFECT : Contraceptive Effectiveness by Method
A : Immediate Continuation Rate
R : Annual Discontinuation Rate

METHOD/	EFFECT (proportion)	A	R
Withdrawal	0.500	0.750	0.386
Periodic abst	0.500	0.750	0.386
Condom	0.700	0.610	0.560
Diaphragm	0.700	0.610	0.560
Spermicide	0.700	0.610	0.560
Pill	0.900	0.840	0.240
Injection	0.950	0.840	0.240
Implant	0.950	1.000	0.180
IUD	0.950	0.800	0.180
Female ster	1.000	1.000	0.080
Vasectomy	1.000	1.000	0.080

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17 Nov 89 Table: INPUT2B Data File: COMPZ Page 1

Universal Method-specific Data Inputs cont.

CONSCACC : Consultations per Continuing Acceptor
CONSCONT : Consultations per Continuing User
CONSDROP : Consultations per Discontinuing Acceptor

METHOD/	CONSCACC	CONSCONT	CONSDROP
Withdrawal	0	0	0
Periodic abst	2	1	2
Condom	2	2	1
Diaphragm	2	2	1
Spermicide	2	2	1
Pill	3	2	1
Injection	6	6	1
Implant	4	1	2
IUD	5	1	2
Female ster	3	0	3
Vasectomy	3	0	3

17 Nov 89 Table: INPUT3 Data File: COMPZ Page 1

User-Supplied Age-specific Data Inputs

BFEMRISK : Base Period Women at Risk (n)
BBIRTHS : Base Period Number of Births (B)
BCONPREV : Base Period Contraceptive Prevalence (U)
POSTPART : Average Length of Postpartum Amenorrhea
BREAST : Average Length of Breastfeeding (months)
ABORTWT : Abortion substitution
TFEMRISK : Target Period Values of Women at Risk
TCONPREV : Target Contraceptive Prevalence (U)

AGE/	BFEMRISK	BBIRTHS	BCONPREV (proportion)	POSTPART (months)	BREAST	ABORTWT	TFEMRISK (proportion)	TCONPREV
20-24	61	22	0.540	1.500	10.000	0.000	61	0.750
25-29	436	77	0.800	3.000	12.000	0.000	436	0.800
30-34	603	67	0.840	3.000	14.000	0.500	603	0.840
35-39	562	38	0.830	3.000	16.000	0.200	562	0.830
40-44	424	6	0.820	3.000	18.000	0.200	424	0.830
45-49	348	2	0.900	3.000	20.000	0.000	348	0.900

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17 Nov 89 Table: INPUT4 Data File: COMPZ Page 1

User-Supplied Method-specific Data Inputs

IMSUBSTN : Immediate Source-Method Substitution
BCONSHRE : Base Period Program Share: Cont. Accept.
ACCSHARE : Program Share of Acceptor Costs
COMMCOST : Unit Cost of Commodities by Method

METHOD/	IMSUBSTN (proportion)	BCONSHRE (proportion)	ACCSHARE (proportion)	COMMCOST (dollars)
Withdrawal	0.400	0.000	0.000	0.00
Periodic abst	0.400	0.000	0.200	0.00
Condom	1.000	1.000	1.000	0.00
Diaphragm	0.000	0.000	0.000	0.00
Spermicide	1.000	0.000	0.000	0.00
Pill	0.490	0.800	0.800	0.00
Injection	0.000	0.000	0.000	0.00
Implant	0.000	0.000	0.000	0.00
IUD	0.170	0.000	0.850	2.50
Female ster	0.000	0.000	0.080	75.00
Vasectomy	0.000	0.000	0.900	50.00

17 Nov 89 Table: INPUT5 Data File: COMPZ Page 1

User-Supplied Scalar Data Inputs

DISCRATE : Discount Rate (percentage)
YRSTOTGT : Years to Target
YRSTOEND : Length of Program (Number of Periods)
INTERP : Whether to Interpolate (1=yes, 2=no)
INTERPFM : Interpolate Femrisk data (1=yes, 2=no)
DIRECTPP : Input postpartum amenorrhea directly
YRSTOTFM : Years to Reach Target Values (TFEMRISK)
BENAVABT : Benefits per Averted Abortion
BENCOND1 : Benefits from Health Condition Averted
CONSCOST : Cost per Consultation

DISCRATE (percent/10^-2)	YRSTOTGT (# years)	YRSTOEND (# years)	INTERP	INTERPFM
10.0	3	5	1	1

DIRECTPP	YRSTOTFM	BENAVABT (dollars)	BENCOND1 (dollars)	CONSCOST (dollars)
1	1	0.000	0.000	3.00

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17 Nov 89 Table: INPUT6 Data File: COMPZ Page 1

User-supplied Data Input: Prevalence Decay after prog termin

DECAYDAT : Data on Time Path of Post-Program Decay
DECAYPER : Start Decay

AGE/METHOD	Withdrawal	Periodic abst	Condom	Diaphragm	Spermicide
20-24	0	0	0	0	0
25-29	0	0	0	0	0
30-34	0	0	0	0	0
35-39	0	0	0	0	0
40-44	0	0	0	0	0
45-49	0	0	0	0	0

AGE/METHOD	Pill	Injection	Implant	IUD	Female Ster	Vasectomy
20-24	0	0	0	0	0	0
25-29	0	0	0	0	0	0
30-34	0	0	0	0	0	0
35-39	0	0	0	0	0	0
40-44	0	0	0	0	0	0
45-49	0	0	0	0	0	0

17 Nov 89 Table: INPUT6 Data File: COMPZ Page 2

User-supplied Data Input: Prevalence Decay after prog termin

DECAYDAT : Data on Time Path of Post-Program Decay
DECAYPER : Return to Base

AGE/METHOD	Withdrawal	Periodic abst	Condom	Diaphragm	Spermicide
20-24	2	2	2	2	2
25-29	2	2	2	2	2
30-34	2	2	2	2	2
35-39	2	2	2	2	2
40-44	2	2	2	2	2
45-49	2	2	2	2	2

AGE/METHOD	Pill	Injection	Implant	IUD	Female Ster	Vasectomy
20-24	2	2	2	2	2	2
25-29	2	2	2	2	2	2
30-34	2	2	2	2	2	2
35-39	2	2	2	2	2	2
40-44	2	2	2	2	2	2
45-49	2	2	2	2	2	2

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17 Nov 89 Table: INPUT7 Data File: COMPZ Page 1

User-Supplied Periodic Data Inputs

HLTHCON1 : Health Condition Averted
FIXCOSTS : Fixed costs

PERIOD	HLTHCON1	FIXCOSTS (Dollars)
1	0.000	0.000
2	0.000	0.000
3	0.000	0.000
4	0.000	0.000
5	0.000	0.000
6	0.000	0.000

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Table 7. OUTPUT TABLES

17 Nov 89 Table: ACCEPTOR Data File: COMPZ Page 1

Target Acceptors and Continuing Users

USERS : Number of Current Users (C)
ACCPTRGT : Annual acceptor targets (TGa)
CONTUSER : Continuing Users from Previous Years (P)

PERIOD : 1

METHOD/	USERS	ACCPTRGT	CONTUSER
Withdrawal	27	3	30
Periodic abst	472	255	342
Condom	60	171	0
Diaphragm	0	0	0
Spermicide	19	54	0
Pill	291	171	178
Injection	0	0	0
Implant	0	0	0
IUD	606	378	353
Female ster	546	26	522
Vasectomy	4	4	0
Total	2025	1063	1425

Table: ACCEPTOR Data File: COMPZ

PERIOD : 2

METHOD/	USERS	ACCPTRGT	CONTUSER
Withdrawal	5	1	18
Periodic abst	374	139	321
Condom	57	66	34
Diaphragm	0	0	0
Spermicide	0	0	11
Pill	232	38	229
Injection	0	0	0
Implant	0	0	0
IUD	787	421	506
Female ster	570	71	504
Vasectomy	8	5	4
Total	2033	742	1627

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Table: ACCEPTOR Data File: COMPZ

PERIOD : 3

METHOD/	USERS	ACCPTRGT	CONTUSER
Withdrawal	5	3	3
Periodic abst	374	235	254
Condom	57	70	33
Diaphragm	0	0	0
Spermicide	0	0	0
Pill	232	75	182
Injection	0	0	0
Implant	0	0	0
IUD	787	194	658
Female ster	570	47	526
Vasectomy	8	1	7
Total	2033	625	1664

Table: ACCEPTOR Data File: COMPZ

PERIOD : 4

METHOD/	USERS	ACCPTRGT	CONTUSER
Withdrawal	27	46	3
Periodic abst	472	428	254
Condom	60	78	33
Diaphragm	0	0	0
Spermicide	18	53	0
Pill	290	164	182
Injection	0	0	0
Implant	0	0	0
IUD	606	0	658
Female ster	546	30	526
Vasectomy	4	0	7
Total	2025	799	1664

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Table: ACCEPTOR Data File: COMPZ

PERIOD : 5

METHOD/	USERS	ACCPTRGT	CONTUSER
Withdrawal	49	60	18
Periodic abst	570	491	321
Condom	63	82	34
Diaphragm	0	0	0
Spermicide	37	76	11
Pill	349	183	228
Injection	0	0	0
Implant	0	0	0
IUD	426	0	507
Female ster	522	30	504
Vasectomy	0	0	4
Total	2016	920	1627

Table: ACCEPTOR Data File: COMPZ

PERIOD : 6

METHOD/	USERS	ACCPTRGT	CONTUSER
Withdrawal	49	31	33
Periodic abst	570	358	388
Condom	63	77	36
Diaphragm	0	0	0
Spermicide	37	45	21
Pill	349	113	275
Injection	0	0	0
Implant	0	0	0
IUD	426	105	356
Female ster	522	44	482
Vasectomy	0	0	0
Total	2016	772	1590

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17 Nov 89 Table: AVERT Data File: COMPZ Page 1

Births and Abortions averted by the program

AVERTBIR : Births Averted
AVERTABT : Number of Abortions Averted

PERIOD/	AVERTBIR	AVERTABT
1	0	24.821
2	23	49.635
3	46	49.635
4	46	24.817
5	23	-0.000
6	-0	-0.000

17 Nov 89 Table: BENCOSTS Data File: COMPZ Page 1

Benefits and Costs Projected by Model

BENEFITS : Total Program Benefits
COSTS : Total Program Costs
CUMBNFIT : Cumulative Program Benefits
CUMCOSTS : Cumulative Program Costs
TBCRATIO : Truncated benefits to costs ratio

PERIOD/	BENEFITS (dollars)	COSTS (dollars)	CUMBNFIT (dollars)	CUMCOSTS (dollars)	TBCRATIO
1	0	7767	0	7767	0.000
2	12913	8187	12913	15954	0.772
3	26671	5917	39584	21871	1.681
4	27807	0	67391	21871	2.720
5	15876	0	83267	21871	3.260
6	4348	0	87615	21871	3.394

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17 Nov 89 Table: BENBREAK Data File: COMPZ Page 1

Breakdown of Family Planning Program Benefits

BENEWBRT : Benefits from New Births Averted
BENPVBRT : Benefits from Previous Births Averted
BENABAVT : Benefits from Abortions Averted
BENHCAVT : Benefits from Health Conditions Averted
BENEFITS : Total Program Benefits

PERIOD : 1

BENEWBRT (dollars)	BENPVBRT (dollars)	BENABAVT (dollars)	BENHCAVT (dollars)	BENEFITS (dollars)
0.000	0.000	0.000	0.000	0

PERIOD : 2

BENEWBRT (dollars)	BENPVBRT (dollars)	BENABAVT (dollars)	BENHCAVT (dollars)	BENEFITS (dollars)
12913.025	0.000	0.000	0.000	12913

PERIOD : 3

BENEWBRT (dollars)	BENPVBRT (dollars)	BENABAVT (dollars)	BENHCAVT (dollars)	BENEFITS (dollars)
26339.787	331.260	0.000	0.000	26671

PERIOD : 4

BENEWBRT (dollars)	BENPVBRT (dollars)	BENABAVT (dollars)	BENHCAVT (dollars)	BENEFITS (dollars)
26339.787	1467.045	0.000	0.000	27807

PERIOD : 5

BENEWBRT (dollars)	BENPVBRT (dollars)	BENABAVT (dollars)	BENHCAVT (dollars)	BENEFITS (dollars)
12795.202	3081.217	0.000	0.000	15876

PERIOD : 6

BENEWBRT (dollars)	BENPVBRT (dollars)	BENABAVT (dollars)	BENHCAVT (dollars)	BENEFITS (dollars)
-0.000	4347.927	0.000	0.000	4348

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17 Nov 89 Table: FUTFERT Data File: COMPZ Page 1

Expected Number of Births and Abortions

FEMRISK : Women at Risk
EXPBIRTH : Births Expected without FP Program
BIRTHS : Number of Births (B)
AVERTBIR : Births Averted
EXPABORT : Abortions Expected without FP Program
ABORT : Number of Abortions
AVERTABT : Number of Abortions Averted

PERIOD : 1

AGE/	FEMRISK	EXPBIRTH	BIRTHS	AVERTBIR	EXPABORT	ABORT	AVERTABT
20-24	61.000	22.000	22	0	-1.900	-2	0.000
25-29	436.000	77.000	77	0	35.753	36	0.000
30-34	603.000	67.000	67	0	126.656	109	18.042
35-39	562.000	38.000	38	0	84.972	80	5.018
40-44	424.000	6.000	6	0	52.363	51	1.761
45-49	348.000	2.000	2	0	16.632	17	0.000

17 Nov 89 Table: FUTFERT Data File: COMPZ

PERIOD : 2

AGE/	FEMRISK	EXPBIRTH	BIRTHS	AVERTBIR	EXPABORT	ABORT	AVERTABT
20-24	61.000	22.000	18	4	-1.900	-2	0.000
25-29	436.000	77.000	69	8	35.753	36	0.000
30-34	603.000	67.000	61	6	126.656	91	36.084
35-39	562.000	38.000	34	4	84.972	75	10.036
40-44	424.000	6.000	6	0	52.363	49	3.515
45-49	348.000	2.000	2	0	16.632	17	0.000

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17 Nov 89 Table: FUTFERT Data File: COMPZ

PERIOD : 3

AGE/	FEMRISK	EXPBIRTH	BIRTHS	AVERTBIR	EXPABORT	ABORT	AVERTABT
20-24	61.000	22.000	14	8	-1.900	-2	0.000
25-29	436.000	77.000	62	15	35.753	36	0.000
30-34	603.000	67.000	54	13	126.656	91	36.084
35-39	562.000	38.000	29	9	84.972	75	10.036
40-44	424.000	6.000	5	1	52.363	49	3.515
45-49	348.000	2.000	2	0	16.632	17	0.000

17 Nov 89 Table: FUTFERT Data File: COMPZ

PERIOD : 4

AGE/	FEMRISK	EXPBIRTH	BIRTHS	AVERTBIR	EXPABORT	ABORT	AVERTABT
20-24	61.000	22.000	14	8	-1.900	-2	0.000
25-29	436.000	77.000	62	15	35.753	36	0.000
30-34	603.000	67.000	54	13	126.656	109	18.042
35-39	562.000	38.000	29	9	84.972	80	5.018
40-44	424.000	6.000	5	1	52.363	51	1.758
45-49	348.000	2.000	2	0	16.632	17	0.000

17 Nov 89 Table: FUTFERT Data File: COMPZ

PERIOD : 5

AGE/	FEMRISK	EXPBIRTH	BIRTHS	AVERTBIR	EXPABORT	ABORT	AVERTABT
20-24	61.000	22.000	18	4	-1.900	-2	0.000
25-29	436.000	77.000	69	8	35.753	36	0.000
30-34	603.000	67.000	61	6	126.656	127	-0.000
35-39	562.000	38.000	34	4	84.972	85	0.000
40-44	424.000	6.000	6	0	52.363	52	0.000
45-49	348.000	2.000	2	0	16.632	17	0.000

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17 Nov 89 Table: FUTFERT Data File: COMPZ

PERIOD : 6

AGE/	FEMRISK	EXPBIRTH	BIRTHS	AVERTBIR	EXPABORT	ABORT	AVERTABT
20-24	61.000	22.000	22	0	-1.900	-2	0.000
25-29	436.000	77.000	77	0	35.753	36	0.000
30-34	603.000	67.000	67	-0	126.656	127	-0.000
35-39	562.000	38.000	38	0	84.972	85	0.000
40-44	424.000	6.000	6	0	52.363	52	0.000
45-49	348.000	2.000	2	0	16.632	17	0.000

17 Nov 89 Table: FUTRATE Data File: COMPZ Page 1

Expected Contraception, Fertility, and Abortion rates

CONPREV : Contraceptive Prevalence (U)
AVEFFECT : Average Contraceptive Effectiveness (e)
MASFR : Marital Age-specific Fertility Rates
MASAR : Marital Age-specific Abortion Rates

PERIOD : 1

AGE/	CONPREV	AVEFFECT	MASFR	MASAR
20-24	0.645	0.865	0.361	-0.031
25-29	0.800	0.848	0.177	0.082
30-34	0.840	0.839	0.111	0.180
35-39	0.830	0.844	0.068	0.142
40-44	0.825	0.871	0.014	0.119
45-49	0.900	0.765	0.006	0.048

PERIOD : 2

AGE/	CONPREV	AVEFFECT	MASFR	MASAR
20-24	0.750	0.870	0.296	-0.031
25-29	0.800	0.886	0.159	0.082
30-34	0.840	0.886	0.101	0.150
35-39	0.830	0.877	0.060	0.133
40-44	0.830	0.881	0.013	0.115
45-49	0.900	0.789	0.005	0.048

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17 Nov 89 Table: FUTRATE Data File: COMPZ Page 1

Expected Contraception, Fertility, and Abortion rates

CONPREV : Contraceptive Prevalence (U)
AVEFFECT : Average Contraceptive Effectiveness (e)
MASFR : Marital Age-specific Fertility Rates
MASAR : Marital Age-specific Abortion Rates

PERIOD : 3

AGE/	CONPREV	AVEFFECT	MASFR	MASAR
20-24	0.750	0.870	0.230	-0.031
25-29	0.800	0.886	0.142	0.082
30-34	0.840	0.886	0.089	0.150
35-39	0.830	0.877	0.052	0.133
40-44	0.830	0.881	0.013	0.115
45-49	0.900	0.739	0.004	0.048

PERIOD : 4

AGE/	CONPREV	AVEFFECT	MASFR	MASAR
20-24	0.648	0.862	0.230	-0.031
25-29	0.800	0.847	0.142	0.082
30-34	0.840	0.838	0.089	0.180
35-39	0.830	0.844	0.052	0.142
40-44	0.825	0.872	0.013	0.119
45-49	0.900	0.765	0.004	0.048

PERIOD : 5

AGE/	CONPREV	AVEFFECT	MASFR	MASAR
20-24	0.541	0.859	0.295	-0.031
25-29	0.801	0.808	0.159	0.082
30-34	0.840	0.791	0.101	0.210
35-39	0.830	0.810	0.060	0.151
40-44	0.820	0.862	0.014	0.123
45-49	0.900	0.740	0.005	0.048

PERIOD : 6

AGE/	CONPREV	AVEFFECT	MASFR	MASAR
20-24	0.541	0.859	0.361	-0.031
25-29	0.801	0.808	0.177	0.082
30-34	0.840	0.791	0.111	0.210
35-39	0.830	0.810	0.068	0.151
40-44	0.820	0.862	0.014	0.123
45-49	0.900	0.740	0.006	0.048

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17 Nov 89 Table: IMPACT Data File: COMPZ Page 1

Family Planning Program Impact on Births, Abortions & Health

TOTAVBIR : Total Annual Births Averted
TOTAVABT : Total Annual Abortions Averted
HLTHCON1 : Health Condition Averted

PERIOD	TOTAVBIR	TOTAVABT	HLTHCON1
1	0.000	24.821	0.000
2	22.720	49.635	0.000
3	46.344	49.635	0.000
4	46.344	24.817	0.000
5	22.513	-0.000	0.000
6	-0.000	-0.000	0.000

17 Nov 89 Table: METHMIX Data File: COMPZ Page 1

Contraceptive Method Mix

METHMIX : Contraceptive Method Mix

PERIOD : 1

METHOD / AGE	20-24	25-29	30-34	35-39	40-44	45-49
Withdrawal	0.000	0.004	0.013	0.008	0.000	0.050
Periodic Abst	0.104	0.179	0.206	0.238	0.189	0.396
Condom	0.066	0.041	0.042	0.022	0.033	0.000
Diaphragm	0.000	0.000	0.000	0.000	0.000	0.000
Spermicide	0.076	0.009	0.018	0.008	0.000	0.000
Pill	0.128	0.253	0.155	0.114	0.189	0.000
Injection	0.000	0.000	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000	0.000	0.000
IUD	0.629	0.421	0.383	0.261	0.111	0.254
Female ster	0.000	0.093	0.175	0.350	0.479	0.301
Vasectomy	0.000	0.000	0.008	0.000	0.000	0.000
Total	1.004	1.000	1.000	1.000	1.000	1.000

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17 Nov 89 Table: METHMIX Data File: COMPZ

PERIOD : 2

METHOD / AGE	20-24	25-29	30-34	35-39	40-44	45-49
Withdrawal	0.000	0.000	0.010	0.000	0.000	0.000
Periodic Abst	0.148	0.104	0.118	0.191	0.170	0.391
Condom	0.071	0.036	0.048	0.012	0.032	0.000
Diaphragm	0.000	0.000	0.000	0.000	0.000	0.000
Spermicide	0.000	0.000	0.000	0.000	0.000	0.000
Pill	0.044	0.247	0.122	0.047	0.170	0.000
Injection	0.000	0.000	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000	0.000	0.000
IUD	0.744	0.520	0.480	0.383	0.153	0.307
Female ster	0.000	0.093	0.207	0.367	0.475	0.302
Vasectomy	0.000	0.000	0.016	0.000	0.000	0.000
Total	1.007	1.000	1.001	1.000	1.000	1.000

17 Nov 89 Table: METHMIX Data File: COMPZ

PERIOD : 3

METHOD / AGE	20-24	25-29	30-34	35-39	40-44	45-49
Withdrawal	0.000	0.000	0.010	0.000	0.000	0.000
Periodic Abst	0.148	0.104	0.118	0.191	0.170	0.391
Condom	0.071	0.036	0.048	0.012	0.032	0.000
Diaphragm	0.000	0.000	0.000	0.000	0.000	0.000
Spermicide	0.000	0.000	0.000	0.000	0.000	0.000
Pill	0.044	0.247	0.122	0.047	0.170	0.000
Injection	0.000	0.000	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000	0.000	0.000
IUD	0.744	0.520	0.480	0.383	0.153	0.307
Female ster	0.000	0.093	0.207	0.367	0.475	0.302
Vasectomy	0.000	0.000	0.016	0.000	0.000	0.000
Total	1.007	1.000	1.001	1.000	1.000	1.000

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17 Nov 89 Table: METHMIX Data File: COMPZ

PERIOD : 4

METHOD / AGE	20-24	25-29	30-34	35-39	40-44	45-49
Withdrawal	0.000	0.004	0.012	0.008	0.000	0.050
Periodic Abst	0.111	0.179	0.206	0.238	0.188	0.396
Condom	0.067	0.041	0.041	0.022	0.033	0.000
Diaphragm	0.000	0.000	0.000	0.000	0.000	0.000
Spermicide	0.063	0.009	0.017	0.008	0.000	0.000
Pill	0.114	0.252	0.155	0.114	0.188	0.000
Injection	0.000	0.000	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000	0.000	0.000
IUD	0.645	0.421	0.383	0.261	0.111	0.254
Female ster	0.000	0.093	0.175	0.350	0.479	0.301
Vasectomy	0.000	0.000	0.000	0.000	0.000	0.000
Total	1.000	1.000	1.000	1.000	1.000	1.000

17 Nov 89 Table: METHMIX Data File: COMPZ

PERIOD : 5

METHOD / AGE	20-24	25-29	30-34	35-39	40-44	45-49
Withdrawal	0.000	0.008	0.015	0.016	0.000	0.100
Periodic abst	0.061	0.254	0.295	0.285	0.207	0.400
Condom	0.061	0.046	0.035	0.032	0.034	0.000
Diaphragm	0.000	0.000	0.000	0.000	0.000	0.000
Spermicide	0.152	0.019	0.035	0.016	0.000	0.000
Pill	0.212	0.258	0.189	0.181	0.207	0.000
Injection	0.000	0.000	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000	0.000	0.000
IUD	0.514	0.322	0.287	0.138	0.069	0.200
Female ster	0.000	0.094	0.144	0.332	0.483	0.300
Vasectomy	0,000	0.000	0.000	0.000	0.000	0.000
Total	1.000	1.000	1.000	1.000	1.000	1.000

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17 Nov 89 Table: METHMIX Data File: COMPZ

PERIOD : 6

METHOD / AGE	20-24	25-29	30-34	35-39	40-44	45-49
Withdrawal	0.000	0.008	0.015	0.016	0.000	0.100
Periodic abst	0.061	0.254	0.295	0.285	0.207	0.400
Condom	0.061	0.046	0.035	0.032	0.034	0.000
Diaphragm	0.000	0.000	0.000	0.000	0.000	0.000
Spermicide	0.152	0.019	0.035	0.016	0.000	0.000
Pill	0.212	0.258	0.189	0.181	0.207	0.000
Injection	0.000	0.000	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000	0.000	0.000
IUD	0.514	0.322	0.287	0.138	0.069	0.200
Female ster	0.000	0.094	0.144	0.332	0.483	0.300
Vasectomy	0.000	0.000	0.000	0.000	0.000	0.000
Total	1.000	1.000	1.000	1.000	1.000	1.000

17 Nov 89 Table: PROGINPT Data File: COMPZ Page 1

Family Planning Program Requirements

METHACPT : New Program Acceptors by Method
METHUSER : Program Continuing Method by User
COMMOD : Number of Commodities by Method
METHCONS : Program Consultations by Method

PERIOD : 1

METHOD/	METHACPT	METHUSER	COMMOD	METHCONS
Withdrawal	0.000	0.000	0.000	0.000
Periodic abst	50.934	17.107	0.000	97.938
Condom	171.404	0.000	9940.375	231.128
Diaphragm	0.000	0.000	0.000	0.000
Spermicide	0.000	0.000	0.000	0.000
Pill	136.741	142.435	3165.413	602.318
Injection	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000
IUD	320.949	75.074	320.949	1253.131
Female ster	2.117	10.450	2.117	6.352
Vasectomy	3.951	0.000	3.951	11.852

BEST AVAILABLE COPY

17 Nov 89 Table: PROGINPT Data File: COMPZ

PERIOD : 2

METHOD/	METHACPT	METHUSER	COMMOD	METHCONS
Withdrawal	0.000	0.000	0.000	0.000
Periodic abst	27.800	32.083	0.000	64.828
Condom	66.372	34.115	8761.690	157.728
Diaphragm	0.000	0.000	0.000	0.000
Spermicide	0.000	0.000	0.000	0.000
Pill	30.064	183.118	2669.383	436.032
Injection	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000
IUD	357.895	214.982	357.895	1528.650
Female ster	5.709	20.174	5.709	17.126
Vasectomy	4.254	1.683	4.254	12.763

PERIOD : 3

METHOD/	METHACPT	METHUSER	COMMOD	METHCONS
Withdrawal	0.000	0.000	0.000	0.000
Periodic abst	47.008	38.155	0.000	101.572
Condom	70.116	32.546	8752.907	159.639
Diaphragm	0.000	0.000	0.000	0.000
Spermicide	0.000	0.000	0.000	0.000
Pill	59.859	145.817	2470.724	430.598
Injection	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000
IUD	164.951	419.169	164.951	1024.629
Female ster	3.799	31.583	3.799	11.398
Vasectomy	0.607	5.050	0.607	1.822

PERIOD : 4

METHOD/	METHACPT	METHUSER	COMMOD	METHCONS
Withdrawal	0.000	0.000	0.000	0.000
Periodic abst	0.000	0.000	0.000	0.000
Condom	0.000	0.000	0.000	0.000
Diaphragm	0.000	0.000	0.000	0.000
Spermicide	0.000	0.000	0.000	0.000
Pill	0.000	0.000	0.000	0.000
Injection	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000
IUD	0.000	0.000	0.000	0.000
Female ster	0.000	0.000	0.000	0.000
Vasectomy	0.000	0.000	0.000	0.000

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17 Nov 89 Table: PROGINPT Data File: COMPZ

PERIOD : 5

METHOD/	METHACPT	METHUSER	COMMOD	METHCONS
Withdrawal	0.000	0.000	0.000	0.000
Periodic abst	0.000	0.000	0.000	0.000
Condom	0.000	0.000	0.000	0.000
Diaphragm	0.000	0.000	0.000	0.000
Spermicide	0.000	0.000	0.000	0.000
Pill	0.000	0.000	0.000	0.000
Injection	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000
IUD	0.000	0.000	0.000	0.000
Female ster	0.000	0.000	0.000	0.000
Vasectomy	0.000	0.000	0.000	0.000

PERIOD : 6

METHOD/	METHACPT	METHUSER	COMMOD	METHCONS
Withdrawal	0.000	0.000	0.000	0.000
Periodic abst	0.000	0.000	0.000	0.000
Condom	0.000	0.000	0.000	0.000
Diaphragm	0.000	0.000	0.000	0.000
Spermicide	0.000	0.000	0.000	0.000
Pill	0.000	0.000	0.000	0.000
Injection	0.000	0.000	0.000	0.000
Implant	0.000	0.000	0.000	0.000
IUD	0.000	0.000	0.000	0.000
Female ster	0.000	0.000	0.000	0.000
Vasectomy	0.000	0.000	0.000	0.000

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17 Nov 89 Table: SUMMARY Data File: COMPZ Page 1

Summary Benefit-Cost Measures

YRSTOEND : Length of Program (Number of Periods)
TOTBEN : Total Program Benefits (life of program)
TOTCOST : Total Program Costs (life of program)
DISCRATE : Discount Rate (percentage)
DISCOSTS : Discounted Program Costs
DISBNFIT : Discounted Benefits
BCRATIO : Benefit-Cost Ratio
IRR : Internal Rate of Return

YRSTOEND (# years)	TOTBEN (dollars)	TOTCOST (dollars)	DISCRATE (percent/10^-2)
3	188130.72561	21870.533	10.0

DISCOSTS (dollars)	DISBNFIT (dollars)	BCRATIO	IRR (percent/10^-2)
18272.181	62015.014	4.907	145.634

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