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2. JH Bratt
DB Fried
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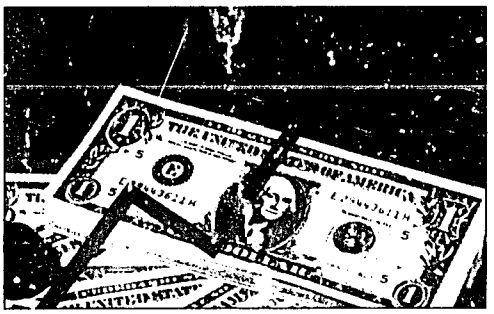

Investing in the Future

A Report on the Cost of Family Planning in the Year 2000

Barbara S. Janowitz
John H. Bratt
Daniel B. Fried

FPI

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Investing in the Future

A Report on the Cost of Family Planning in the Year 2000

FAMILY HEALTH INTERNATIONAL
Research Triangle Park, N.C.
U.S.A.

April 1990

A. Contributors To This Project:

FHI staff

Dr. Barbara S. Janowitz, Evaluation Specialist, Executive Office
Mr. John H. Bratt, Research Analyst, Executive Office
Mr. Daniel B. Fried, Research Assistant, Executive Office

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SUMMARY OF FINDINGS

We estimate that the cost in real terms of providing family planning services in public and private voluntary organization (PVO) programs, and the cost of related population services in developing countries (excluding the people's Republic of China) will be approximately US$2.6 billion in the year 2000. The share of these costs borne by developing country governments and foreign donors will be somewhat lower, the exact amount dependent on fees paid by consumers and income generated locally through user fees and donations. This figure is considerably lower than previous projections, but still represents a nearly 60% increase over current estimated levels of spending on family planning. Our projections indicate that the largest percentage increases in cost will be in Sub-Saharan Africa and the Near East, regions where contraceptive use will likely increase the most. The largest absolute increase in costs will be in Asia, the region with the largest number of people and the largest predicted increase in population.

Overview of Report

We have estimated the costs of public and PVO programs that provide family planning services and the costs of related population services needed to reach the medium level population projection of the United Nations in the year 2000 in Asia (excluding China), Latin America, Sub-Saharan Africa and the Near East. Our approach is to estimate current costs of providing family planning services in a number of countries and to use these estimates as a basis for projecting future costs.

Bongaarts' TARGET computer model is used to calculate the number of couples who must use contraception to reach a target fertility rate. The TARGET model requires information on baseline contraceptive prevalence as well as the method and source mix for the baseline and for the final year of the projection. A series of regression equations provides prevalence, method and source mix estimates for countries with no baseline data, and also allows us to predict changes in these parameters. In general, trends show an increase in use of modern methods and an increased share of methods provided by the commercial sector.

We obtain data on the in-country costs to developing countries and donors of providing different methods in different delivery settings, excluding contraceptive services provided in the commercial sector. For each method, we estimate the cost per acceptor visit and per continuing user visit, or the cost per couple year of protection (CYP). We multiply these estimates by the output from the TARGET model (number of acceptors and continuing users by method) to calculate a total local cost figure for each method-delivery system combination.

If the United Nations medium variant population projections are realized, the population of developing countries will increase from 2.95 billion in 1988 to 3.8 billion in the year 2000, or an increase of 29%. The number of married women of reproductive age (MWRA) will increase from 490 million to 654 million, with the largest absolute increase in Asia, and the largest relative increase in Sub-Saharan Africa.

The total fertility rate (TFR) in developing countries must decline from 4.8 to 3.9, or about one child per woman, in order to reach the medium variant population projections. In order to achieve this reduction in the TFR, the number of MWRA using contraception must increase from 190 million in 1988 to 320 million in the year 2000, or by about 68%.

The total estimated local costs of providing family planning in 1988 for all developing countries was $1.2 billion. This total increases to $1.9 billion (or almost 60%) in 2000 assuming the 1985 method-source-distribution mix remains constant throughout the period.

Foreign donor funds are used directly to support family planning services in developing countries, and also indirectly to promote programs through biomedical and demographic research, program evaluation, training, and information, education and communication (IE&C) assistance. We estimate that in 1988, of the US$661 million in foreign funds (again excluding China) spent on population activities, US$211 million were used directly to support service delivery and the remaining US$450 million were used for research, evaluation, training and IE&C.

Thus, the total costs of providing family planning in 1988 was slightly more than US$1.6 billion, including direct support of service provision (US$1.2 billion either funded locally or through donor funds) and US$450 million for indirect support of family planning. We estimate that the total cost in the year 2000 will be approximately US$2.6 billion, depending on assumptions about future method and source mixes and excluding China and the commercial sector. About US$1.9 billion would be used for direct service provision and US$713 million for indirect support of activities.

Our multiple scenario approach allows us to examine the cost implications of changes in method and sectoral source mix. For example, if the source mix for Asia changes as predicted by the regression equation such that a higher percentage of services are provided in the commercial sector, then costs of public and PVO programs would be 5.5% lower than if such a change did not occur. An especially interesting scenario is one in which Asia adopts the 1985 source mix of Latin America. In this case, costs of public and PVO programs in the year 2000 would be lower than in 1988. The increase in the commercial sector share of services would be large enough to reduce the costs of public and PVO programs in the year 2000 so that they would be below those of 1988 even given the rapid expansion of the contracepting cohort and the increase in the contraceptive prevalence rate. As a consequence of this change, the share of family planning costs borne by local governments and by donor organizations would decline substantially.

Costs in Sub-Saharan Africa increase most under a scenario in which users in Sub-Saharan Africa move from their current high reliance on traditional methods to adopting the 1985 method mix of Latin America; this reflects the importance of modern, more costly methods in Latin America. Costs under this scenario would increase by 73% over one in which the method mix did not change. This scenario assumes that the number of sterilization acceptors increases dramatically. Although these acceptors provide a stream of CYPs extending into the future, these CYPs all are purchased at time of acceptance, resulting in high initial costs.

Our cost analysis poses the following policy questions that national and international decisionmakers must address:

(1) Which mix of methods should be promoted?
(2) What proportion of services should be delivered by public and PVO programs?
(3) Who should bear the costs of family planning? and
(4) Which delivery systems should be emphasized?

The following approaches will be needed to maintain and expand the resources available for family planning:

(1) Increasing donations from industrialized nations to developing countries.
(2) Increasing the proportion of development aid currently invested in family planning, and
(3) Reallocating national resources to give greater emphasis to family planning.

Other approaches to reducing costs to governments and foreign donors include increasing the proportion of costs borne by the consumer of contraceptives and increasing the efficiency with which resources are used. While the primary concern of family planning programs has been to increase the number of couples using contraception, the reality of limited resources will focus more attention on efficient use of funds.

By increasing the funding allocated to family planning, and by making program decisions that will ensure the best use of these resources, it may still not be too late for the world to reach the lower population projection of the United Nations. Reaching this more ambitious goal would result in a total world population of 7.6 billion in the year 2025, instead of the medium projection of 8.5 billion.

INTRODUCTION

Although contraceptive prevalence remains low in parts of the developing world, especially Sub-Saharan Africa, recent surveys show important increases in levels of use, and many expect that contraceptive use will continue to rise. (1) While these trends are highly desirable, concern is growing that future levels of funding will be insufficient to satisfy the expanding demand for family planning services. Donor contributions (in constant dollars, including World Bank loans) for family planning increased rapidly up to 1970, and then increased at a slower pace until 1986; since then, donor contributions have declined. (2) If contraceptive use is to continue to increase, then additional funds in the form of donor contributions, local government support or private sector fee-for-services payments will be necessary.

The purpose of this paper is to estimate the costs of family planning services provided by public sector and by Private Voluntary Organization (PVO) programs needed to reach the medium level population variant of the United Nations in the year 2000 in Asia, Latin America, Sub-Saharan Africa and the Near East. We exclude contraceptive services provided in the commercial or private for-profit sector. Our approach is to calculate national current costs of providing family planning services in a number of countries in public and PVO programs and to use these estimates to project future costs both in the countries where data were collected and in countries with no cost information. We attempt to go beyond previous work by obtaining data on the in-country costs of providing different methods in different delivery settings.

Although foreign donor funding can be estimated on a program basis for some distribution systems, such as social marketing, for others these donor funds will be difficult to assign to the recipient program. Donor funding data are therefore aggregated on a global basis.

The approach used by others including Gillespie, Bulatao, and Speidel (3,4,5) is to use information on government expenditures and donor contributions as a measure of funding available for family planning and to relate this total to contraceptive use to get current estimates of per capita funding of family planning. If information is not available for some countries, then it is imputed using other available data. Projections of future resource requirements are then made using contraceptive use or fertility targets.

This approach has proven useful but is open to refinement. First, our analysis examines costs by method and by delivery system. To date, costs have not been separated by method and delivery system, and it has been impossible to examine the implications of selecting different combinations of methods and delivery systems. Gillespie has considered variations in commodity costs, but these are only a small part of total costs; since Gillespie assumes other costs are constant across methods, total costs vary directly with commodity costs.

Second, some methods may yield contraceptive protection long past the period in which services are provided. For example, the cost of sterilization is incurred when the operation is performed; additional costs (i.e., complications) are unlikely. Contraceptive protection lasts well beyond the time in which the person sterilized will require program services.

Third, expenditures in a given year should not necessarily be fully counted as costs for that year. Some current expenditures to finance services (equipment and vehicles for example), should be pro-rated over a longer time period. When correctly pro-rated, this year's expenditure for certain family planning methods affects the true cost in future years, and the true cost in this year is affected by expenditures made in past years.

Fourth, previous estimates have calculated costs per contraceptive user, including those who obtain services in the commercial sector. Donor funds, however, go only to public and PVO programs. Even if costs are constant across methods and delivery systems, costs per contraceptive user borne by local governments and foreign donors may vary with the mix of public/PVO/commercial sector provision of services. For example, in Latin America where the commercial sector is an important provider of contraception, local and donor costs per contraceptor may be lower than elsewhere, even if costs per user in the public/PVO sectors are not.

Finally, although information on donor funding for family planning is available for a large number of countries (2,6), information on national government funding for family planning is scarce. As Speidel notes, estimates of government expenditures on family planning often include expenditures on health, since family planning is often provided through integrated maternal-child health/family planning programs and expenditures on the two components are difficult to separate.

We begin by describing the methodology employed to calculate the number of present and future acceptors and users of different contraceptive methods, and the costs associated with each method-delivery system combination. We then present the results of our analysis, along with an explanation of its limitations. Finally, we discuss the implications of our findings for resource needs in the 1990s.

DATA AND METHODS

The first step in estimating the costs of providing family planning in the year 2000 is to specify a target fertility rate. We chose the rate which underlies the medium variant population projection of the United Nations. We then used Bongaarts' TARGET model (7) to calculate the number of couples that must use contraception to reach this fertility rate. The TARGET Model generates as output the number of new acceptors and continuing users required, by method, source and delivery system, to reach the target fertility rate.

The TARGET Model is based on Bongaarts' "proximate determinants of fertility", the most important of which are contraceptive prevalence and effectiveness, postpartum infecundability, induced abortion and marital patterns. We assume that the latter three determinants remain constant, an assumption that can be justified because the projection period is short. This simplification does not introduce significant distortion into the analysis. (8)

A. TARGET Model Inputs

1. Contraceptive Prevalence

The TARGET model requires information on baseline contraceptive use. Recent survey data (1980s) are available for 46 countries, which account for 71.5 percent of eligible contraceptors. Contraceptive prevalence in the remaining countries must be estimated. We used a methodology similar to that described in Bulatao (4), in which the impact of socioeconomic development and program effort on contraceptive use is assessed using regression analysis. For countries with no recent data on contraceptive prevalence, the regression equation uses independent variables, including life expectancy, per capita income, female literacy, and proportion urban to produce an estimate of baseline contraceptive prevalence. Program effort means "the sum of the policies adopted and implemented; the activities carried out to provide family planning knowledge, supplies, and services; the availability and accessibility of fertility regulation methods; and the monitoring and evaluation of all of these." (9). The measurement of program effort is based on a 30-item scale developed by Lapham and Mauldin, including 8 items for policy and stage-setting activities, 13 for service and service-related activities, three for record-keeping and evaluation and six for the availability and accessibility of fertility regulation supplies and services. Regional averages of contraceptive prevalence are used for countries that lack even basic socioeconomic data.

2. Method Mix

The current method mix must be estimated for countries with no recent survey data and a projected method mix for the year 2000 must be estimated for all countries. We used a methodology derived from Gillespie's work, and similar to that described previously for contraceptive prevalence to estimate the baseline method mix for countries that lack method mix data. (Because we did not collect cost data on provision of vaginal methods, we set vaginal method use equal to zero, and prorated users of vaginal methods across other methods.) Variables to assess the impact of regional differences in contraceptive choice were also included in these regression equations. We use regional method mix averages for countries with no available socioeconomic data.

The mix of contraceptives is likely to change in the future; specifically, a larger proportion of couples will probably use modern methods in the year 2000, and use of new methods like long-acting steroids may increase. We make cost projections under three scenarios: no change in method mix, a change to be predicted by the independent variables in our regression model, and a change in which Sub-Saharan Africa and the Near East would adopt by the year 2000 the 1985 method mix of Latin American countries. While the latter scenario is less likely to occur, its importance lies in showing how a rapid increase in use of modern methods, particularly sterilization, can affect costs. We will make a projection incorporating the cost impact of long-acting steroids at a later date.

Contraceptive prevalence and method mix data for the 1980's are available from the Demographic and Health Surveys (DHS) Project, and also from other comparable surveys. (See Appendix Table 1) Socioeconomic indicators and projections are available from United Nations sources. Finally, program effort scores for 1972 and 1982 are available from Lapham and Mauldin; estimates must be made for other years. Gillespie assumed that the linear increase estimated over the period 1972 to 1982 would continue through the year 2000 and beyond. However, this technique yields program effort scores for countries in the next century which are well above current program effort scores in any country; indeed, in some cases these projected scores would far exceed the 120 point scale maximum. We attempted to fit a logistic curve to these data, a curve which combines rapid increases for countries with low scores with smaller changes in scores for those countries that have already achieved high scores. However, these initial efforts proved unsatisfactory, since the variance explained was lower than if a linear relationship was assumed. We will attempt to fit other curves to these data in the future. Program effort scores are therefore extrapolated assuming that the linear increases observed during the period 1972-82 continue through the year 2000. However, a maximum score of 100 was imposed, because the highest score ever recorded was 101 points for China in 1982.

3. PVO/Public Sector Provision

Since we confine our cost projections to the public/PVO sector, we are interested only in that share of services currently provided or predicted to be provided by PVOs or by the public sector. Few countries have such data available, and estimates must be made for other countries. In some countries with recent surveys (mainly in Sub-Saharan African), contraceptive use is so low that there are not enough users to classify by method and by sectoral source. Using the remaining countries to estimate the determinants of funding for services (public or PVO vs. commercial) would likely give results that could not be generalized to the entire developing world. Nonetheless, some estimate of sectoral funding source must be made to predict the share of services that the public/PVO sector will need to provide for these countries to meet fertility targets.

For countries with information on the public-PVO/commercial sector breakdown, we used linear regression analysis to identify factors explaining the percentage of users of each method obtaining contraceptive services from the public/PVO sector. Estimates and projections were made using the same methodology as described for contraceptive prevalence and method mix. The presence of social marketing programs can overstate the role of the commercial sector since all contraceptives purchased at pharmacies tend to be classified as coming from the commercial sector, even though public/PVO organizations finance social marketing programs. In the case of female sterilization, the sectoral source may be obscured where public or PVO programs finance sterilizations performed in

private hospitals through contracts with social security systems, Ministries of Health, or with PVOs.*

Because of insufficient data, we assume that the share of injectables provided in the public/PVO sector is the same as that of IUDs.

We make cost projections using three scenarios: no change in source mix, a change to be predicted by the regression equations, and a change in which Asia would adopt by the year 2000, the source mix of Latin America in 1985. These scenarios include both likely changes in source mix and a more unlikely change that would have important cost implications for public/PVO programs.

4. Service Outlet

Within the share of services provided by PVOs and by the public sector, a determination of the proportion of services delivered through each service outlet must be made. Oral contraceptives, for example, can be provided by clinics or by Community-Based Distribution (CBD) programs; sterilization can be provided using different procedures, at clinics or hospitals, and on an in-patient or on an out-patient basis. In addition, the mix of services may vary by geographic area. Survey data often do not identify the ways that contraceptive methods are distributed. Sometimes the funding source of services is ascribed, but not the distribution system; in other instances, the distribution system such as clinic or CBD distributor is recorded. Because distribution systems vary greatly, we use method and distribution-specific estimates for each regional area. For Sub-Saharan Africa and the Near East, we estimated that 15% of users of oral contraceptives (OCs) received services from a home distributor, 25% from a CBD distributor, 58% from a health center or clinic and 2% from a social marketing program. We have projected percentages for 2000 assuming a moderate increase in social marketing: home distributor (15%), CBD (25%), health center/clinic (50%), social marketing (10%). Distributions for Latin America and Asia for 1985 and 2000 are assumed to be as follows: home distributor (15,15%), CBD (15,15%), health center/clinic (60,50%) and social marketing (10,20%).

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*Brazil and the Dominican Republic have public sector or PVO programs that pay for some sterilizations that are done at private hospitals. Because it is not possible to determine the share of sterilizations in the private sector that should be attributed to public/PVO supported programs, these countries are omitted from the regression equation. Omitting them increases the R^2 from .45 to .57. The equation for OCs in the public/PVO sector includes OCs sold through the social marketing programs in Honduras and the Dominican Republic; however, adjustments for other countries with social marketing programs have not been made.

5. Discontinuation Rates/Consumption of Commodities

Costs will be influenced by the method discontinuation rate and, in the case of re-supply methods, by the number of contraceptive units required for one CYP. We assumed the following annual discontinuation rates:

Oral Contraceptives	.35
IUDs	.15
Injectables	.50
Condoms	.50

Higher method discontinuation rates will sometimes lead to higher costs of achieving fertility reduction; in a later section we discuss the cost implications of higher discontinuation rates.

We have assumed that the following units of contraceptive commodities each equal one CYP:

Oral Contraceptives	13 cycles
Injectables (3 month)	4 injections
Condoms	100 pieces

These assumptions obviously do not allow for commodity wastage.

B. Calculation of Costs

1. Overview

The total cost of providing contraceptive services includes local direct service delivery costs, in-country administrative support of programs, and foreign donor costs. Our estimates refer to gross costs and do not subtract acceptor payments or reimbursements. Thus, they show the total resources needed to provide services in the public/PVO sector, regardless of who pays. If user fees were subtracted, then the result would be those costs that would need to be borne by local governments and foreign donors to provide services.

Local costs are collected for each program in selected countries, including Honduras, Mexico and Thailand, and an estimate of cost per acceptor or continuing user visit or cost per couple-year of protection (CYP) is calculated. We use these estimates in conjunction with the output from the TARGET model (the number of acceptors and continuing users by method and source) to calculate a total local cost figure for each method-delivery system combination. Thus, for example, the cost of sterilization is incurred by an acceptor in the year of sterilization; there are no additional costs unless follow-up care is sought or programs routinely provide such care. In the case of re-supply methods like OCs, costs are incurred by acceptors and by continuing users. Where no distinction between acceptor and user costs is possible or necessary, we provide information on the costs of providing one CYP. To facilitate comparison with programs in which such a distinction in costs is not made, the cost of a CYP is presented; however, we use acceptor and user visit costs in our calculations. It is important to note that all costs are incurred at the time services are provided; we do not pro-rate or "average" costs over the period during which CYPs are provided.

Local costs are classified either as direct or indirect costs. Direct costs include those that can be assigned to the production of a particular product or service. These include labor and transportation costs for direct service provision, supervisory support, and product promotion; contraceptive commodities, and medical supplies and materials; and maintenance, depreciation and opportunity costs of medical equipment and vehicles. Indirect costs include those that cannot be directly assigned but must be pro-rated among the different products or services provided by the program. Examples include administrative support, evaluation, Information, Education and Communication (IE&C) and training which is not method-specific, and facilities costs. For commodity costs, we used local production costs or costs of imports. If commodities were donated, we used the costs paid by the donor organization. For equipment donations, we used the market value of the donated equipment.

Staff time allocations must be examined closely since salaries and benefits usually comprise the largest percentage of program cost. Family planning personnel often perform more than one function, or they may provide other non-contraceptive services. Their time must be allocated to the various family planning service activities to determine a salary cost for each method. We were unable to obtain prospective time allocation information from the countries visited (with one exception). Instead, we interviewed supervisors and staff members to determine how much time they spent in providing various family planning services. Whenever possible, we checked the accuracy of these informal estimates against salary expenditures, and determined whether time allotted to particular functions was under-reported. We then made an estimate of unallocated time, or "down time".

Data on donor funding of family planning and related population services for 1988 are available on a country and region-specific basis. (2) In addition, information on how these expenditures are divided among support of family planning service provision and related activities is available from UNFPA for earlier years. However, information is not generally available on the division of expenditures between those made to provide direct in-country support of service provision (payment of local salaries, for example) and expenditures for technical assistance. We did, however, make some estimates as to how funds were allocated between these two categories, in order to adjust for double-counting. Foreign donor costs were then added to local costs to produce a global estimate of the cost to public sector/PVO programs and foreign donors of family planning services in 1988 and 2000.

2. Country Visits

We selected countries with a wide range of contraceptive prevalence rates and with different method and source mixes. We visited three countries for which cost data is presently available: Honduras, Mexico, and Thailand. Visits also were made to Kenya and the Dominican Republic, but data for these two countries are not yet available. In each of the three countries, we collected cost information from selected family planning programs. In Mexico, data were obtained through the Social Security Program which accounts for over a third of contraceptive use. (10) In Honduras, we collected information from the Family Planning Association of Honduras (ASHONPLAFA) which account for over half of contraceptive use. (11) In Thailand, the Ministry of Health - the main service outlet for contraception - furnished the necessary information. (12)

a. Honduras

ASHONPLAFA provides family planning services through clinics, a CBD program, and a social marketing program. Sterilization, IUDs, and re-supply methods are available at clinics in Tegucigalpa, San Pedro Sula and Choluteca, and soon will be provided in La Ceiba. ASHONPLAFA also contracts with private hospitals to do sterilizations. The CBD program offers several brands of OCs (which account for 90 percent of program CYPs) as well as condoms and foam; the social marketing program sells primarily OCs and condoms.

ASHONPLAFA's expenditure data for 1988 were reviewed. Data were available for the various distribution systems including separate budgets for temporary and permanent methods (sterilization). We obtained information on specific direct costs for initial and follow-up visits for both IUDs and OCs, but not for other re-supply methods since they represented such a small proportion of use. We also asked about compliance with recommended follow-up schedules for IUD acceptors. In both the social marketing and the CBD programs, we used CYPs to pro-rate costs that could not be assigned to a particular method. For the sterilization program, we obtained data on costs of sterilization at clinics and at private hospitals.

In addition to our review of recurrent expenditures, we also collected information on ASHONPLAFA's capital stock, including vehicles, equipment and physical plant. For the vehicles, we assumed straight line depreciation and calculated the annual cost using the remaining years of use of the vehicle and its current depreciated value. We then allocated these costs to programs depending on the number of vehicles assigned to a particular program. We used a similar procedure for sterilization equipment; we calculated the annual cost of equipment for three clinics and averaged these estimates. For the cost of facilities, we used an estimate of the cost of renting equivalent space.

b. Mexico

In Mexico, the Social Security Administration Family Planning Program (FPP) is the largest provider of contraceptive services and supplies. The FPP administrative unit maintains a comprehensive and continuously updated data base of contraceptive acceptors and users, by method, delivery system and urban-rural residence. Users of re-supply methods are estimated from inventory disbursement; users of long-acting methods are estimated from discontinuation rates (applied on an acceptor cohort basis).

Financial records are kept according to modern accounting principles. Annual expenditure figures were allocated to various family planning activities using FP studies in which the direct personnel costs of specific contraceptive procedures were obtained by direct observation in different settings. Direct materials and overhead were not itemized; instead, standard multipliers created by the FPP to reflect average resource expenditures were used.

c. Thailand

The Ministry of Health of Thailand provides the full range of contraceptive methods including OCs, injectables, IUDs, sterilization, NORPLANT, and barrier methods. Methods are offered through both health centers and hospitals, with health centers accounting for most of the re-supply methods

and about a third of IUDs. NORPLANT and female sterilization are provided only at hospitals. We decided to focus our efforts on costing those services delivered through health centers; originally we had intended to estimate the cost of female sterilization but this proved to be too complex to carry out in a short period of time.

Six health centers were visited, and each center provided information on how the staff divides its effort among various method and visit types. We also collected data on average salaries and monthly work schedules. We used these data to calculate the direct costs of personnel needed to serve new and continuing users of each method. In the case of IUDs, we focused on the cost of a discontinuation visit but not a routine care visit since few IUD users return for check-ups.

Health Center staff in Thailand also give talks at the center and in the community, and they make postpartum visits. One purpose of these activities is to interest women in family planning and to encourage them to continue using a method. On the basis of conversations with health center personnel, we decided to allocate half of these costs (time and travel) to health and half to family planning. The family planning portion was then pro-rated among visits of new users and continuing users for each method.

We obtained information on the costs of contraceptive commodities, and where multiple brands were available, we assumed that the distribution of brands for the health centers was the same as that for the program as a whole. In addition, we obtained information on the cost of capital, including the annual cost (depreciation and opportunity cost of capital) of motorcycles used by the staff, and also the replacement cost of a new health center. These costs were pro-rated across methods depending on the number of user visits of each type.

Provincial Center Medical Offices (PCMOs) represent the next layer of the Thai public health hierarchy. Each PCMO is responsible for supervising 100 health centers. Two PCMOs were visited and data on costs of supervising health centers were obtained, including time and travel of PCMO staff. No attempt was made to determine indirect costs related to the operation of the PCMOs.

Finally, the Ministry's headquarters in Bangkok provides administrative support, IE&C, and training in both health and family planning. However, these costs apply to all family planning services provided, not just those delivered through health centers. The share attributable to health centers was correspondingly reduced to reflect administrative effort to support services provided at hospitals for sterilization and for other methods.

3. Data from Other Countries

Several studies recently have been conducted which give information on method and delivery system-specific costs of providing family planning methods. Where methodologies used to measure costs included all local costs (or all local direct costs), these data were used to expand the range of costs of providing specific methods. Some of these studies do not differentiate costs by method; where these estimates are for CBD and social marketing programs, we have assumed all costs and

CYPs to be due to OCs, or we assumed the same cost per CYP for both condoms and OCs. In certain cases, only direct costs were tabulated. In one case, we have used information from other sources to estimate an appropriate indirect cost rate.

Studies examining the costs of sterilization are available from Morocco, Indonesia, Bangladesh, Morocco, Colombia, and Guatemala. Although these studies vary considerably in the methodologies used to cost out sterilization services, (especially in how promotion costs are treated), they provide valuable comparative data on the costs of sterilization.

RESULTS

1. Population Projections

Figure 1 presents estimates of future population size, assuming that population grows at the medium variant rate projected by the United Nations. To facilitate comparisons with Gillespie's analysis, China is omitted from these estimates. During the period 1988 to 2000, population in less developed countries (LDCs) will increase by 29%, with the highest rates of growth in Sub-Saharan Africa and the Near East and the lowest rates of growth in Asia and Latin America. Figure 2 shows that similar rates of growth are projected for the sub-population of married women of reproductive age (MWRA).

Figure 1
Regional and Total LDC Population Estimates (and Percent Change) for 1988 and 2000

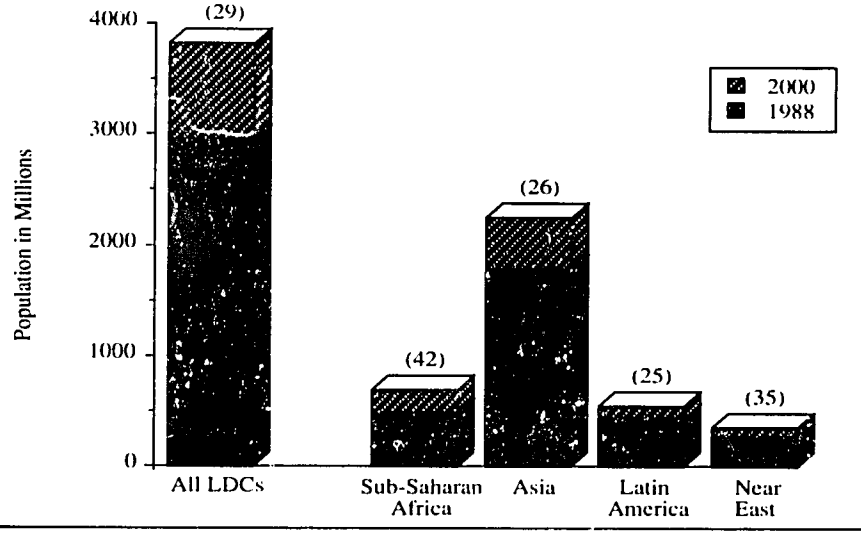


Figure 2
Regional and Total LDC Married Women of Reproductive Age Estimates (and Percent Change) for 1988 and 2000

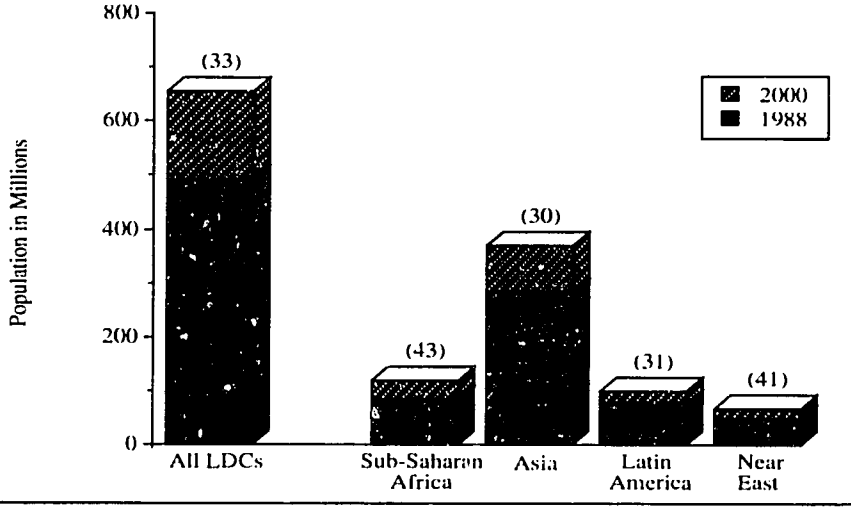


Table 1 shows the estimated baseline total fertility rates (TFRs) for 1988 and the projected TFRs necessary to achieve the medium variant population projection of the U.N. For all developing countries, the TFR must decline by almost 20% or from 4.8 to 3.9. Sub-Saharan Africa is predicted to experience both the smallest absolute and relative decrease.

Table 1
Total Fertility Rates for 1985 and Projected for 2000 Assuming United Nations Medium Variant Population Projection

REGION	1988	2000
Sub-Saharan Africa	6.29	5.66
Asia	4.33	3.56
Latin America	3.91	3.04
Near East	5.43	4.27
Total	4.78	3.93

Note: Rates for Asia exclude People's Republic of China.
Source: World Population Prospects, 1988. New York: United Nations, 1989.
1988 rates calculated using linear interpolation between 1985 and 1990 rates.

2. Contraceptive Use

Appendix Table 2 shows the results for the regression equation that estimates total contraceptive prevalence by country. These results are similar to those reported by Bulatao; socioeconomic development and program effort scores both have important effects on contraceptive use. Of the socioeconomic indicators, female literacy and life expectancy are positively and significantly associated with contraceptive use. The results also suggest that increases in program effort lead to increases in contraceptive prevalence rates.

Table 2 presents actual and estimated regional contraceptive prevalence rates for 1985 using the results of the regression equation for those countries with socioeconomic data, and regional aggregates of contraceptive prevalence for countries without any data on socioeconomic variables. It should be pointed out that we used contraceptive prevalence surveys from various years in the 1980s; we refer to 1985 because it is the temporal mid-point of the period during which the surveys were conducted. Baseline contraceptive prevalence rates for 1988 and prevalence ranges for 2000 are projected using the TARGET model.

Contraceptive use in 1985 is highest in Latin America and lowest in Sub-Saharan Africa. Only in the Near East do the prevalence estimates derived from the regression equation diverge greatly (10 percentage points) from rates drawn from survey data. To achieve fertility targets, the overall contraceptive prevalence rate in developing countries must increase from an estimated 39 percent in 1988 to 49 percent in 2000. The largest absolute change will occur in Asia and the Near East and the largest percentage increase in Sub-Saharan Africa.

Table 2
Contraceptive Prevalence Rates for 1985 and 2000, by Region

REGION	1985 ACTUAL (Countries with Data)	1985 ESTIMATED (All Countries)	1988 PROJECTED* (Using TARGET)	2000 PROJECTED* (Using TARGET)
Sub-Saharan Africa	9.8	11.0	13.2	20.1 - 22.7
Asia	40.8	40.0	42.8	54.1 - 54.3
Latin America	54.7	53.0	55.3	63.8 - 64.7
Near East	40.1	29.7	33.1	44.4 - 47.7
Total	40.1	36.2	39.0	48.4 - 49.5

NOTES: Number of countries with data: Sub-Saharan Africa = 14, Asia = 11, Latin America = 16, Near East = 5.

Number of countries including those in which contraceptive prevalence was estimated using regression analysis: Sub-Saharan Africa = 34, Asia = 20, Latin America = 20, Near East = 11.

In column 2, if data on contraceptive prevalence are available, these are used. Estimates are made from regression equations for countries with no information on contraceptive use but with information on socioeconomic variables; regional averages are used if socioeconomic data are not available.

The range of contraceptive prevalence rates for the year 2000 depends on the method mix; a method mix which includes methods with higher effectiveness will require a lower contraceptive prevalence rate.

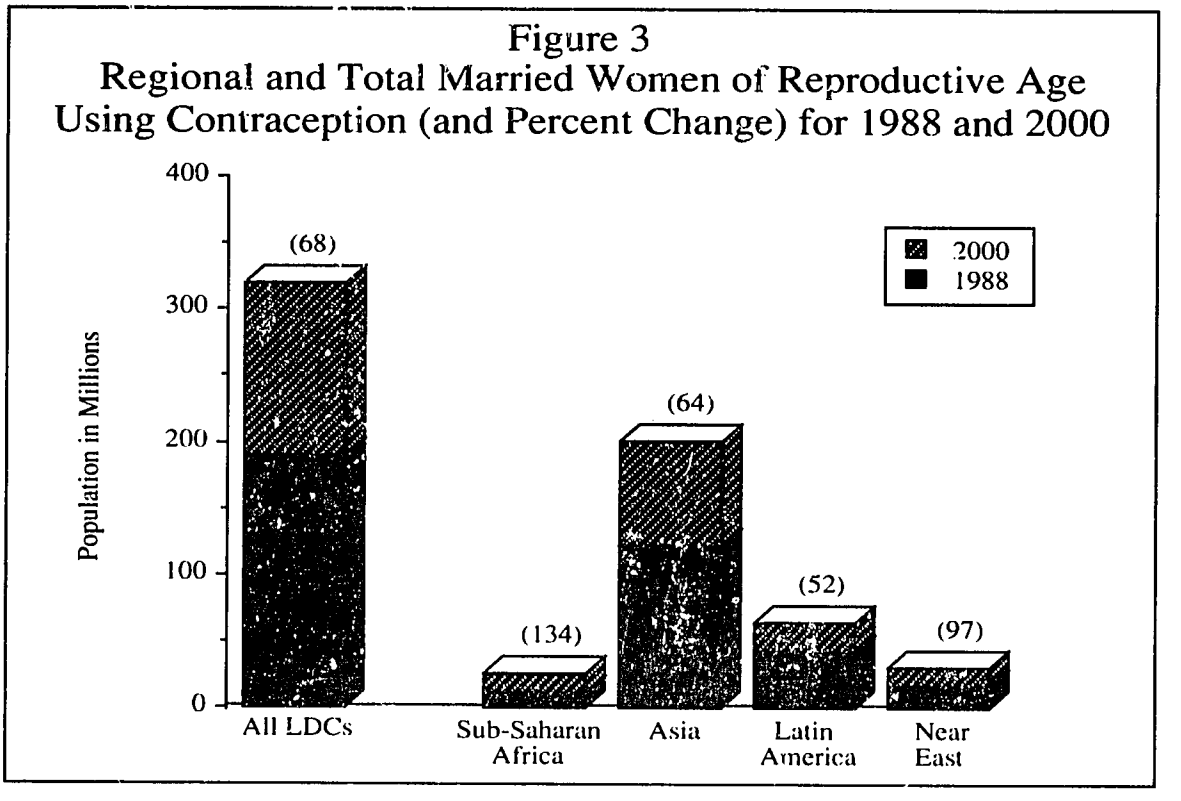
* Since the range of prevalence rates is narrow in 1988, we present only the midpoint; the entire range is presented for the year 2000.

The increment in the number of contracepting women needed to reach the target fertility rate is 130 million (Figure 3). About half of this increase is due to rapid growth of the population of married women of reproductive age, and the remainder is a result of the increase in the contraceptive prevalence rates projected by TARGET.

3. Contraceptive Method Mix

Appendix Table 3 shows the results of the regression equations that predict users of each type of contraceptive method as a percentage of all users. Initially, we examined the impact of approximately 20 variables including measures of the status of women, overall development, program effort and geographic region. Of these 20 variables, nine were significant predictors of one or more methods. Each equation includes only those variables significantly associated with the use of that method.

The explanatory power of the regressions varies greatly; the OC regression equation exhibits the poorest fit, while the equations that explain use of condoms, IUDs, female sterilization and "other methods" show the best fits. Program effort scores were important predictors of the choice between modern and traditional methods, and also female sterilization. Regional dummy variables played an important role in explaining the use of IUDs, condoms, and female and male sterilization.



We also fit a regression equation using a sub-set of six variables (program effort score, female literacy, per-capita GNP, Asia dummy, Latin America dummy, and Near East dummy) to explain the use of each of the contraceptive methods. The number of variables was limited to six because of the small sample size and high degree of multicollinearity. The results are very similar to those already presented, with the exception that for equations in which excluded variables were important, the percent of variance explained decreases, whereas for the other equations there is a small increase in the percent of variance explained. In cases where the explained variance increased, however, no other variables were significant.

Table 3 presents current and projected contraceptive method distributions for the four regions. Estimates for countries without method mix data were obtained using the estimated coefficients shown in Appendix Table 3, applied to current socioeconomic and program indicators. The same procedure was used for 2000 except that projections of independent variables were used; linear interpolations were used for 1988.

In both Latin America and Asia, sterilization is the most prevalent method and the regression analysis predicts that its importance will grow in all four regions. However, in Sub-Saharan Africa, the pill, and in the Near East, the pill and the IUD will remain the dominant methods. In all regions, the percentage of couples using traditional methods is predicted to decrease, although only slightly in Sub-Saharan Africa and Asia.

Table 3
Contraceptive Method Mix for 1985 and 2000, by Region

	Sub-Saharan Africa			Asia		
	1985		2000	1985		2000
METHOD	ACTUAL	ESTIMATED	PROJECTED	ACTUAL	ESTIMATED	PROJECTED
FS	6.3	5.4	8.9	28.5	28.2	34.2
MS	0.0	0.0	1.1	20.9	19.9	12.5
OCs	21.6	20.7	23.7	11.2	11.6	19.2
INJECT	3.4	4.4	2.7	4.3	4.4	3.3
IUD	5.6	9.4	6.1	6.9	7.1	2.8
CONDOM	1.8	2.0	2.9	9.3	9.2	9.5
OTHER	61.2	58.1	54.6	18.9	19.6	18.5
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

	Latin America			Near East		
	1985		2000	1985		2000
METHOD	ACTUAL	ESTIMATED	PROJECTED	ACTUAL	ESTIMATED	PROJECTED
FS	37.1	36.2	41.0	4.9	4.9	15.3
MS	1.1	0.9	0.0	0.0	0.3	1.5
CCs	30.3	30.2	29.9	29.9	28.7	29.7
INJECT	2.3	2.1	0.6	0.5	0.5	0.1
IUD	8.2	8.4	8.5	23.2	23.6	26.1
CONDOM	3.1	3.8	9.9	6.1	7.0	8.7
OTHER	17.9	18.4	10.1	35.4	35.0	18.6
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

FS = Female Sterilization
MS = Male Sterilization
OCs = Oral Contraceptives
INJECT = Injectables

See notes to Table 2.

4. Source of Services

Appendix Table 4 presents the results of the regression equations used to predict source (i.e. public/PVO vs. commercial). The dependent variable in each of the regressions is the percentage of users obtaining the method from the public sector or from a PVO. Although the sample sizes are very small, the regressions explain at least 50% of the variance (except in the case of condoms) in source of methods. For all methods, the results suggest that increases in urbanization lead to decreases in the proportion of services delivered through the public/PVO sector; in other words, public/PVO programs are most important in the least urbanized countries. The "program effort score" is positively associated with the proportion of users receiving IUDs or sterilization from the public/PVO sector, but does not explain the source for users of re-supply methods. Including the program effort score in the regression equations for OC and condom use has an insignificant impact on the percent of variance explained.

The coefficients from the source equation are used to estimate the current and projected share of services funded by public/PVO programs as shown in Table 4 for the four regional areas. Both the current and predicted source distributions differ sharply by region. In Latin America, OCs are distributed mainly in the commercial sector, and the regression equation predicts that the commercial sector will grow in importance. For example, in Brazil over 90% of women get OCs from the commercial sector. In Asia, by contrast, the commercial sector provides less than a third of family planning services (except for condoms) although this share is predicted to grow. In Sub-Saharan Africa, the distribution by source is similar to that of Asia whereas in the Near East, the commercial sector is more important. The sometimes considerable differences between the averages for coun-

Table 4
Source Mix for 1985 and 2000, by Region

	Sub-Saharan Africa			Asia		
	1985		2000	1985		2000
METHOD	ACTUAL	ESTIMATED	PROJECTED	ACTUAL	ESTIMATED	PROJECTED
FS	93.8	81.9	82.4	93.6	94.5	92.3
OCs	90.7	72.4	60.7	81.9	71.9	64.1
IUD	85.2	69.7	69.8	88.3	91.6	86.8
CONDOM	85.0	46.8	39.5	40.5	46.0	40.0

	Latin America			Near East		
	1985		2000	1985		2000
METHOD	ACTUAL	ESTIMATED	PROJECTED	ACTUAL	ESTIMATED	PROJECTED
FS	80.5	76.8	78.3	81.5	79.1	82.6
OCs	13.1	26.0	17.0	36.8	52.0	42.4
IUD	74.3	64.5	66.5	46.5	65.6	70.1
CONDOM	17.6	19.7	14.1	2.0	33.4	27.6

FS = Female Sterilization
OCs = Oral Contraceptives

See notes to Table 2.

tries with source data and the averages for all countries, especially for Sub-Saharan Africa and the Near East, can be explained by the small number of countries for which data were available.

In all regions, public and PVO programs are the major providers of sterilization. Latin America exhibited the highest percentage of commercial sector sterilizations (23%), whereas fewer than 6% of sterilizations in Asia were performed in the commercial sector. Similar results were found for IUDs, except that the commercial sector was a more important provider of IUDs than of sterilization.

5. Costs of Methods

a. Female Sterilization

Table 5
Cost of Female Sterilization in Selected Countries
(in Constant 1988 US Dollars)

Country/Program	Direct Costs	Indirect Costs	Total Costs
Honduras, 1988			
ASHONPLAFA clinic	66	35	101
ASHONPLAFA-supported[1]	61	35	96
Mexico, 1988[2]			
Weighted Average			126
Urban Hospital	55	77	132
Rural Hospital	10	13	23
Indonesia, 1988[3]			
National Family Planning Program (NFPP)	37		
Morocco, 1986			
National Average[4]			133
National Center			152
Major Provincial Center			85
Medium Provincial Center			164
Small Provincial Center			190
Colombia, 1985[5]			
Laparoscopy	33	10	43
Mini-laparotomy	24	9	33
Bangladesh, 1985[6]			64
1985[7]			98
Guatemala, 1983/84[8]			68

1. ASHONPLAFA - supported sterilizations are performed in private hospitals under a standard reimbursement contract in which ASHONPLAFA pays 120 Lempiras per procedure. Sterilization promotion is not included in the standard payment, but is an extra expense absorbed by ASHONPLAFA. Indirect costs are averaged across all procedures performed or supported by ASHONPLAFA. The market exchange rate of 3 Lempiras for $US 1 was used.
2. Direct costs include only personnel costs; other direct costs and indirect costs are combined into one category called "other costs". These costs are calculated by multiplying personnel costs by 1.4 in urban hospitals and 1.3 in rural hospitals.
3. The authors of the Indonesian study refer to "operational costs" and "investment costs". These costs should all be treated as direct costs. No discussion of indirect costs appears in this study. The estimate shown is for an average procedure using local anesthesia; direct costs for a sterilization performed under general anesthetic would be $41.00.
4. This estimate is a weighted average of sterilization costs at several clinics and hospitals of varying size.
5. These estimates are based on the average number of cases for the first six months of 1985. Four clinics providing laparoscopy offer sterilization as a routine clinical procedure, while the other four contract with independent physicians.
6. Clinic costs only.
7. Includes promotion and follow-up care provided by health workers in year of sterilization.
8. Using official rate of Q1 = $1, although it was overvalued.

NOTE: For source of secondary data, see reference 13.

Table 5 presents information on the costs of female sterilization. Costs vary widely across and within countries, from a low of $23 in rural Mexico to a high of $190 for small provincial centers in Morocco. (13)

The scope of sterilization services affects total costs. Costs should include not only those directly related to the surgery (including pre- and post-operative care) but also those associated with motivation, education and administration. Only surgery costs are included in the Indonesian and Guatemalan examples, while the Colombian and Honduran studies include all costs.

Variations in place of surgery (hospital/clinic, urban/rural), type of surgical procedure (laparoscopy or mini-laparotomy), and in method of payment (salaried personnel or fee-for-service) help to explain the differences in sterilization costs across countries. In clinics, surgical staff perform sterilizations only during certain hours and days of the week; indeed they may be hired specifically for this purpose. If they perform the maximum number of sterilizations possible given time and material constraints, then unit costs will be low. If few women seek sterilization, however, unit costs will be high.

In hospitals, the percentage of surgeon time charged to sterilization will depend on the number of sterilizations performed and the number of all other operative procedures performed, and the time spent on each. Thus, in a hospital, even if demand is low for sterilization, surgeons may perform other operative procedures and overall per unit costs of operative procedures could remain low.

In some countries, family planning programs contract directly with private hospitals or private physicians to perform sterilizations on a per-procedure basis. In such cases, unit costs are constant and the total cost of sterilization varies directly with the number of procedures.

b. Oral Contraceptives

Table 6 presents information on the cost of oral contraceptives. (14) As with sterilization, the cost of OCs varies by both country and program. In general, the lowest per unit costs were found in social marketing programs; the highest costs were for an outreach program in Morocco and a clinic in Honduras.

In health centers and clinics, acceptor visit costs are higher than continuing user visit costs because of greater staff requirements for counseling and medical services on an initial visit. Thus, the lower is the discontinuation rate for a method, the lower is the cost of a CYP, because continuing user visits require fewer resources than do new acceptor visits.

Variations in costs for clinic-based and health center programs may be affected by the extent of outreach activities. Some clinics vigorously follow up women who fail to return for follow-up visits, while others limit their efforts to women who come to the clinic building. In some programs, clinic staff may give talks in the community or at the health center/clinic or make home visits to recruit new users or to encourage women to continue to use contraceptives.

The Honduran CBD program is more costly than other CBD programs. One important difference is that in Mexico, Peru, and Colombia, the distribution network relies on uncompensated labor, while

in the Honduran program distributors receive sales commissions. However, in the cost estimate for the Peruvian program, a minimum wage rate was imputed for volunteer labor. The Honduran CBD program is part of a national family planning organization and the program's indirect costs, including IE&C and evaluation, have been pro-rated among the organization's various programs. Some of the variations in costs of CBD programs may also be explained by differences in services provided. In certain cases, distributors work mainly at a post, although they may also make home visits; in the outreach programs (and in some CBD programs), distributors may spend most of their time making home visits, requiring additional resources for travel.

Table 6
Cost of Oral Contraceptives Delivery by Program and Country
(in Constant 1988 US Dollars)

Program/Country	Cost per Acceptor Visit	Cost per Follow-up Visit	Cost per CYP
Social Marketing			
Bangladesh 1985			5.62
Honduras[1] 1989			11.94
Colombia[2] 1984-86			4.69
Community-based Distribution			
Honduras[1] 1988			18.47
Mexico 1989			5.87
Peru[3] 1986-87			6.18
Colombia[2] 1984-86			13.79
Outreach/Home Visits			
Bangladesh[4] 1985	15.00	3.67	14.67
Morocco[5] 1987			29.34
Clinic/Health Center			
Thailand 1988	4.38	3.56	18.62
Honduras[1] 1988	7.63	5.88	31.15
Mexico			
Urban 1989	8.80	3.90	24.40
Rural 1989	1.73	1.37	7.21
Philippines[6] 1984	7.57	3.38	21.09

1. Exchange rate used is $1 = L3 except commodities which are converted into dollars at official exchange rate, which is $1 = L2. See section on sensitivity of results for additional discussion.
2. Overhead rate derived from study of Profamilia's sterilization program; figures refer to largest program for which data are presented; assumed all sales were OCs.
3. Official exchange rate used although it was overvalued.
4. Cost per acceptor visit is cost in first three months of use; cost per follow-up visit is one-quarter of follow-up costs in subsequent years; cost per CYP in first year of use is $26.00.
5. Assumed all sales were OCs; costs refer to rural CBD program which has lower cost / CYP than urban program.
6. Data from clinic study designed to determine reimbursement.

NOTE: For clinic / health centers, costs are calculated on assumption that women receive one cycle of pills on first visit and three on subsequent visits. For other programs, costs per cycle are assumed constant. For source of secondary data, see reference 14.

c. IUDs

Table 7 presents information on initial and follow-up visit costs for IUDs. (16) Costs are highest in Bangladesh where IUDs are inserted by health workers in the acceptor's home. Other estimates are for more conventional health center and clinic programs. Acceptor visit costs are surprisingly low in Thailand in view of the fact that costs of imported IUDs are high.

Table 7
Cost of IUD Services by Program and Country
(in Constant 1988 US Dollars)

Program/Country	Cost per Acceptor Visit	Cost per Follow-up Visit
Clinic/Hospital		
Honduras[1] 1988	10.77	6.06
Thailand[2] 1989	9.82	
Mexico - urban 1989	13.46	10.30
rural 1989	6.40	4.80
Philippines 1984	9.06	2.66
Outreach workers		
Bangladesh[3] 1985	18.00	2.68

1. Exchange rate of $1 = 1.3
2. Too few follow-up visits were recorded to permit calculation of cost of follow-up visit.
3. Cost per acceptor visit is cost in first three months of use; cost per follow-up visit is one-quarter of follow-up costs in subsequent years.

NOTE: For sources of secondary data, see reference 15.

Table 8
Cost of Injectable Delivery by Program and Country
(in Constant 1988 US Dollars)

Program/Country	Cost per Acceptor Visit	Cost per Follow-up Visit
Clinic/Hospital		
Thailand 1988	4.28	3.03
Philippines 1984	8.76	7.56
Outreach workers		
Bangladesh[1] 1985	15.36	4.69

1. Cost per acceptor visit is cost in first three months of use; cost per follow-up visit is one-quarter of follow-up costs in subsequent years.

NOTE: For source of Philippines data, see reference 14.

d. Other Methods

Injectables were an important method of contraception only in Thailand, and we could find only two other estimates of the cost of injectables. Table 8 shows that unit costs of services delivered through clinics/health centers are lower in Thailand than in the Philippines. (16) We obtained little information about condom costs, again because condoms are not a prevalent method in many countries (table 9). As with OCs, the costs of condoms distributed through the social marketing program were lowest. (17)

Table 9
Cost of Condom Delivery by Program and Country
(in Constant 1988 US Dollars)

Program/Country	Cost per CYP
Social Marketing	
Honduras[1] 1989	14.77
Bangladesh 1985	6.55
Community-based Distribution	
Honduras[1] 1988	21.72
Outreach	
Bangladesh[2] 1985	11.01

1. Exchange rate of $1 = L3 used.
2. Cost of 1 CYP in years subsequent to year of acceptance; Cost per CYP in year of acceptance = $22.38.

e. Full/Net Costs

Costs to local governments and to donors (but not to society) also are affected by the amount of cost recovery. The greater the fees charged for services, the lower will be that portion of costs borne by local governments and by donors. Table 10 provides information for those programs/countries for which information is available on total costs and on costs to governments/PVOs of OCs and condoms. In Honduras, the difference in costs borne by the CBD and the social marketing programs is larger than the difference in the total resource cost because the social marketing program recovers a far higher proportion of its costs than does the CBD program. Although fees are charged in all CBD programs, (except the Mexican program), CBD efforts generally target the poorest women and therefore charge low prices to acceptors.

Table 10
Full and Net Costs per CYP for Oral Contraceptives and Condoms in Selected Countries
(in Constant 1988 US Dollars)

Method/Country	Full Cost	Net Cost
Community-based Distribution		
Oral Contraceptives		
Honduras 1988	18.47	15.87
Peru 1986-87	6.18	6.13
Colombia 1984-86	13.79	7.86
Condoms		
Honduras 1988	21.72	18.38
Social Marketing		
Oral Contraceptives		
Honduras 1989	11.94	6.13
Bangladesh 1985	5.62	4.97
Colombia 1984-86	4.69	(.64)
Condoms		
Honduras 1989	14.77	4.59
Bangladesh 1985	6.55	5.90

NOTE: Numbers appearing in brackets represent negative costs, or in other words, an excess of program revenues over program costs.

6. Cost Estimates Used with the TARGET Model

For this report, we select a cost estimate for each method except for OCs, where we use a cost estimate for each delivery system (see Table 11). We assume that the real cost of each method-delivery system combination remains constant over the projection period; in other words, we assume that inflation will have no net effect. The range of costs for female sterilization is $98 to $133 (excluding countries without information on all service costs and excluding Colombia where costs are far lower than they are in other countries). For our calculations we use $100, which is the cost in Honduras and Bangladesh but below the cost in urban Mexico and Morocco.

Although vasectomy is a prevalent method of contraception in some Asian countries (notably India), we did not generate cost estimates for this procedure. Instead, we apply the cost estimate for a female sterilization to all sterilizations. A recent operations research study carried out in Colombia calculated the cost of a vasectomy at over $100; however, the authors predict that costs would decline over time. (18) Thus, using the cost for a female sterilization probably does not significantly distort the results in Latin America and Africa, where vasectomy is rarely performed; however, in Asia, we likely have overstated sterilization costs.

We generated cost figures for four OC delivery systems: social marketing, CBD, outreach program and clinic/health center. Wherever possible, we use acceptor and follow-up visit costs unless these are equal or there was not sufficient information to make such a distinction. For CBD and social marketing programs we use information on costs per CYP. In some of these programs, service providers are not salaried by the program, and services provided may be the same for acceptors and continuing users. We used the Honduran estimate of $18.00 as the cost of a CYP in a CBD program.

Table 11
Cost Multipliers Used with the TARGET Model

Method	Unit Cost
Female Sterilization	$100
Vasectomy	$100
Oral Contraceptives	
Social Marketing	$9/CYP
CBD	$18/CYP
Outreach Program	$20/CYP
Clinic/Health Center	$7 Acceptor, $4 Follow-up
IUDs	$10 Acceptor, $6 Follow-up
Condoms	$15/CYP
Injectables	$7 Acceptor, $4 Follow-up
Traditional Methods	$0

Although this figure is higher than other country estimates, it refers to a national level program and one in which distributors earn sales commissions. Outreach programs were the most expensive; we use a cost estimate of $20.00 per CYP. For health center/clinic programs, we use an acceptor cost of $7.00 and a follow-up cost of $4.00 which is roughly the average of the estimates. For social marketing, we used a cost of $9.00 per CYP.

We use only one cost figure for condoms and assume that all condoms are provided at a cost of $15.00. For injectables, the cost of an initial visit is set at $7.00 and the cost of subsequent visits at $4.00. In the case of IUDs, an acceptance visit costs $10.00, and follow-up visits cost $6.00 each.

Traditional methods are costed at zero. Natural Family Planning Programs teach periodic abstinence methods. Research has found that initial training costs of NFP methods can be quite high; one study conducted in Bogota, Colombia concluded that the cost per acceptor of NFP was about four times higher than per acceptor of IUDs, and the cost per year of protection was about 2.5 times higher than for users of barrier methods. (19) Nevertheless, most couples reporting that they use periodic abstinence methods do not learn these methods from a formal source, and hence these costs would not apply. Since most traditional methods are self-taught and learned from friends or neighbors, we have assumed that the cost to family planning programs is zero.

7. Foreign Donor Costs

Foreign donor funds are used to directly support family planning services in developing countries, and also to promote programs indirectly through biomedical and demographic research, program evaluation, training, and information, education and communication (IE&C) assistance. Total donor country support for all family planning activities in 1988 was US$661 million. In 1985, 64 percent of all donor population assistance was used to support family planning programs directly. If this percentage is applied to the 1988 donor funding total, US$422 million were spent directly on family planning programs. The remainder (US$239 million) was thus used to provide support for related population activities.

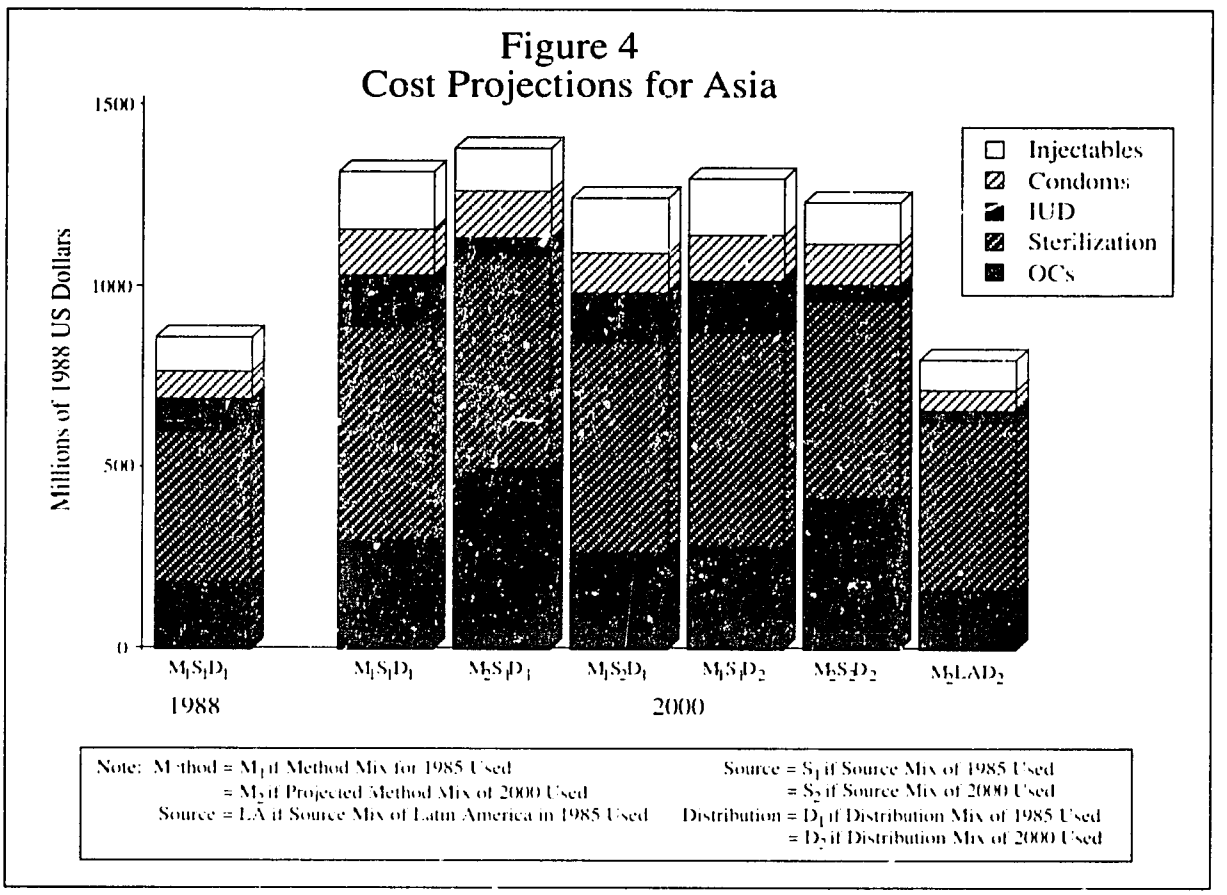
However, a portion of foreign donor funds pay for local country service delivery programs used to provide technical assistance to improve service delivery, and should be separated out to avoid double-counting. These funds are used to purchase commodities and equipment, and to pay salaries of service providers. We assumed that US$211 million (half of the US$422 million spent on family planning) were used in this manner. The remaining US$211 million were added to the US$239 million figure discussed previously to produce an estimate of US$450 million for activities indirectly supporting family planning in 1988 (See Figure 9).

An alternative methodology would be to use the UNFPA estimate of US$406 million allocated to developing countries, and to assume that half of this amount is spent on local service delivery and half is used to provide technical assistance support. The remaining funds included those allocated for international or global activities, and for administrative costs. We have assumed that none of these expenditures are in direct support of service delivery programs and are therefore for related population activities. The results obtained from this method do not differ significantly from our other approach; US$203 million were spent on local country service delivery, and US$458 million were spent on activities indirectly supporting family planning and technical assistance to improve service delivery.

8. Local Costs of Providing Contraceptives

Figures 4-7 present data on the local costs of providing contraceptive services in the four regions. These services may be funded through any combination of local government resources, user fees, and donor support. Several scenarios have been costed out for each region. These scenarios include variations in method mix, source mix, and distribution system for OCs.

The estimated local cost of providing contraceptive services in Asia (Figure 4) in 1988 was US$861 million. Assuming no change in the mix of methods, sources, or distribution system for oral contraceptives, and an increase in contraceptive use from 40% to 54% to reach the target fertility rate, costs would increase to US$1.318 billion (or 53%) by the year 2000. The major factors responsible for the change are the increase in contraceptive prevalence needed to reach the target fertility rate and the increase in the number of women in the reproductive ages. If the method mix changes as predicted by our regression equations, then costs would be US$66 million higher in 2000. If the source mix changes, that is, if the commercial sector provides a larger proportion of services then the total cost to public and PVO programs falls by US$73 million or 5.5%. If social marketing increases in importance, then costs would be lower by US$17 million than if such a change did not occur.



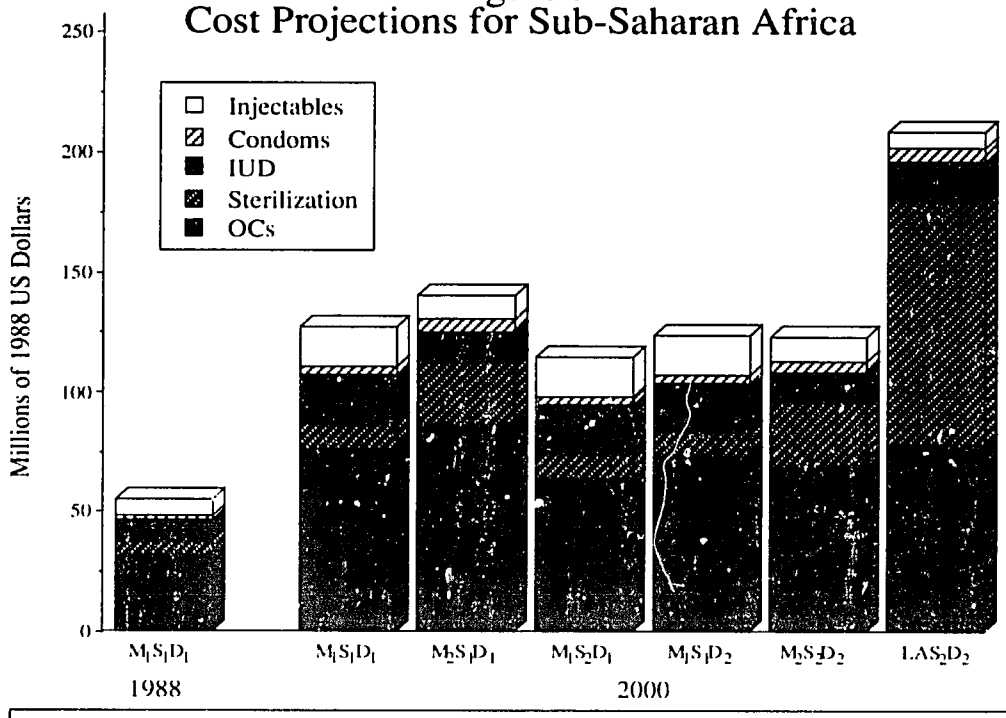
Finally, if both the method and source mix change as predicted by the regression equations and social marketing programs increase in importance, costs will decrease by US$84 million or 7.2%.

If there were a radical change in source mix, with Asia adopting by the year 2000 the mix of Latin America in 1985 (in addition to the predicted changes in method and distribution mix), then costs of public and PVO programs in the year 2000 would be lower than in 1988. The increase in the share of services provided by the commercial sector would be large enough to reduce public/PVO costs, even given the rapid increase in the number of contraceptors and the increase in the contraceptive prevalence rate.

Similar comparisons can be made for other regional areas. For Sub-Saharan Africa (Figure 5), contraceptive use will need to increase from 11% to 20-23% to reach the target fertility rate, the exact proportion dependent on the method mix. The predicted increase in costs over the period 1988 to 2000 is US$72 million or 133%. If the mix of methods includes more modern methods (as predicted by the regression results), then costs will increase by an additional US$13 million or by 10%. The largest increase is in sterilization, while other methods decrease in importance. Changes in the source or the distribution mix would reduce costs by 10% and 3% respectively.

An interesting question is what would happen if Sub-Saharan Africa adopted a method mix typical of other regions with a high prevalence of sterilization. We attempted to answer this question by costing out a scenario in which Sub-Saharan Africa adopted, by the year 2000, the method mix of Latin America in 1985. Costs under this scenario would increase by US$86 million or by 73% over

Figure 5
Cost Projections for Sub-Saharan Africa

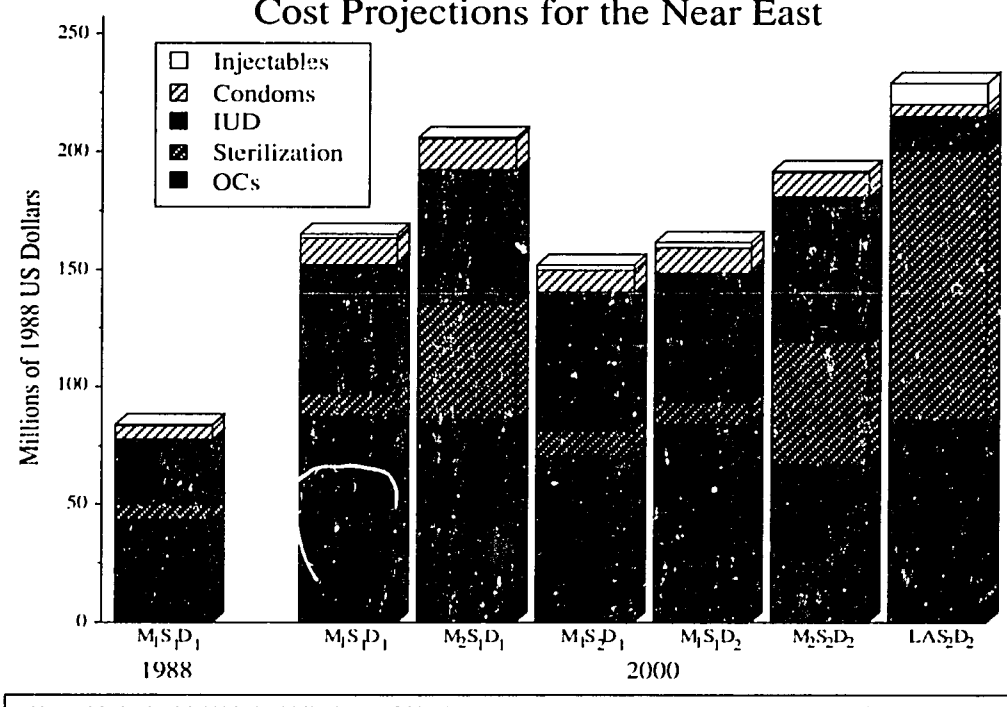


Note: Method = M_1 if Method Mix for 1985 Used
= M_2 if Projected Method Mix of 2000 Used
= LA if Method Mix of Latin America in 1985 Used

Source = S_1 if Source Mix of 1985 Used
= S_2 if Source Mix of 2000 Used

Distribution = D_1 if Distribution Mix of 1985 Used
= D_2 if Distribution Mix of 2000 Used

Figure 6
Cost Projections for the Near East



Note: Method = M_1 if Method Mix for 1985 Used
= M_2 if Projected Method Mix of 2000 Used
= LA if Method Mix of Latin America in 1985 Used

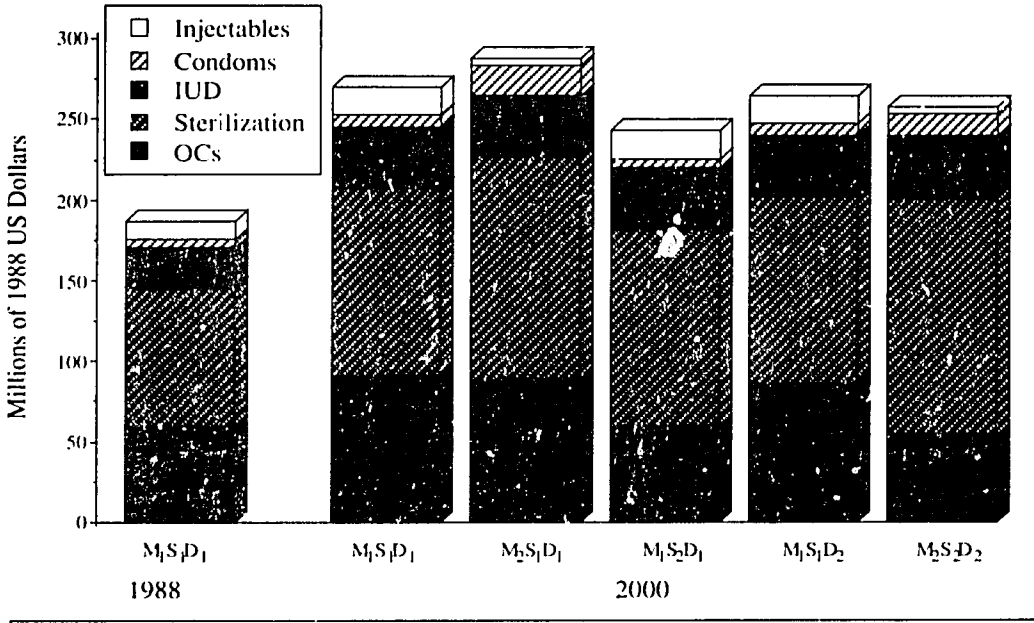
Source = S_1 if Source Mix of 1985 Used
= S_2 if Source Mix of 2000 Used

Distribution = D_1 if Distribution Mix of 1985 Used
= D_2 if Distribution Mix of 2000 Used

one in which the predicted changes in method-source-distribution mix occurred. The reason for this substantial change is that the number of sterilization acceptors would need to increase dramatically to achieve such a large increase in the prevalence of sterilization. While these acceptors provide CYPs in the future, the CYPs all are purchased at acceptance, resulting in high initial costs. Moreover, initial expenditures to finance these sterilizations may even be higher as sterilization programs build facilities, purchase equipment, and train staff.

Results for the Near East were similar to those in Sub-Saharan Africa (see Figure 6). Contraceptive use would need to increase from 30% to 44-48% to reach the target fertility rate. Costs would increase by 96% or US$81 million, with an even larger increase if the method mix predicted from the regression equations were adopted; costs increase substantially under this latter scenario, in part because the predicted decrease in the use of traditional methods is largest for this region and the shift implies a large movement from costless to costly methods. The largest increase would occur if the region adopted by the year 2000 the method mix of Latin America in 1985.

Figure 7
Cost Projections for Latin America



Note: Method = M_1 if Method Mix for 1985 Used
= M_2 if Projected Method Mix of 2000 Used
Source = S_1 if Source Mix of 1985 Used
= S_2 if Source Mix of 2000 Used
Distribution = D_1 if Distribution Mix of 1985 Used
= D_2 if Distribution Mix of 2000 Used

In Latin America, contraceptive use would need to increase from 53% to 64-65% (Figure 7). The estimated total cost was US$187 million in 1988. Assuming no change in method-source-OC distribution, costs would increase to US$270 million (or by 45%). This is similar to the increase for Asia, since predicted changes in population and contraceptive use are similar in the two regions. The additional costs would be highest if the predicted method mix change occurred and lowest if the predicted change in source occurred.

The total estimated local costs of public and PVO family planning programs providing family planning in 1988 for all LDCs was US$1.187 billion. This total increases to US$1.880 billion (or by 58%) in 2000, assuming the same method, source, distribution mix as was observed in 1985. If only the predicted change in method mix occurred, costs would be US$2.018 billion (or 7%) higher than if such a change did not occur. The predicted changes in source and distribution mix, however, would reduce the costs of public/PVO programs. If the predicted changes in method and source mix occur together with the new distribution mix for OCs, costs in 2000 would be US$1.806 billion.

9. Why is the Percentage Increase in Costs Smaller than the Percentage Increase in the Number of Contraceptive Users?

To achieve the medium variant population projection for the year 2000, we found that the number of contraceptors must increase by 68% while the costs increase by only 58%. Intuitively, one might expect costs to increase at the same rate as users. Appendix Table 5 presents, by method and region, the ratio of percentage increase in costs to the percentage increase in users; the lower the ratio, the larger the divergence from unity (or a one-to-one relationship) between increases in costs and increases in users. The weighted average for all four regions is .8529. Latin America and Asia are responsible for most of the overall change; their ratios are below and closer to the weighted average than those of Sub-Saharan Africa and the Near East.

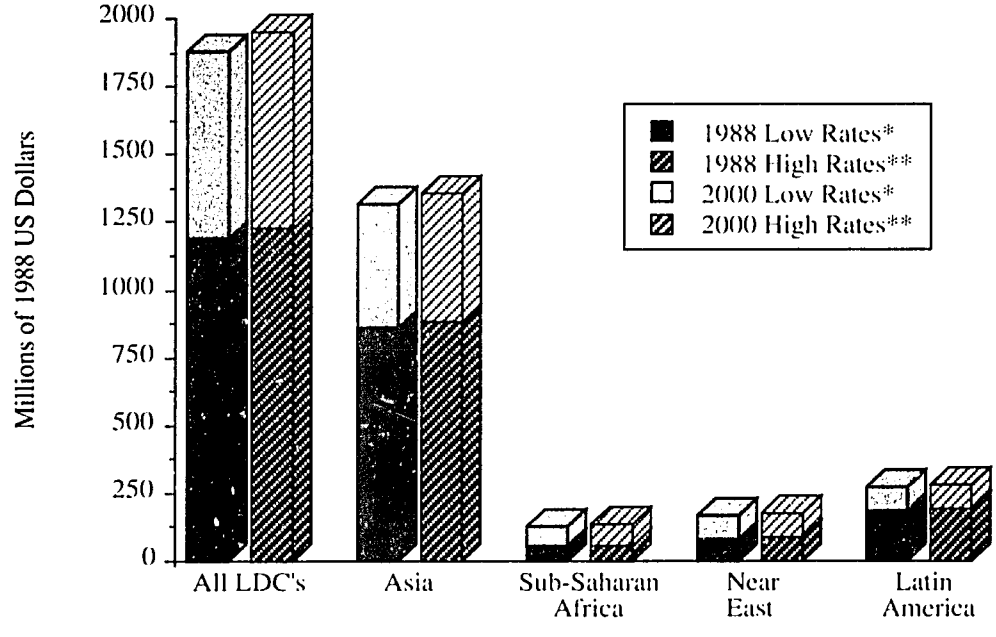
Sterilization is the method responsible for most of the divergence from unity of each region's cost-user ratio. The ratios for IUDs are considerably higher than those for sterilization, but somewhat lower than those for OCs and other re-supply methods. The lowest ratios for IUDs are in Sub-Saharan Africa and the Near East, the regions with the highest proportion of IUD users. The ratios for other methods are very close to unity, implying that costs and users increase at the same rate (as one would probably expect for re-supply methods).

But if the ratios for sterilization are closer to unity in Latin America and Asia, then why are regional ratios closer to unity in Sub-Saharan Africa and the Near East? Appendix Figure 1 shows algebraically that the ratio of the percentage change in costs to the percentage change in users depends on two terms: the baseline proportion of total costs attributed to each method, and the percentage increase in costs of providing that method divided by the percentage increase in users of that method. Appendix Figure 2 provides information on the first term, the proportion of total costs attributed to each method in 1988. In Asia and Latin America, sterilization accounts for a large share of the method mix, and therefore a high proportion of costs. But in Sub-Saharan Africa and the Near East sterilization increases rapidly; accordingly the percentage increase in costs for that method divided by the percentage increase in users (the second term in the equation derived in appendix 6) is smaller than for Asia and Latin America. Appendix table 6 shows, for each method and region, the result of multiplying the two terms in Appendix Figure 1. The larger the deviation from unity for any particular method, the greater the deviation from unity of the regional cost-user ratio. Because the initial share of costs for sterilization is so high in Latin America and Asia (Appendix Figure 2), the net result is that costs increase more slowly relative to users in Latin America and Asia, even though the deviation from unity for sterilization is lowest in these two regions (Appendix Table 5).

10. What is the Impact of Higher Rates of Discontinuation on Costs?

Selection of higher discontinuation rates raises the ratio of new acceptors to continuing users and tends to increase costs since initial visits generally cost more than follow-up visits. To examine the implications of increases in discontinuation rates for both baseline (1988) and percent change in costs, we assumed an increase in the annual discontinuation rate for OCs from 35% to 50% and a change in the rate for IUDs from 15% to 24%; this latter change would lower the average number of

Figure 8
Regional and Total Costs in 1988 and 2000 Using Low and High Discontinuation Rates for OCs and IUDs



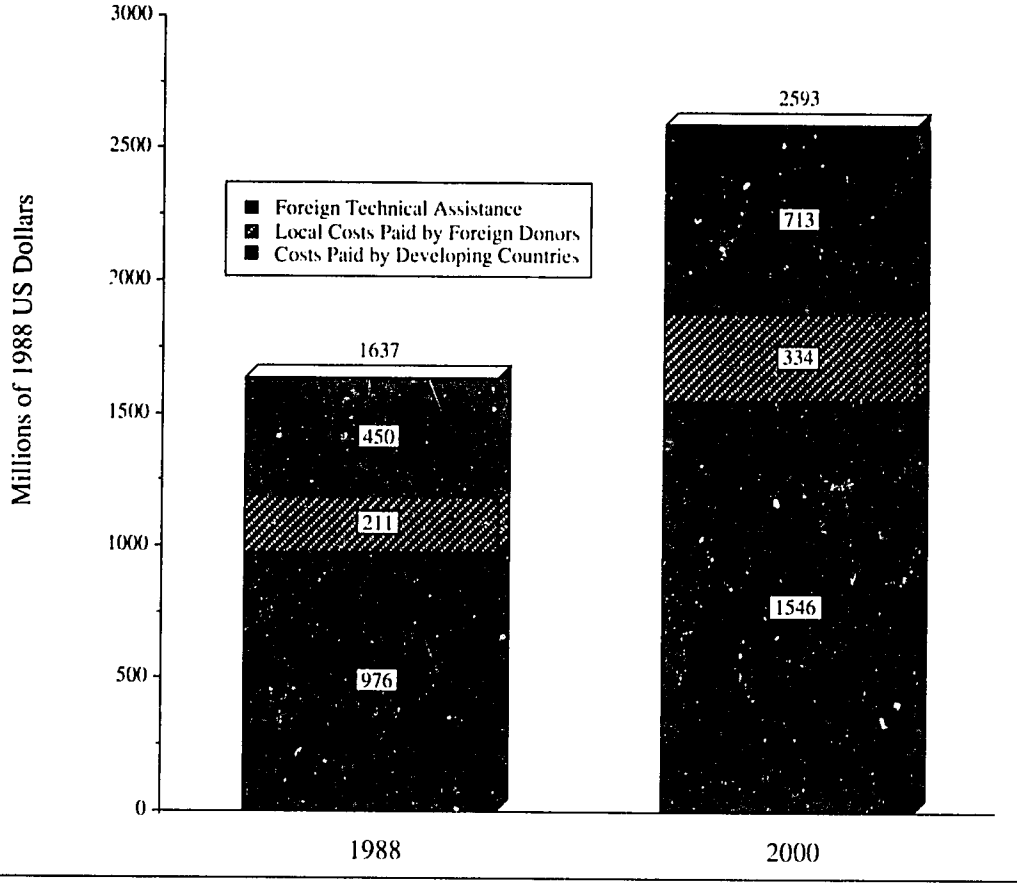
*Discontinuation rates for OCs and IUDs are 35 and 15 percent per year, respectively.
**Discontinuation rates for OCs and IUDs are 50 and 24 percent per year, respectively.

CYPs provided by IUDs from just over four years to 2-1/2 years. In the case of OCs, only those OCs provided by clinics and health centers will increase in cost as this was the only distribution system for which we assumed that the cost of re-supply (or follow-up visits) was lower than the cost of initial supply. As shown in Figure 8, costs do increase; for 1988, the increase is 3.5%; a similar increase occurs in 2000. Consequently, the increase in costs resulting from higher discontinuation rates over the projection period is negligible (0.6%).

11. Total Costs of Public/PVO Family Planning Services

Adding local costs and foreign technical assistance costs gives an estimate of US$1.637 billion in 1988 (Figure 9). The middle section of each bar shows the portion of donor funding that we estimate is used to support service delivery programs. The larger this section (assuming that total local

Figure 9
Total Costs to Developing Countries (Excluding China) and International Donors of Providing Family Planning Services, 1988 and 2000



costs and foreign technical assistance costs remain constant), the lower would be our estimate of total costs. Thus, for example, if half of donor funds were used directly to support service delivery programs, estimated total costs would be US$1.493 billion or about 9% lower. We assume that in the year 2000 the ratio of foreign technical assistance to local costs will be the same as in 1988. Consequently, foreign technical assistance in the year 2000 is estimated at US$713 million. Moreover, we assume that the proportion of local costs met by foreign donors will be the same as in 1988. Therefore, in 2000, we calculate that US$334 million will be provided by foreign donors to support local service provision. In order to reach the U.N. medium variant population projection, the total provided by foreign donors will need to be over US$1 billion. Adding this amount to local costs of US$1.880 billion gives a total cost of providing family planning of US$2.593 billion. As with the estimate for 1988, if donor funds are used to support a larger proportion of direct service delivery costs, our total cost estimate would be lower.

12. Cost of Delivering All Contraceptive Services in the Public Sector

What if all contraceptives were provided by PVOs or by public sector programs; what would be their cost? We attempted to answer this question by applying our cost estimates to all contraceptive users and not just those getting their methods through public sector and PVO-supported programs. The

total estimated cost of providing contraception in the commercial sector in 1988 was US$527 million, assuming that unit costs of family planning services in the commercial and public/PVO sectors were equal. Including commercial sector costs, local costs increase from US$1.187 billion to US$1.714 billion or by 44%. Therefore, the total cost of providing contraception in 1988 (including foreign donor support for public sector/PVO family planning services) was US$2.164 billion.

The total estimated cost of providing family planning services in the commercial sector in the year 2000 is US$1.104 billion; total local costs are US$2.910 billion. Adding our estimate of foreign technical assistance for the year 2000 (US$713 million) gives a total cost of US$3.623 billion.

13. Comparisons with Other Estimates

In order to compare our estimates with those of UNFPA, we have added to our 1988 figure the costs of providing contraception in China. This increases costs significantly both because of China's large population and its high contraceptive use. Total costs increase to US$2.605 billion, or by almost US$1 billion, most of which is for local service provision, but a small part of which is support from UNFPA. In the year 2000, we estimate that the costs of family planning in the developing world including China will be approximately US$3.675 billion. This figure is higher than the low figure used in briefing documents for the UNFPA meeting recently held in Amsterdam. Including both China and the cost of commercial sector services increases costs in the year 2000 to approximately US$5 billion. This figure is close to Gillespie's estimate for the year 2000 (3); however, it should be remembered that his analysis excludes China.

Our estimate for 1988 can also be compared with the Population Crisis Committee's estimate for 1990. Their estimate is derived by summing all family planning expenditures made by local governments, local consumers, and foreign donors, including the large expenditures made in China. Adding the costs of providing contraception in the commercial sector and in China increases our estimate to US$3.132 billion for 1988. This is only slightly below their estimate of US$3.2 billion for 1990. (20) (Their estimate for the year 2000 is not comparable with ours, as it assumes a more rapid fall in fertility and therefore a far greater increase in contraceptive prevalence.)

DISCUSSION

Originally, we had hoped to visit and collect cost data from two countries in each of three regional areas: Asia, Latin America, and Sub-Saharan Africa. We also had hoped to collect enough data to make region-specific cost estimates for each method-delivery system combination. However, we were able to visit only one African country and have not yet received final cost data. Therefore, the cost estimates we developed for Asia and Latin America are also used in Africa. Since family planning infrastructure is relatively less developed in Africa than in Asia or Latin America, the capital portion of future resource requirements may be underestimated. Moreover, some African programs - including CBD programs - require women to undergo a medical examination before receiving oral contraceptives. Such requirements result in higher costs per acceptor.

During the course of the analysis, we made several assumptions which directly affected our cost estimates. This section explains how these assumptions - the choice of an exchange rate, the assignment of overhead, the treatment of excess capacity, and compliance with follow-up schedules - can alter costs.

1. Exchange Rates

In order to make regional and world estimates of the cost of providing family planning, resources must be valued in a common currency. Generally, costs calculated in local currencies are converted into U.S. dollars at the official exchange rate. However, this rate does not always reflect accurately the comparative value of resources in different countries. A major study of "International Comparisons of Product" in 34 countries found that when all goods and services in each country were valued at a common set of prices (average international prices), resources (especially in the services sector) were more highly valued in developed countries than in LDCs. (21) For example, among a group of eight developing countries, services were 2-1/2 to 10 times more expensive when international prices were used.

The choice of an exchange rate is particularly important in this project because we generalize costs from a few countries to the entire developing world. Table 12 shows that in Honduras, where the official exchange rate differs substantially from the "market rate", the selection of the exchange rate has a substantial impact on costs. Costs of programs that receive mostly donor contributions should be converted into dollars at the official exchange rate. However, for other countries with freely fluctuating rates and for programs funded through local support, costs should be converted using the "market rate". Without a full review of exchange rate policies in the developing world and sufficient information to split PVO and local government costs, we were unable to determine the appropriate "mix" of exchange rates to use in making conversions into dollars. In our estimates, we used the actual dollar cost of donated contraceptives and equipment, and the market exchange rate for local goods and services. Since we used the market exchange rate, dollar costs may be understated for the particular country and program from which these data were collected.

2. Overhead Allocation

The criterion used to allocate overhead among particular methods and delivery systems also makes a difference, even though the total indirect costs remain constant. Overhead usually is allocated based

on total direct costs or total personnel costs. These criteria provide the best proxy for the administrative effort needed to support direct service provision. In an ideal world, the analyst could directly observe and quantify the level of administrative support given to each program; this was the approach taken by Profamilia (Colombia) and the Population Council in an empirical study of the allocation of overhead. This study effectively converted all indirect costs into direct costs. (22)

Table 12 shows that in Honduras, the variation in cost per CYP due to alternative overhead allocation techniques affects cost comparisons of the social marketing and CBD programs. If overhead is calculated on the basis of direct costs, the cost per CYP for the social marketing program is much higher than if overhead is based on personnel costs (which would exclude subcontracts). Which calculation is correct? For Honduras, where we collected detailed budget information, we allocated indirect costs based on personnel costs since we thought that these costs best indicated the level of administrative support needed. However, the authors of most of the other costing studies we reviewed allocated overhead on the basis of direct costs.

Table 12
Sensitivity of Cost Estimates to Assumptions About Exchange Rates and Overhead Allocation, Honduras, 1988
(in 1988 US Dollars)

Overhead Allocation*	Exchange Rate	
	2L = $1	3L = $1
Female Sterilization		
Program costs/Total costs	155.00	105.00
Personnel costs/Total costs	147.00	101.00
Community-based Distribution**		
Program costs/Total costs	25.34	17.48
Personnel costs/Total costs	26.83	18.47
Social Marketing**		
Program costs/Total costs	26.52	18.77
Personnel costs/Total costs	16.28	11.94

* Overhead can be allocated in several ways. The first row of cost estimates reflects an overhead percentage calculated by dividing total direct costs for sterilization by ASHONPLAFA's total costs; the second row shows overhead calculated by dividing direct personnel costs (salaries, fees, benefits) by ASHONPLAFA's total costs.

** Community-based Distribution and Social Marketing costs are estimates of the cost per couple-year of protection for users of oral contraceptives. Condom costs for the two programs show similar variations.

3. Marginal and Average Costs

We have assumed in our calculations that average costs are constant. Often, however, services could be expanded over the short run by using fixed capacities more intensively. For example, in the sterilization clinic in Tegucigalpa, Honduras, surgical staff perform only sterilizations. They can do a maximum of seven per day, or nine with the assistance of another physician whose primary function is to train medical students. On average, surgical staff perform five procedures per day; thus,

fixed capacity is underused by more than 25%. Assuming that all three ASHONPLAFA clinics operate at similar excess capacity, we can then calculate the additional costs of operating at full capacity (See Table 13) Given that the only additional cost incurred is for materials and supplies (personnel and equipment are fixed costs), the marginal cost of an additional sterilization is much lower than the average cost. Thus, when the clinic operates at full capacity, average costs are lower than when there is excess capacity. (A similar calculation could be done raising the number of sterilizations from 7 to 9; those marginal costs would be higher since additional surgical staff would be needed in addition to materials and supplies). In our cost calculations, we use actual average costs, making no adjustment for excess capacity.

Table 13
Direct Costs of Current Volume of Female Sterilization and Predicted Costs if Clinics Operated at Full Capacity, Honduras, 1988
(in 1988 US Dollars)

Current Volume: 3276 Sterilizations	
Total Cost:	215,509
Average Cost:	66
Full Capacity: 4586 Sterilizations	
Total Cost:	230,356
Average Cost:	50
Approximate Marginal Cost:	11

NOTE: Assumes that all 4 ASHONPLAFA clinics operate 28% below capacity as does the Tegucigalpa clinic, and that only expenditures on medicines / medical supplies would need to be increased to perform the extra procedures. Exchange rate of L3 = $US 1.

4. Compliance with Follow-up Schedules

Recommended follow-up regimens at clinics or health centers will affect costs. The more follow-up visits, the higher will be costs per user. However, intensive follow-up may be necessary to encourage continued use of the method. Recommended follow-up schedules vary according to method. For re-supply methods like OCs, failure to make follow-up visits is equivalent to discontinuation. In the case of sterilization, minimal follow-up is required and contraceptive protection lasts throughout the acceptor's reproductive life; there are no costs associated with continued use. For other methods like the IUD and NORPLANT, acceptors may be encouraged to make additional visits in order to determine if they have method-related problems. A final visit is made at the time of discontinuation. The cost of providing such methods therefore is dependent upon the cost of the initial visit, the cost of follow-up visits and the number of such visits.

Table 14 shows IUD costs under three scenarios: full compliance with the follow-up schedule, partial compliance, and one follow-up visit for removal. (It is assumed that personnel changes can be made to institute these follow-up schedules either through staff increases or decreases, or that personnel perform other tasks when not engaged in IUD service provision.) Not surprisingly, costs are lowest when only one follow-up visit for removal is made. The important issue is whether follow-up visits encourage women to continue using the IUD, either by motivating them or by offering counseling and care if problems arise. If the number of follow-up visits and continuation rates are related, more visits could increase a method's cost-effectiveness if continuation rates increased.

Table 14
IUD Costs per CYP* Assuming Varying Compliance with Recommended Follow-up Schedule, Honduras, 1988 (in 1988 US Dollars)

Insertion Visit Cost: $10.77

Follow-up Visit Cost: $6.06

Follow-up Regimen	Cost per CYP
Full compliance**	$18.85
60 percent compliance	$13.03
No follow-up, removal only	$6.73

* Assumes that average continuation of method use is 2.5 years.

** A standard follow-up regimen includes three follow-up visits in the first year, two in the second year, and one discontinuation (removal) visit in the third year.

What is the schedule of routine follow-up visits actually made by women? Our discussions with program personnel would suggest substantial differences across programs. In one Latin American country, we were told that compliance with follow-up schedules was almost universal, while program staff in another reported that compliance was about 60%. In one Asian country, we were told that women getting IUDs at health centers rarely returned until they wanted the IUD removed, unless they experienced problems with the method. But in another country in which there were home visits, follow-up care was a routine part of the visit.

We suggest that additional research be done on the relationship between compliance with follow-up schedules and continuation; one way to save resources may be to encourage fewer follow-up visits, and in the case of IUDs, minimal follow-up may be sufficient unless problems arise.

CONCLUSIONS

Using the United Nations' medium projection for population growth in developing countries (excluding the People's Republic of China), we predict that the annual costs of providing family planning services in public and PVO programs must increase by nearly 60% between 1988 and the year 2000, assuming a stable method, source and distribution mix. This rise from $1.637 billion to $2.593 billion would provide contraception to 320 million women, or 68% more women than in 1988. Thus, the costs of family planning increase at a slower rate relative to the number of women receiving contraceptive services. The increase in costs would be lower yet if method and source mixes were to change as predicted by the regression equations, and if social marketing programs became a more important distribution channel for OCs.

Policy Issues

The projection of costs poses a number of policy questions that national and international decision-makers must address. These include the following:

1. What mix of methods should be promoted?

Programs obviously want to promote modern methods, especially in Africa, where use of traditional methods dominates. Altering the method mix to emphasize voluntary sterilization and reducing the importance of traditional methods would initially increase costs, but would result in improved program output.

2. Which delivery systems should be emphasized?

Based on our analysis, one might conclude that all program resources to provide re-supply methods should be put into social marketing programs because of their low costs per CYP. But resources should be allocated in a way that best meets program objectives. Some populations can only be reached by more costly delivery systems. Program planners must decide if the extra investment in more costly programs is worth the increase in contraceptive use. We hope that our analysis stimulates the formulation of strategies to allocate program resources to match conditions in individual countries.

3. Who should bear the costs of family planning?

It is clear that reducing the proportion of services provided by public/PVO programs, especially in Asia, would reduce costs borne by governments and donors significantly. Moreover, an increase in user fees for public/PVO programs would further reduce costs borne by governments and donors while increasing the share borne by consumers of services. The results of two recent studies in Thailand (23,24) suggest that user fees for most contraceptives could be increased with little change in contraceptive use. An ongoing operations research project to test the impact of price changes on contraceptive acceptance and use will provide further insight into the potential for cost recovery of family planning services in Thailand.

However, it should be kept in mind that Thailand is one of the richest countries in Asia (as measured by per capita income), and has a rapidly expanding economy. The "small family" norm is also very well established. Many other countries are considerably poorer, and thus may have less potential for charging consumers for contraceptives. (25) While we should continue to seek ways to recover costs from consumers who can afford to pay, foreign donor and local government support will continue to be important sources of financing for contraceptive services in the year 2000 and beyond.

The commercialization of services and more emphasis on social marketing of contraceptives will help to lower costs of public/PVO programs while several other trends will work to increase these costs. For example, fewer women likely will choose a traditional and costless method, thereby increasing the costs of providing services. Also, higher demand for sterilization will increase the annual number of procedures and, therefore, costs. Even though several couple-years of protection may be achieved through a sterilization, the costs all are incurred at acceptance. Finally, facilities will need to be expanded and equipment purchased which will increase initial expenditures, although the costs are annualized over the life of the facilities and equipment.

The costs of public and PVO family planning programs will certainly increase during the coming decades. Some of the ways to meet these increased costs include:

- an absolute increase in donations from industrialized nations to developing countries;

- increases in the proportion of development aid (currently about 1.3%) invested in family planning;

- alterations in the allocation of national budgets to give greater emphasis to family planning;

- more efficient use of resources already allocated to family planning activities.

Until now the primary concern of family planning programs has been to increase the number of couples using contraception. But with the realization that funds are limited, more attention must be focused on efficient use of resources, including such issues as:

- how service provision can be streamlined without reducing the safety, acceptance and continued use of methods;

- how resources can be used more efficiently so that programs with low costs become the norm.

The share of costs borne by foreign donors and local governments is dependent on commercial sector provision of contraception. The need for donor funding can be reduced by increasing the role of the commercial sector, and by establishing or increasing user fees in public/PVO programs.

We see these cost projections as an important challenge to the global community. In the past 25 years, successful family planning programs (as measured by increases in contraceptive prevalence and decreases in fertility) have been established. By increasing the resources allocated to family planning, and making policy decisions that encourage the best use of these resources, it may still be possible for the world to reach more ambitious population targets.

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APPENDIX TABLES AND FIGURES

Appendix Table 1
Total Contraceptive Prevalence Rate (CPR) and Percent Distribution of Methods Used for 46 LDCs, by Region

Region/Country	CPR	FS	MS	OCs	Inject	IUD	Condom	Other	Total	Year
Sub-Saharan Africa										
Benin	9.2	0.0	0.0	2.2	0.0	1.1	1.1	95.6	100.0	1981/82
Botswana	32.9	13.1	0.6	44.7	16.7	17.0	3.6	4.3	100.0	1988
Burundi	8.7	1.1	0.0	2.3	5.7	3.4	1.1	86.4	100.0	1987
Ghana	12.8	7.8	0.0	14.1	2.3	3.9	2.3	69.6	100.0	1988
Kenya	17.0	15.3	0.0	18.2	2.9	17.6	1.8	44.2	100.0	1984
Liberia	6.4	17.2	0.0	51.6	4.7	9.4	0.0	17.1	100.0	1986
Mali	4.6	2.2	0.0	19.6	2.2	2.2	2.2	71.6	100.0	1987
Mauritius	75.4	6.2	0.0	27.9	8.2	3.1	14.3	40.3	100.0	1985
Nigeria	4.8	2.1	0.0	4.2	4.2	2.1	0.0	87.4	100.0	1981/82
Rwanda	10.1	0.0	0.0	2.0	4.0	3.0	0.0	91.0	100.0	1983
Senegal	11.3	1.8	0.0	10.6	0.9	6.2	0.9	79.6	100.0	1986
Togo	33.9	1.8	0.0	1.2	0.6	2.4	1.2	92.8	100.0	1988
Uganda	4.9	16.3	0.0	22.4	8.2	4.1	0.0	49.0	100.0	1988/89
Zimbabwe	43.1	5.3	0.5	71.9	0.7	2.6	2.8	16.2	100.0	1989
Asia										
Bangladesh	25.2	31.0	6.0	20.0	2.0	5.6	7.1	28.1	100.0	1985
India	34.1	34.3	34.3	2.6	0.0	1.2	12.3	15.3	100.0	1980
Indonesia	47.9	6.5	0.4	33.8	19.8	27.8	4.2	7.5	100.0	1987
Korea, S.	70.4	44.9	12.6	6.1	0.0	10.5	10.2	15.7	100.0	1985
Malaysia	51.4	14.6	0.4	22.6	1.0	4.3	15.0	42.1	100.0	1984
Nepal	13.9	45.0	40.7	5.7	3.6	0.7	4.3	0.0	100.0	1986
Pakistan	7.6	28.9	0.0	15.8	6.6	9.2	22.4	17.1	100.0	1984/85
Philippines	45.3	24.1	1.1	14.1	0.4	5.3	2.6	52.4	100.0	1986
Singapore	74.2	30.1	0.8	15.6	0.0	0.0	32.7	20.8	100.0	1982
Sri Lanka	62.0	40.0	7.9	6.6	4.4	3.4	3.1	34.6	100.0	1987
Thailand	67.5	33.2	8.1	29.6	13.6	10.7	1.7	3.1	100.0	1987
Latin America										
Bolivia	26.0	11.5	0.0	11.5	3.8	15.4	0.0	57.7	100.0	1983
Brazil	65.8	40.9	1.2	38.3	0.9	1.5	2.6	14.6	100.0	1986
Colombia	64.8	28.2	0.6	25.3	3.7	17.0	2.6	22.6	100.0	1986
Costa Rica	69.5	20.0	0.7	29.8	1.4	11.5	19.3	17.3	100.0	1986
Dominican Republic	50.0	65.8	0.2	17.6	0.6	6.0	2.8	7.0	100.0	1986
Ecuador	44.3	33.9	0.0	19.2	1.6	22.1	1.4	21.8	100.0	1987
El Salvador	47.3	67.2	1.5	14.0	1.5	7.0	2.5	6.3	100.0	1985
Guatemala	23.2	44.8	3.9	17.2	2.2	7.8	4.7	19.4	100.0	1987
Haiti	6.9	10.1	1.4	31.9	2.9	2.9	7.2	43.6	100.0	1983
Honduras	40.6	31.0	0.5	33.0	0.7	10.6	4.4	19.8	100.0	1987
Jamaica	51.4	21.2	0.0	37.5	14.8	3.5	14.8	7.8	100.0	1983
Mexico	53.0	35.5	1.5	18.3	5.1	19.8	3.6	16.2	100.0	1987
Panama	58.2	55.7	0.7	20.3	1.4	10.3	2.7	8.9	100.0	1984
Paraguay	44.8	8.9	0.0	30.1	8.0	11.4	5.1	36.5	100.0	1987
Peru	45.8	13.3	0.0	14.2	2.8	16.2	1.5	52.0	100.0	1986
Trinidad/Tobago	52.7	15.6	0.4	26.6	1.5	8.3	22.4	25.2	100.0	1987
Near East										
Egypt	37.6	4.0	0.0	40.7	0.3	41.5	6.4	7.1	100.0	1989
Jordan	26.5	18.5	0.0	22.6	0.4	40.8	1.5	16.2	100.0	1985
Morocco	35.9	6.1	0.0	63.8	0.8	8.1	1.4	19.8	100.0	1987
Tunisia	49.7	23.1	0.0	17.7	1.6	34.2	2.6	20.8	100.0	1988
Turkey	51.0	2.2	0.0	14.7	0.4	14.5	8.0	60.2	100.0	1983

FS = Female Sterilization MS = Male Sterilization Inject = Injectables

Appendix Table 2
Regression for Total Contraceptive Prevalence
(N = 46)

Predictors	Partial Regression Coefficient	Prob > T
Life expectancy	1.09	.0010
Program effort	0.25	.0001
Female Literacy	0.28	.0053
Summary Statistics		
Intercept	- 54.65	
R-squared	0.83	
Prob > F	.0001	

Appendix Table 3
Regression Results for Method Mix

Predictors	FS	MS	OCs	Inject	IUD	Condom	Other
	Partial Regression Coefficients						
Program Effort	0.23*						- 0.29*
Percent Urban				- 0.14**			
Life Expectancy			0.46		- 0.43		- 0.79
Per Capita GNP						0.0033**	
Female Literacy		- 0.06		0.09**	0.22		
Africa							20.14*
Asia	13.03*	9.91**	- 9.18			4.98**	
Latin America	20.22**						
Near East					24.14**		
	Summary Statistics						
Intercept	- 0.76	3.97	- 2.87	3.97	20.03	1.02	89.30
R-squared	.5149	.3305	.1156	.2823	.4934	.5535	.5054
Prob > F	.0001	.0002	.0712	.0008	.0001	.0001	.0001

N = 46

* = Significant at .05 level
** = Significant at .01 level

FS = Female Sterilization
MS = Male Sterilization
OCs = Oral Contraceptives
Inject = Injectables

Appendix Table 4
Regression Results for Source Mixes: Public / PVO Sector

Predictors	FS	OCs	IUD	Condom
	Partial Regression Coefficients			
Program Effort	0.271**	0.0673	0.418**	0.0129
Percent Urban	- 0.388**	- 1.150***	- 0.568**	- 0.659
	Summary Statistics			
Intercept	84.48	102.56	74.79	65.88
R-squared	.5726	.5294	.5822	.2411
Prob > F	.0011	.0004	.0009	.2193

Number of cases: Female Sterilization = 19, Oral Contraceptives = 24, IUD = 19, Condom = 14.

* = Significant at .05 level
** = Significant at .01 level
*** = Significant at .001 level

Appendix Table 5
Ratio of Percent Increase in Cost to Percent Increase in Users, 1988-2000, by Method and Region

Region	Percent Cost Increase / Percent User Increase				
	All methods	Sterilization	IUD	OCs	Other
Latin America	.8415	.6734	.9601	.9945	.9941
Asia	.8226	.6501	.9517	.9935	.9947
Sub-Saharan Africa	.9208	.5307	.9005	.9850	.9824
Near East	.9439	.5939	.9397	.9909	.9978

Appendix Figure 1

$$\frac{\textbf{percent increase in total cost}}{\textbf{percent increase in total users}} = \frac{(TC_2 - TC_1) / TC_1}{(TU_2 - TU_1) / TU_1} =$$

$$\frac{(TC_2 - TC_1)}{TC_1} \times \frac{TU_1}{(TU_2 - TU_1)} = \sum_{i=1}^{n} \frac{(MC_{i2} - MC_{i1})}{TC_1} \times \frac{TU_1}{(MU_{i2} - MU_{i1})} =$$

$$\text{Since} \quad 1 = \frac{TC_1}{TC_1} = \frac{1}{TC_1} \times \sum_{i=1}^{n} MC_{i1} = \sum_{i=1}^{n} \frac{MC_{i1}}{TC_1} .$$

$$\sum_{i=1}^{n} \frac{MC_{i1}}{TC_1} \times \frac{(MC_{i2} - MC_{i1})}{TC_1} \times \frac{TU_1}{(MU_{i2} - MU_{i1})} =$$

$$\sum_{i=1}^{n} \frac{MC_{i1}}{TC_1} \times \frac{(MC_{i2} - MC_{i1}) / TC_1}{(MU_{i2} - MU_{i1}) / TU_1} =$$

$$\sum_{i=1}^{n} \left(\begin{array}{c}\textbf{cost of method i as a} \\ \textbf{proportion of total costs}\end{array} \right) \times \left(\frac{\textbf{percent increase in costs attributed to method i}}{\textbf{percent increase in users attributed to method i}} \right)$$

Notation:

TC_1 = Total Cost in 1988

TC_2 = Total Cost in 2000

TU_1 = Total Number of Users in 1988

TU_2 = Total Number of Users in 2000

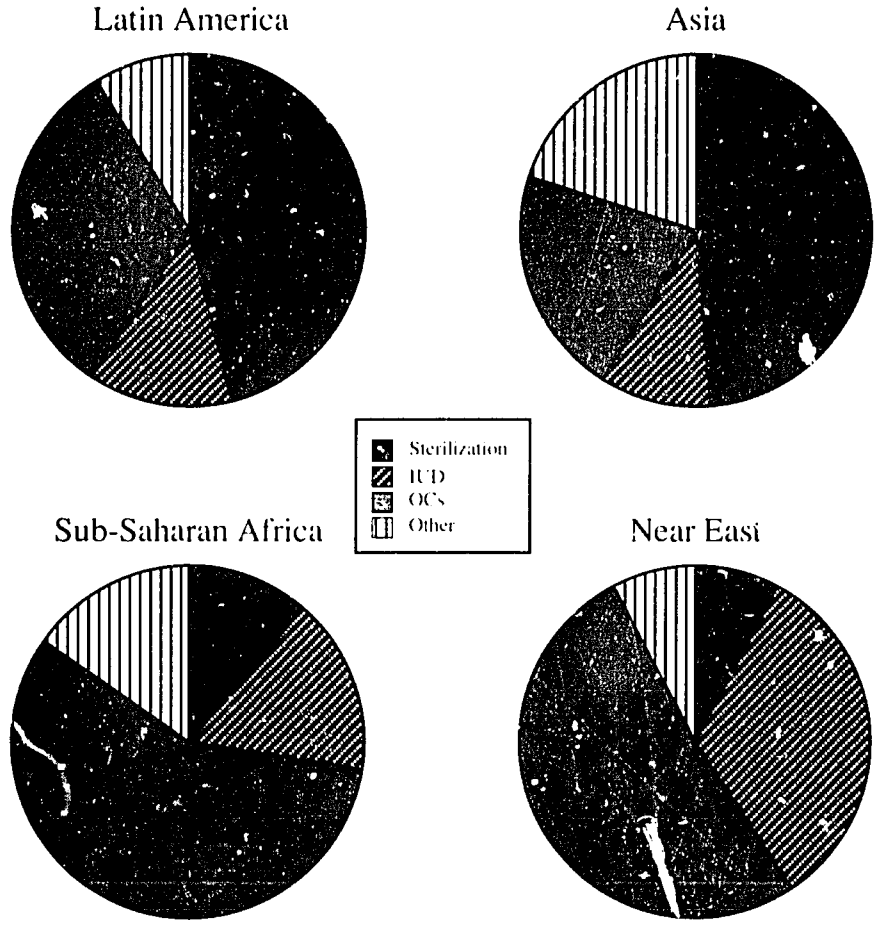
MC_{i1} = Total Cost in 1988 for ith Method

MC_{i2} = Total Cost in 2000 for ith Method

MU_{i1} = Users in 1988 for ith Method

MU_{i2} = Users in 2000 for ith Method

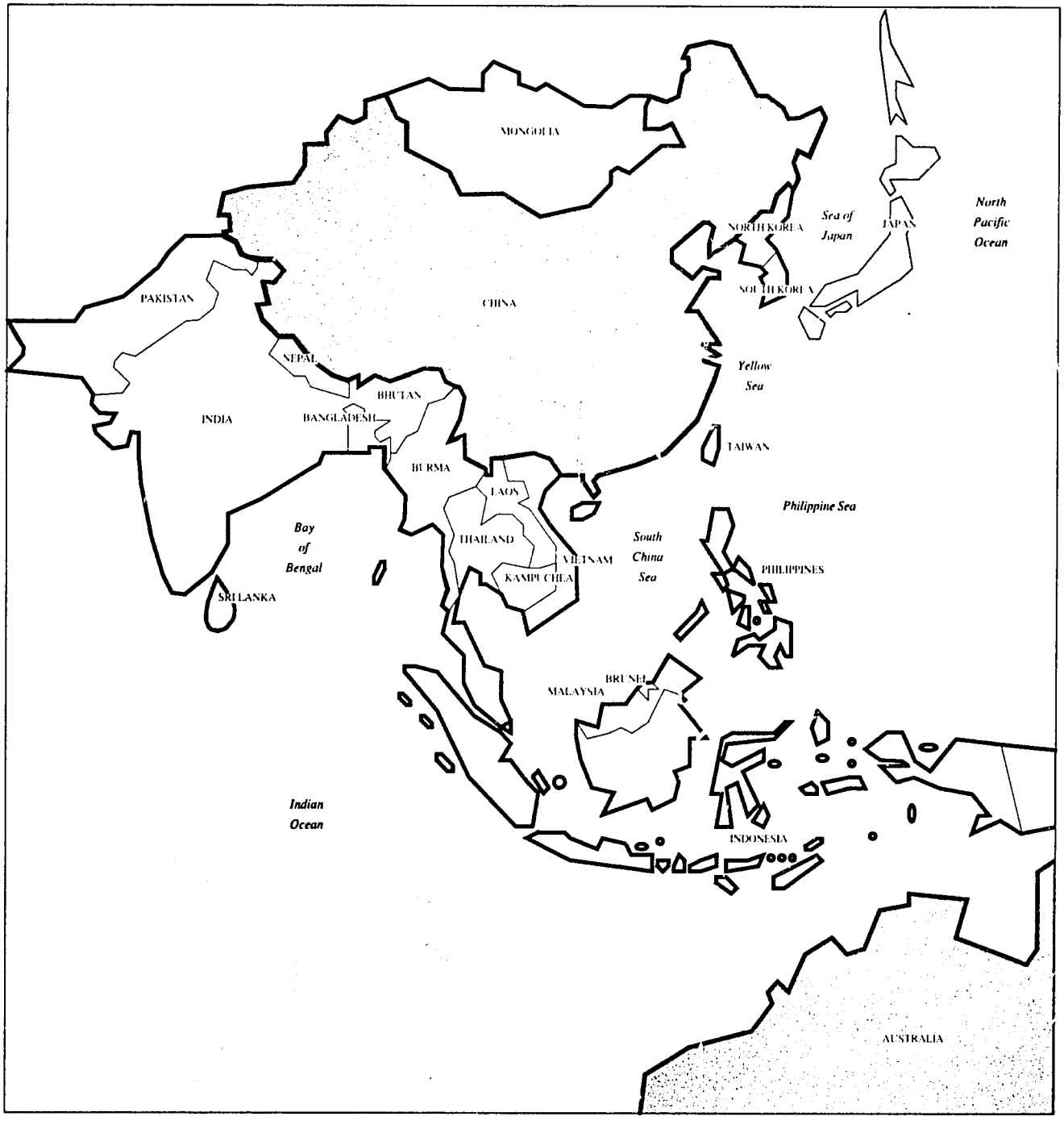
Appendix Figure 2
Proportional Distribution of Costs by Method and Region for 1988



Appendix Table 6
Deviation from Unity in the Ratio of Percent Increase in Cost to Percent Increase in Users by Method and Region

Region	Method					
	Ster	IUD	OCs	Other	(1 - Total)	Actual
Latin America	.1509	.0054	.0017	.0005	.8415	.8415
Asia	.1701	.0052	.0016	.0011	.8220	.8226
Sub-Saharan Africa	.0528	.0161	.0085	.0023	.9203	.9208
Near East	.0310	.0203	.0047	.0007	.9433	.9439

Map 1 - Asia


MONGOLIA
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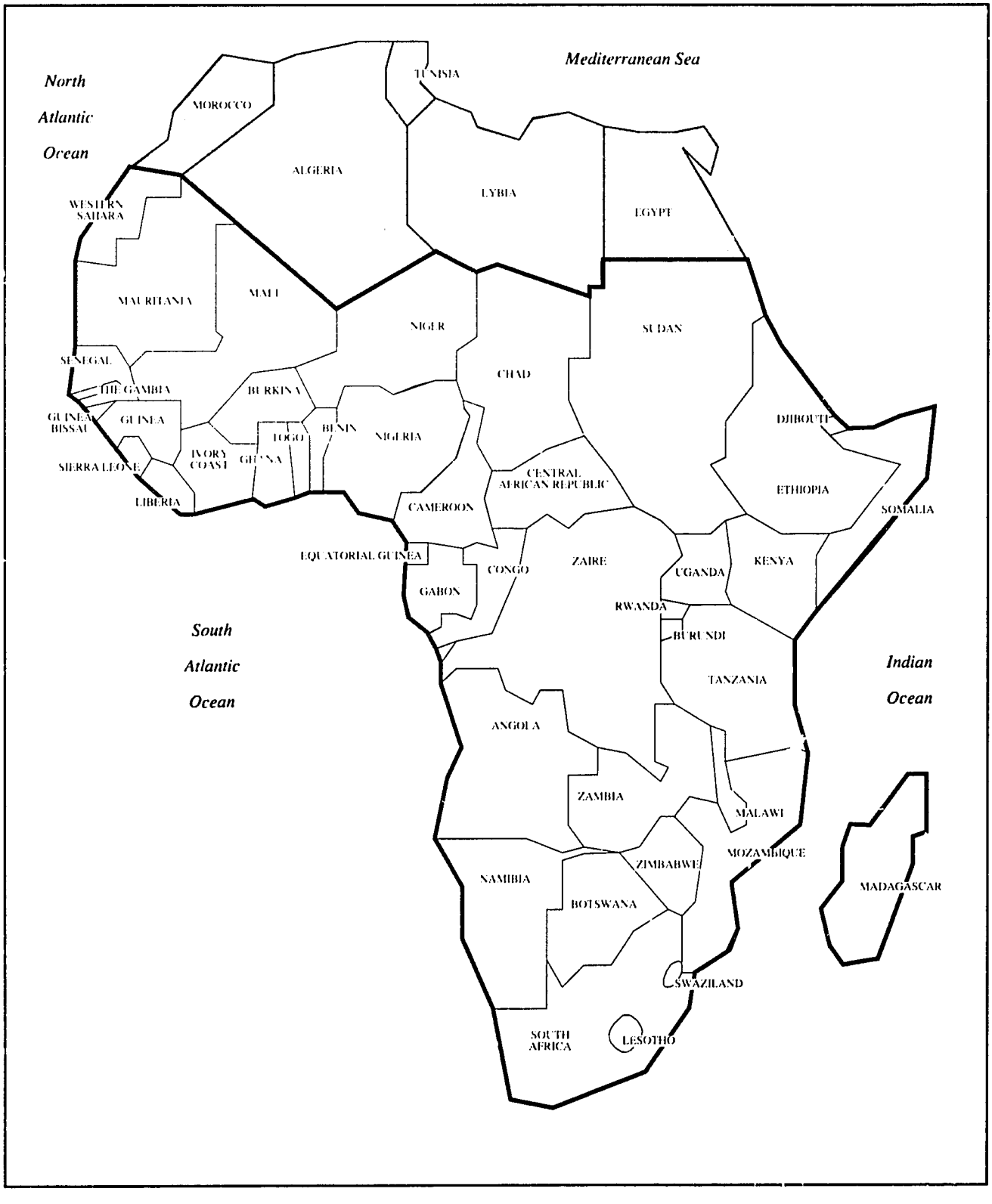
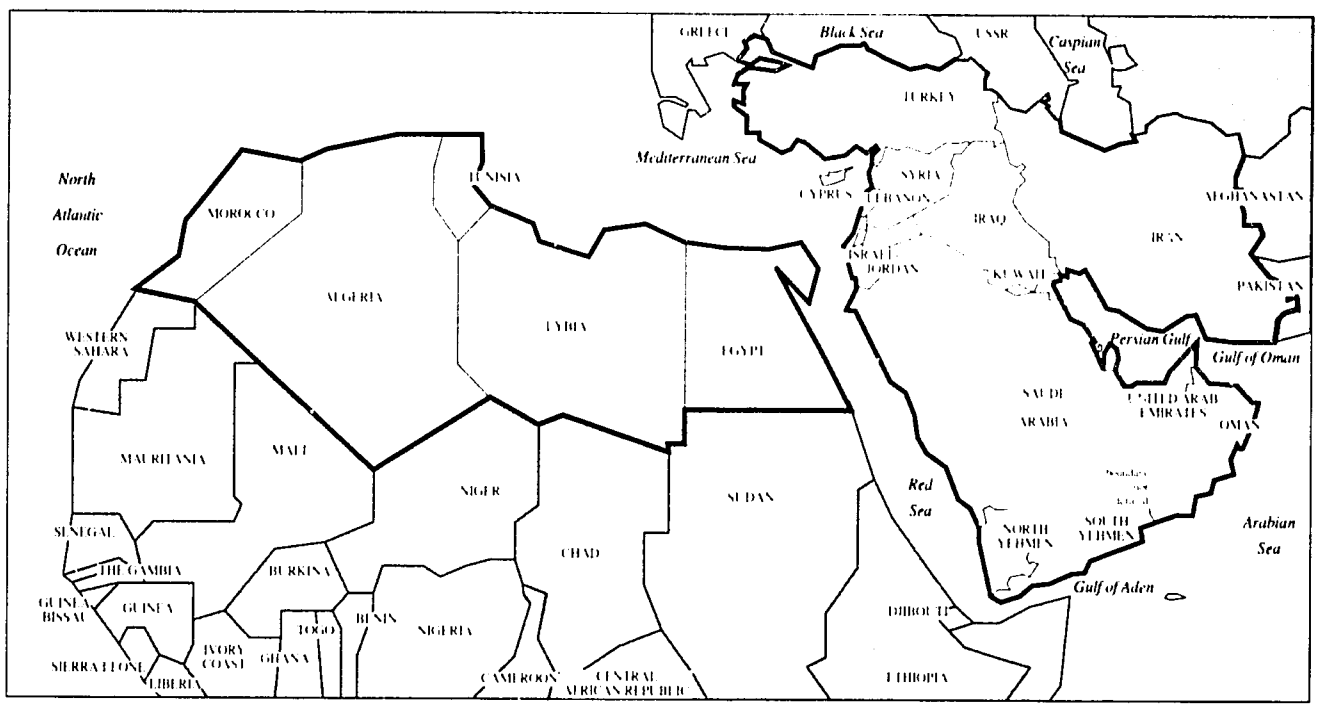
PAKISTAN
NEPAL
BHUTAN
INDIA
BANGLADESH
BURMA
LAOS
THAILAND
VIETNAM
KAMPUCHEA
SRI LANKA
Bay of Bengal
Indian Ocean
NORTH KOREA
SOUTH KOREA
Sea of Japan
JAPAN
North Pacific Ocean
Yellow Sea
TAIWAN
Philippine Sea
South China Sea
PHILIPPINES
BRUNEI
MALAYSIA
INDONESIA
AUSTRALIA

Map 2 - Sub-Saharan Africa



Map 3 - Near East



Map 4 - Latin America