



Financing the Delivery of Contraceptives:
The Challenge of the Next Twenty Years

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I. Introduction

The developing world has dramatically changed attitudes and behavior toward fertility in the past twenty years. When the U.S. Agency for International Development (A.I.D.) started its program in the mid-1960s, there were perhaps 15 million family planning users in the Third World, excluding China.* Today, there are more than 200 million. Prevalence for all methods has increased during the same period from 15 percent of married women of reproductive age in the late 1960s to about 40 percent in 1988. These dramatic shifts in behavior have accompanied changes in governmental and donor policies. The perception of governments and donors has been transformed from one of near indifference and inaction twenty-five years ago to one of intense concern and activity today. In the mid-1960s, donor support for family planning amounted to a few million dollars. Today, that figure exceeds a half a billion dollars. The changing political environment is highlighted by the fact that most developing country governments currently have population policies favoring lower fertility.

The revolutionary shift in contraceptive behavior will likely continue and has very serious financial implications. Concurrent with an increased use of family planning has been an equally impressive expansion of organized family planning programs and a wider range of fertility regulation technologies. This paper examines the costs of buying and providing contraceptives over the past twenty years and estimates what these costs will be over the next twenty years.

The estimates are based on a number of assumptions concerning demand and supply for family planning. Undoubtedly, one could alter some of the assumptions underlying this analysis and arrive at different cost figures -- perhaps higher, perhaps lower. However, there can be little doubt that relative and absolute increases in costs above current levels would remain staggering. Governments and private organizations need to address now the future funding needs suggested by these cost estimates. Indeed, if we do not, the moderate increase in contraceptive use rates (far lower than what countries such as

* Because of its large population, China is excluded throughout this paper since its inclusion would skew the analysis.

Brazil have already achieved) assumed in this paper will not occur.

Recent survey data has confirmed a substantial demand for limiting and spacing births in developing countries. While use of family planning services has been growing in most countries, there is evidence of considerable unmet demand for services (Boulier, 1986). A primary goal among donors and LDC governments is to expand access to information and services in a way that closes the gap between demand and use. By focusing attention on projected costs, this paper will hopefully help to stimulate the resources and commitment needed to ensure that supply increases sufficiently to meet future demand. Before presenting the results, the assumptions about demand and supply underlying the analysis will be reviewed.

II. Contraceptive Demand

How is demand for family planning going to change between now and the year 2010? Demand can be considered in quantitative as well as qualitative terms.

A. How Much Demand? A rough indicator of potential demand is the absolute number of married women of reproductive age. In the thirty-year period 1980-2010, this figure will more than double to 1.3 billion women, representing an increase of 700 million women in just over one generation. (A high degree of confidence is placed on this estimate since most of the women of reproductive age in the year 2010 have already been born.)

An indicator of satisfied demand is the contraceptive prevalence rate (CPR) for all methods among married women aged 15 to 49. A calculation based on U.N. estimates places the 1970 CPR at under 20 percent. By 1980, prevalence had risen to 32 percent, and today it most likely exceeds 40 percent (United Nations, 1987). Using Bongaarts' methodology, contraceptive prevalence rates are estimated at 52 percent for the year 2000 and 57 percent for the year 2010 (Bongaarts and Stover, 1986). These estimates assume that total fertility rates in the developing world will follow the U.N.'s medium-variant projections.*

* While demographers generally rely on the U.N. medium variant projection series, the course of fertility decline hinges on the pace of socioeconomic improvements and program efforts to stimulate demand and supply. The actual path of fertility decline will likely fall within the U.N. high and low variant estimates (see Appendix Table A.2.). Recent evidence indicates that developing country fertility rates may be closer to the high variant path (Haub and Kent, 1988).

The U.N. medium variant fertility decline may be achieved if recent improvements in contraceptive prevalence observed in a number of countries are sustained and repeated elsewhere. Recent surveys show that prevalence is rising in many developing countries. In Thailand, it climbed from 36 percent in 1975 to 67 percent last year (1987). Colombia witnessed an increase from 45 percent to 63 percent in the decade between 1976 and 1986. Even African countries are beginning to show signs of rising contraceptive prevalence rates. In Kenya, prevalence more than doubled in the six years between 1978 and 1984 from 7 to 17 percent (Population Information Program, Johns Hopkins University, 1985).

The absolute numbers of women of reproductive age and the prevalence rates can be used to estimate future contraceptive use. In 1980, there were about 130 million couples using family planning methods. By the year 2000, a little more than 11 years from now, there would be 350 million users in the Third World if current trends continue. The number would reach more than half a billion (556 million) by the year 2010. These numbers signal a dramatically expanding market for family planning services.

B. How Will Demand Change? Not only are large increases in the quantity of demand anticipated, but the character of demand is expected to change almost as significantly. The principal assumptions are that socioeconomic conditions in developing countries will improve and that high rates of urbanization will continue. Family planning programs are also assumed to continue to stimulate demand through information and education efforts and by expanding access to services.

Life expectancy has been shown to be a good proxy for socioeconomic conditions (Lapham and Mauldin, 1985). This indicator has risen steadily since World War II. In 1970, life expectancy in developing countries was 50 years; today, it is 57 years. By 2010, the U.N. estimates that it will reach 64 years (United Nations, 1986). This trend portends continued improvements in socioeconomic conditions despite periodic setbacks that can be expected in some countries. Similarly, the shift of populations from rural to urban areas will continue. In 1970, about one-quarter of the developing world's population lived in urban areas; by the year 2010 more than half are estimated to be urban dwellers (United Nations, 1986).

Improvements in social and economic status (measured by higher incomes, more education and improved health) and urbanization are generally associated with better access to family planning information and services. These conditions also result in the desire for fewer children and the increased use of family planning for limiting as well as spacing births (National Academy of Sciences, 1982).

To summarize, improved socioeconomic conditions and urbanization are associated with: 1) rising general demand for family planning services, 2) more motivated demand for family planning, and 3) greater proportions of users relying on family planning for limiting rather than spacing births. These trends are modifying the profile of contraceptive users resulting in discernible shifts to more effective and long-term methods.

Table 1 presents key trends in demographic, socioeconomic and family planning program indicators underlying this analysis.

Table 1.
Aggregate LDC Demographic, Socioeconomic and
Family Planning Program Indicators: 1970-2010

Characteristic	1970	1980	1990	2000	2010
<u>Demographic Indicators</u>					
Pop (mil)	1,815.2	2,316.8	2,912.6	3,589.3	4,303.0
WRA 15-49 (mil)	410.6	538.7	703.2	899.8	1,278.8
MWRA 15-49 (mil)	307.9	404.0	527.4	674.8	959.1
TFR	5.7	4.8	4.1	3.4	2.9
CPR	17.3	32.0	43.0	51.7	58.0
FP Users	53.3	129.3	226.7	349.1	556.2
<u>Socioeconomic Indicators</u>					
Life Expectancy	49.9	53.7	57.0	60.9	64.2
Percent Urban	27.9	32.9	38.3	44.3	50.7
<u>Family Planning Program Indicator</u>					
Program Effort	22.7	33.0	43.3	53.6	63.9

(See Appendix Table A.1. for explanatory notes.)

III. Contraceptive Supply

Unlike projecting demand, it is not easy to forecast future levels and patterns of supply. Whether the supply of family planning will increase to meet expected increases in demand over the coming twenty years is a major, and in large measure unanswerable, question for this analysis. The factors underlying future supply of family planning information and services are more varied and more complex than for demand (where ninety percent of the women who are potential family planning consumers twenty years from now are already living).

First, new contraceptive technologies could conceivably revolutionize contraceptive use and costs twenty or thirty years

from now. Contraceptive technology has improved considerably since the 1960s. Compared to twenty years ago, family planning users have the choice of safer and more effective contraceptives. While this trend might generally be expected to continue into the next century, the development of a technology that would revolutionize contraceptive use is difficult to predict.

Clinical trials for two new methods, Norplant^R and Net-90, portend an increased availability of contraceptives which can meet the demand for longer-lasting methods. These new methods have the added advantage that they are potentially more attractive to users. Norplant^R, for example, may require only a few hours of clinic time over a five-year period. Not only is Norplant^R less intrusive and less time-consuming than the alternative (oral contraceptives), but there are fewer side effects with this new method, further increasing its attractiveness. Technology has played and hopefully will continue to play a key role in helping family planning users shift to methods which more closely match their fertility intentions and preferences.

Second, family planning programs of the future may or may not reflect past trends. Family planning program effort has been defined as the combination of policy, financial, and program indicators which describe the "total environment" for family planning use (Mauldin and Berelson, 1976 and Lapham and Mauldin, 1985). Program effort in developing countries improved substantially between 1970 and 1980 (see Table 1 above). The challenge of continuing such improvements in the future is formidable. This is especially so as more low-income countries, particularly in sub-Saharan Africa, initiate family planning activities.

Third, the resources allocated to family planning by donors and developing country governments are difficult to predict with confidence. Donor resources for family planning have more than doubled over the period 1971 and 1987 (Spiedel, 1988). When considered in constant dollar terms, however, donor resources have increased only slightly. The future of funding for family planning among donors depends upon allocations for foreign assistance and upon the priority given to population assistance. As more developing country governments have adopted population policies, many are allocating increased resources to support family planning services. The future levels of funding for family planning by governments will obviously be constrained by overall government resources as well as the priority each places on population programs.

Fourth, levels of education and income of the populations in developing countries can be expected to increase, in general,

over the next twenty years. The magnitude and distribution of these increases, which are difficult to predict, will determine the ability of the higher-income segments of these populations to pay for services. Because the elasticity of demand for private health and family planning services with respect to income is high, a larger future role can be anticipated for the for-profit private sector as people have more discretionary income (Lewis and Kenney 1988.) The extent to which the for-profit private sector responds to this demand is also difficult to predict and depends, in part, on regulations that affect local production, import, and distribution of family planning commodities.

IV. The Projection Analysis

Based on the foregoing assumptions about future demand for contraception, a projection analysis was undertaken, comprised of three elements.

- o Estimates are made of current method mix and future changes in this mix.
- o Estimates are made of the future number of contraceptive users and commodity requirements.
- o Future commodity costs are estimated.

Cost estimates are generated using currently available contraceptive methods (Baseline A) and two alternative scenarios which assume small shifts (Scenario B) and moderate shifts (Scenario C) to two new contraceptive methods -- Norplant^R and the Net-90 injectable. These two new methods are chosen for this analysis because they are expected to become commercially viable in the 1990s. While other methods like the vaginal ring and the monthly injectable might also become available, Norplant^R and Net-90 are used as examples in order to keep the analysis manageable. For analytical purposes, it is assumed that these new methods will achieve significant combined market shares of three and six percent under scenarios B and C respectively by the year 2000.

Briefly the methodology used to estimate future demand, method mix and costs consists of the following computations.

A. Estimating Current and Future Method Mix

1. Current method mix: Method mix data from 50 LDCs surveyed between 1976 and 1986 were used to construct averages for each of three geographic regions -- Africa, Asia/Near East, and Latin America (U.N. 1987, supplemented by DHS survey reports). These 50 LDCs

represent over 75 percent of the population all LDCs. Regional averages are weighted by Married Women of Reproductive Age (MWRA) to produce a 1980 method mix estimate for all LDCs.

2. Future method mix: To estimate future (and 1970) method mix, contraceptive use is assumed to change as countries undergo socioeconomic and family planning program development. Using method mix data as described above, the percent of contraceptors currently using a given method is regressed on two commonly-accepted indicators of socioeconomic development (life expectancy and urbanization) and a composite measure of program performance (Mauldin and Lapham 1984).

The resulting set of six method-specific regression equations is used to estimate future method mix, based on U.N. estimates for future levels of life expectancy and urbanization and assuming the 1972-1982 trend in program effort will continue (see Appendix Tables A.3a. and A.3b.).

B. Estimating Current and Future Users and Commodity Requirements

1. Current CPR: An estimate of current (1980) contraceptive prevalence is derived in the same way as method mix described in part A-1 above, using CPR estimates from 50 surveyed LDCs.
2. Future Contraceptive Use and Commodity Requirements: As a basis for estimating future contraceptive prevalence, it is assumed that fertility in LDCs will follow the U.N.'s medium variant projection series. The projection analysis employs Bongaarts' family planning demand methodology (Bongaarts and Stover, 1986).
3. Comparative Estimates of Use and Commodity Requirements:

Bongaarts' methodology is used to generate three scenarios of future contraceptive use and commodity requirements. These illustrate how the introduction of new contraceptive methods might affect total costs of family planning commodities. These three scenarios include:

- (a) "Baseline A" projection which assumes that no new contraceptive methods are introduced over the next twenty years,

(b) "Scenario B" projection which assumes there is a small shift toward two new methods (Norplant^R and the Net-90 injectable), and

(c) "Scenario C" projection which assumes there is a moderate shift toward these two methods over time.

In Scenario B, six percent of all users is assumed to shift to these methods by the year 2010. In Scenario C, a twelve percent shift to these methods is assumed. Recognizing that new methods may attract new users, for the purpose of this analysis, Norplant^R is assumed to displace some sterilization and to a lesser degree IUD use. The Net-90 injectable is assumed to displace pills and to a lesser degree IUD use.

C. Estimating Future Commodity and Service Delivery Costs

1. Commodities: To determine commodity costs associated with meeting the projected method-specific demand for family planning in each scenario, 1988 unit prices paid by A.I.D. are applied as multipliers. Cost estimates are based on constant 1988 dollars (see Appendix Table C.1.).
2. Services: The total cost of providing family planning services in LDCs is the sum of the commodity costs plus service delivery costs. \$18.00 is assumed as the average cost of delivering contraceptive services for one couple year of protection. This is based on international averages (Bulatao, 1985).

V. Findings

The analytic framework described above produces estimates of method mix, contraceptive commodity costs and service delivery costs for the period 1970-2010.

A. Method Mix: The regression analysis indicates that as socioeconomic conditions improve, family planning users will shift away from temporary and non-supply* methods to longer-term methods. Table 2 summarizes projected method mix for the Third World to the year 2010 based on currently available methods.

* "Non-Supply" methods include withdrawal, rhythm and folk methods.

Table 2.
Contraceptive Method Mix Estimates for LDCs
Baseline A: No New Methods
(percents)

Method	1970	1980	1990	2000	2010
Sterilization	12.9	18.0	23.0	28.0	33.0
IUD	6.6	8.0	9.3	10.9	12.4
Pill	22.1	22.8	23.2	24.1	24.6
Condom	3.0	4.0	4.9	5.9	6.7
Other Supply*	4.9	5.7	6.3	7.0	7.6
Non-Supply	50.5	41.6	33.3	24.1	15.7
Total	100.0	100.0	100.0	100.0	100.0

(See Appendix Table A.4. for explanatory notes.)

The most dramatic shift occurring in the Baseline A projection is the steep decline in the use of non-supply methods. In 1970, non-supply methods accounted for half of all contraceptive use. By the year 2010, these methods will comprise only about 15 percent of the total. A second notable shift occurs with longer-term methods -- sterilization and IUDs. As expected, projected use of these longer-term methods increases over time with sterilization more than doubling between 1970 and 2010. According to this estimate, in the absence of new contraceptive methods, sterilization will account for one-third of all contraceptive use twenty years from now. IUDs will nearly double over this period, while the combined use of more temporary methods (i.e., pill, condom and other supply) increases more modestly from 30 to 39 percent. Overall, by the year 2010 the proportion of demand for longer-term methods will more than double from 1970 levels.

The next step in the method mix analysis is to factor in market shares for Norplant^R and Net-90. In Scenario B, these methods increase their combined market share to account for 6 percent by 2010; in Scenario C, they increase to 12 percent. Because they are longer-term methods, it is assumed that they will substitute for other longer-term methods. Norplant^R, under these scenarios, will substitute for sterilization and to a lesser extent for the IUD. Net-90 will substitute for the pill and to a lesser extent for the IUD. The results of these market share shifts in the years 2000 and 2010 for the affected methods are presented in Table 3.

* "Other supply" methods include diaphragms, foam, tablets and injectables.

Table 3.
Contraceptive Method Mix for LDCs, 2000-2010
Scenario B and C Projections
(percents)

Method	2000	2010
Scenario B		
Sterilization	27.0	30.9
IUD	10.0	10.6
Norplant ^R	1.5	3.0
Injectable	1.5	3.0
Pill	23.1	22.5
Scenario C		
Sterilization	25.9	28.8
IUD	9.1	8.8
Norplant ^R	3.0	6.0
Injectable	3.0	6.0
Pill	22.0	20.4

(See Appendix Tables A.5. and A.6. for explanatory notes.)

B. Contraceptive Users and Commodities: Future contraceptive use by method required to achieve the U.N. medium variant fertility levels is presented in Table 4. The number of users grows more than ten-fold over this forty-year period. This increase results, in part, from a growth in numbers of MWRA, which increase by nearly three-fold over the period. It is also due to a rising rate of contraceptive prevalence which increases by more than three-fold over the period.

Table 4.
Contraceptive Users by Method for LDCs, 1970-2010
Baseline A: No New Methods
(millions)

Method	1970	1980	1990	2000	2010
Sterilization	6.9	23.3	52.1	97.8	183.6
IUD	3.5	10.3	21.4	38.1	69.0
Pill	11.8	29.5	52.6	84.1	136.8
Condom	1.6	5.2	11.1	20.6	37.3
Other Supply	2.6	7.4	14.3	24.4	42.3
Non-Supply	26.9	53.7	75.5	84.1	87.3
Total Users	53.3	129.4	227.0	349.1	556.3

(See Appendix Table B.1. for explanatory notes.)

C. Commodity and Service Delivery Costs: The foregoing projections when coupled with unit costs yield estimates of future commodity costs by method. Table 5 presents aggregate commodity costs under the different method mix scenarios.

Table 5.
Contraceptive Commodity Cost Estimates for LDCs
(millions of 1980 \$)

Scenario	1970	1980	1990	2000	2010
Baseline	53	145	271	456	786
Scenario B	--	--	--	533	1,016
Scenario C	--	--	--	602	1,245

(See Appendix Tables C.2.- C.4. for explanatory notes.)

Costs escalate dramatically under each of these three scenarios. With the introduction of new contraceptive methods in scenarios B and C, commodity costs increase even more quickly. Under Scenario B, which assumes a small shift toward new methods, total commodity costs increase by about 30 percent over baseline by the year 2010. Under Scenario C, which assumes a stronger shift toward these methods, there is an increase of about 60 percent over baseline costs. These cost increases are due largely to the introduction of Net-90, which is substantially more expensive than the methods for which it is substituted (See Appendix Table C.6.).

Considered alone, these increased costs seem inordinately large. Commodity costs are, however, only a fraction of total service costs. When combined with service delivery costs, the cost differentials associated with the introduction of new methods become greatly attenuated as illustrated in Table 6. Costs under Scenario B increase by less than 3 percent over baseline by the year 2010 and under Scenario C increase by just 5 percent. Seen in this light, supply costs are relatively unaffected by shifts to new contraceptive methods. However, service delivery costs are assumed here to be fixed over time and across methods. A more complete analysis would consider the service delivery costs associated with specific types of methods and the added costs of introducing new methods.

What is notable in this cost projection is the dramatic increase in service delivery costs over this forty-year period. Considered in constant dollars, there is more than a seventeen-fold increase in costs. Resources required to meet projected family planning demand in the year 2010 are more than

Table 6.
Total Service Delivery Cost Estimates for LDCs
(millions of 1988 \$)

Method	1970	1980	1990	2000	2010
Baseline A	528	1,508	2,998	5,226	9,227
Scenario B	--	--	--	5,301	9,445
Scenario C	--	--	--	5,365	9,665

(See Appendix Table C.7. for explanatory notes.)

triple that required today. This translates to cost increases averaging more than \$300 million annually over the next twenty years.

VI. Discussion

A plethora of demographic and program data are used in this analysis. A number of straight-forward assumptions are made about demand for family planning in order to project future method mix, the potential number of contraceptive users and associated commodity and delivery costs under different method mix scenarios. Throughout the analysis, a conservative approach has been taken to estimate the financial needs for family planning commodities and services. In particular, estimates of commodity costs are low since they are based on A.I.D. procurement prices which are among the lowest anywhere in the world.

Similarly, the overhead cost of \$18 per CYP is an underestimate since it is largely based on successful countries in Asia and Latin America. Many of the additions to the pool of family planning users in the next twenty years will come from Sub-Saharan Africa where costs will probably be much higher than the \$18 estimate. The delivery cost is also assumed to be fixed, regardless of method. However, methods that provide multiple-year protection may have lower associated annual service costs when amortized over a multiple-year period. Methods that require clinic facilities, highly-trained staff and frequent follow-up (such as Norplant^R) may have higher associated annual service costs. Lastly, new methods may have higher associated service costs during their introductory period to the extent that they require service staff retraining, changes in delivery system structure, new equipment purchases, and introductory IEC efforts.

The analysis, therefore, may underestimate the cost of providing family planning services in the Third World over the next two decades. Nevertheless, the total cost is calculated at over nine billion dollars annually by the year 2010. This figure represents three-times the amount of money and effort currently being invested in family planning. The cumulative amount of money necessary to cover costs for the two decades, 1990-2010, is estimated to exceed \$110 billion in 1988 dollars.

The principal conclusions are two-fold:

1. Most importantly, no matter what calculus one uses, the cost and effort to provide services over the next twenty years will be enormous. The annual estimate for the year 2010 is between \$9.0 and \$10.0 billion. Even if the estimate is low or high by a few billion, the results are still staggering. Resources must increase by more than \$300 million each year, on average, to enable projected declines in fertility to take place.

2. The cost of contraceptives will not have a major influence on the overall cost structure of family planning. By themselves, the cost of commodities varies considerably depending upon method mix, but when considered as part of overall service delivery, there is minimal effect on the total annual bill. Of course, new methods that have higher service delivery costs could affect total costs considerably.

Perhaps a more significant role of new contraceptive technology is its potential effect not on supply but on demand for family planning. The availability of methods that are longer-term, effective, safe and attractive to the user can stimulate future demand for contraceptives (Reboussin, et. al., 1987 and Knodel, et. al., 1987). Contraceptive technology should continue to be innovative in order to produce methods that can satisfy consumer needs and preferences.

VII. Challenge for the Future

All of the above -- generating demand, furnishing supply and developing better contraceptive technologies -- will require large amounts of resources over the next two decades.

The rising need for resources is occurring at a time when donor funding has actually declined in constant dollar terms. When considered against the rising demand for services in developing countries, donor resources went further twenty years ago than today. This places us in a resource bind. Donors may be unable or unwilling to carry the bulk of the responsibility for family

planning in the future. Donors face formidable challenges in responding effectively to future resource requirements:

- o Available funds need to be used more effectively and
- o Local governments and the private sector need to be stimulated to provide greater resources.

Where will the resources come from to meet future needs? In 1980, the costs of family planning were shared almost equally among donors, developing country governments and the private sector. Even under the most optimistic assumptions about increases in contributions, the sheer numbers of new users will mean that the donors' share of the total will decline substantially over the next two decades (Gillespie, 1987). Local governments and the private sector, then, must make up the considerable difference.

Given these severe financial constraints, what can be done? At A.I.D., we realize that we have to be more imaginative and thoughtful in our approaches. To make the resources go farther we are:

1. Stimulating new sources of investment in family planning;
2. Concentrating on activities which are highly leveraged, that is, which can multiply our investments many times over;
3. Improving the efficiency (management) of our family planning programs; and
4. Improving contraceptive technology.

Stimulating New Sources of Investment. A relative decline of resources has caused us to look at potential new sources of support for family planning. A World Bank study estimates that 80 percent of the new funds needed to expand family planning services will have to come from developing country governments and the private sector (Bulatao, 1985). Stimulating governments, businesses and consumers to assume the future costs of family planning is an appropriate and necessary role for donors.

Concentrating on Leveraged Activities. One key to coping successfully with resource constraints is to ensure that activities which are undertaken have a multiplier effect in the future. Therefore, A.I.D. supports a range of activities which affect resource allocations today and in the future. Among the most important are efforts to encourage policy reforms,

operational improvements, and greater availability of more effective and inexpensive contraceptives.

For example, countries can make the contraceptive market place more attractive for the private sector with relatively minor, but highly-leveraged changes such as eliminating import duties, allowing contraceptive advertising, and offering tax or other incentives to businesses.

Improving Efficiency of Programs. To stretch resources, existing systems must be made to work better. After all, the major cost of family planning is not the commodities but the systems used to deliver them. We can obtain more for our dollar if available resources are used more efficiently. A.I.D. is placing more emphasis on good management. Additional money is being invested in training to improve the management skills of family planning program managers. Assistance in training for improved logistics management has also been expanded. More efficient contraceptive distribution systems can increase coverage without increasing costs. A.I.D. continues to support operations research as a way of testing the efficacy and efficiency of service delivery programs. Various research studies have shown that better quality services can increase acceptance and promote continued use of family planning methods (Lipton, et al., 1987).

Donors have other potential approaches to improved efficiencies that could have large pay-offs. Donors and developing world governments should explore possibilities such as local production and consortium purchasing of contraceptives -- keeping in mind the need to continue to provide a wide spectrum of high quality products. Finally and perhaps most immediately, there should be a much greater coordination between donors than presently exists -- not only to avoid redundancies, but also to build on each other's strengths.

Improving Contraceptive Technology. Contraceptive technology can have a major influence on the supply and demand for family planning services. New and improved products will increase the safety and effectiveness of contraceptive use in the future. Safer and more effective contraceptives will in turn stimulate the demand for family planning, and at the same time reduce unmet demand. Perhaps more importantly, new contraceptive technology can affect service delivery costs. We have seen that the major cost component of family planning services is delivery. Contraceptives that have low initial fixed costs and low recurrent delivery costs will lower the average cost of family planning services and thus increase availability. Given the enormous financial needs outlined in this paper, the delivery costs of contraceptives should be an important factor in future research funding.

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APPENDIX A
PROJECTION OF CONTRACEPTIVE METHOD MIX

Table A.1.
Aggregate LDC Demographic, Socioeconomic and
Family Planning Program Indicators: 1970-2010 *

Characteristic	1970	1980	1990	2000	2010
<u>Demographic Indicators</u>					
Pop (mil)	1,815.2	2,316.8	2,912.6	3,589.3	4,303.0
WRA 15-49 (mil)	410.6	538.7	703.2	899.8	1,278.8
MWRA 15-49 (mil)	307.9	404.0	527.4	674.8	959.1
TFR	5.7	4.8	4.1	3.4	2.9
CPR	17.3	32.0	43.0	51.7	58.0
FP Users	53.3	129.3	226.7	349.1	556.2
<u>Socioeconomic Indicators</u>					
Life Expectancy	49.9	53.7	57.0	60.9	64.2
Percent Urban	27.9	32.9	38.3	44.3	50.7
<u>Family Planning Program Indicator</u>					
Program Effort	22.7	33.0	43.3	53.6	63.9

- * Note: Throughout analysis, LDC estimates exclude China.
Sources for indicators as follows:
- Population, women of reproductive age (WRA), total fertility rate (TFR), life expectancy, and urban estimates are drawn from United Nations population projections (medium variant), 1986.
 - Married women of reproductive age (MWRA) is derived from WRA and assumes that 75% of the women 15-49 are married.
 - Contraceptive prevalence rate (CPR) for 1980 is derived from U.N. data (1987) and augmented by recent DHS surveys.
 - Contraceptive prevalence rates for remaining years are derived using Bongaarts' family planning use estimation methodology (Bongaarts and Stover, 1986). This methodology estimates future numbers of contraceptive users and the associated commodity requirements given assumptions about fertility trends (in this case, the U.N. medium variant TFR estimates), other proximate determinants of fertility (assumed to be fixed throughout the projection period based on 1980 regionally-weighted averages), method mix (derived from the regression analysis presented in Tables A.3a. and A.3b.) and effectiveness of each method (mid-range estimates taken from Population Crisis Committee, 1985).
 - Family planning (FP) users are derived by applying CPRs to MWRA.
 - Program effort is adapted from Lapham and Mauldin (1984) estimates for 1972 and 1982. Point estimates were derived using linear interpolation and extrapolation.

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Table A.2.
Aggregate LDC Demographic and Family Planning
Program Indicators: 1970-2010 *

Characteristic	1970	1980	1990	2000	2010
<u>Married Women of Reproductive Age (millions)</u>					
High Variant				679.5	987.7
Medium Variant	307.9	404.0	527.4	674.8	959.1
Low Variant				670.9	934.5
<u>Total Fertility Rate</u>					
High Variant			4.4	3.9	3.3
Medium Variant	5.7	4.8	4.1	3.4	3.0
Low Variant			3.7	3.0	2.4
<u>Contraceptive Prevalence Rate</u>					
High Variant			39.7	43.6	53.8
Medium Variant	17.3	32.0	43.0	51.7	57.4
Low Variant			46.6	51.8	64.2
<u>Family Planning Users (millions)</u>					
High Variant			209.4	319.4	531.0
Medium Variant	53.3	129.3	226.7	349.1	475.3
Low Variant			246.0	347.4	599.9

- * Note: Sources for indicators as follows:
- Women of reproductive Age (WRA) and TFR estimates are drawn from United Nations population projections (medium variant), 1986.
 - Married women of reproductive age (MWRA) is derived from WRA and assumes that 75% of the women 15-49 are married.
 - Contraceptive prevalence rate (CPR) for 1980 is derived from U.N. data (1987) and augmented by recent DHS surveys. Contraceptive prevalence rates for remaining years are derived using Bongaarts' family planning use estimation methodology (Bongaarts and Stover, 1986).
 - Family planning (FP) users are derived by applying CPRs to MWRA.

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Table A.3a.
Method Mix Determination Regression Equations

Variables in Equation	Regressor					
	(1)		(2)		(3)	
	Sterilization		IUD		Pill	
	B	(t)	B	(t)	B	(t)
Life Expectancy	.216	(.49)	.136	(.70)	.617	(1.40)*
Percent Urban	-.034	(-.18)	.150	(1.85)**	.077	(.42)
Program Effort	.434	(3.62)***	.010	(.19)	-.194	(-1.62)*
----- Summary Statistics -----						
Intercept	-6.82		-4.64		-6.46	
R-squared	.340		.164		.091	
Total F	7.91 **		3.01 *		1.53	

N = 50

* = significant at .20 level

** = significant at .10 level

*** = significant at .05 level

Note: Method mix data are drawn from 50 national surveys conducted between 1976 and 1986. Life expectancy and percent urban data are drawn from United Nations (1986) estimates for 1980. Program effort data are drawn from Lapham and Mauldin (1985) analysis of family planning programs conducted in 1982.

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Table A.3b.
Method Mix Determination Regression Equations

Variables in Equation	Regressor					
	(4)		(5)		(6)	
	Condom		Other Supply		Non-Supply	
	B	(t)	B	(t)	B	(t)
Life Expectancy	.295	(2.32)***	.129	(.99)	-1.394	(-2.63)***
Percent Urban	.055	(-1.04)	-.041	(-.77)	-.097	(-.44)
Program Effort	.016	(.47)	.042	(1.18)	-.308	(-2.14)***
----- Summary Statistics -----						
Intercept	-10.55		-1.29		129.76	
R-squared	.188		.107		.438	
Total F	3.54 *		1.84		11.96 ***	

N = 50

* = significant at .20 level

** = significant at .10 level

*** = significant at .05 level

Note: Method mix data are drawn from 50 national surveys conducted between 1976 and 1986. Life expectancy and percent urban data are drawn from United Nations (1986) estimates for 1980. Program effort data are drawn from Lapham and Mauldin (1985) analysis of family planning programs conducted in 1982.

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Table A.4.
 Contraceptive Method Mix Estimates for LDCs
 Baseline A: No New Methods *
 (percents)

Method	1970	1980	1990	2000	2010
Sterilization	12.9	18.0	23.0	28.0	33.0
IUD	6.6	8.0	9.3	10.9	12.4
Norplant ^R	--	--	--	--	--
Injectable	--	--	--	--	--
Pill	22.1	22.8	23.2	24.1	24.6
Condom	3.0	4.0	4.9	5.9	6.7
Other Supply	4.9	5.7	6.3	7.0	7.6
Non-Supply	50.5	41.6	33.3	24.1	15.7
Total	100.0	100.0	100.0	100.0	100.0

* Note: Sterilization includes male and female methods; other supply methods include injectables, foam, tablets, and diaphragms; non-supply methods include withdrawal, rhythm, and folk methods.

The 1980 method mix is derived using prevalence data from 50 LDC's (representing over 75 percent of the population in all LDCs except China) surveyed between 1976 and 1986. A regionally-weighted average method mix for all LDCs was then calculated.

To estimate future (and 1970) method mix, contraceptive use was hypothesized to change as countries undergo socioeconomic and family planning program development. Two indicators of socioeconomic development (life expectancy and urbanization) and a composite measure of program performance (Mauldin and Lapham 1984) were regressed on the percent of contraceptors using each method (regression results are presented in Tables A.3a. and A.3b.). Using U.N. estimates for future life expectancy and urbanization and assuming the 1970-1980 trend in program performance will continue, future (and 1970) contraceptive method mix was estimated applying the regression coefficients to estimated future levels of socioeconomic and family planning program development.

Table A.5.
 Contraceptive Method Mix Estimates for LDCs
 Scenario B: Small Shift to New Methods
 (percents)

Method	1970	1980	1990	2000	2010
Sterilization	12.9	18.0	23.0	27.0	30.9
IUD	6.6	8.0	9.3	10.0	10.6
Norplant ^R	--	--	--	1.5	3.0
Injectable	--	--	--	1.5	3.0
Pill	22.1	22.8	23.2	23.1	22.5
Condom	3.0	4.0	4.9	5.9	6.7
Other Supply	4.9	5.7	6.3	7.0	7.6
Non-Supply	50.5	41.5	33.3	24.1	15.7
Total	100.0	100.0	100.0	100.0	100.0

Table A.6.
 Contraceptive Method Mix Estimates for LDCs
 Scenario C: Moderate Shift to New Methods
 (percents)

Method	1970	1980	1990	2000	2010
Sterilization	12.9	18.0	23.0	25.9	28.8
IUD	6.6	8.0	9.3	9.1	8.8
Norplant ^R	--	--	--	3.0	6.0
Injectable	--	--	--	3.0	6.0
Pill	22.1	22.8	23.2	22.0	20.4
Condom	3.0	4.0	4.9	5.9	6.7
Other Supply	4.9	5.7	6.3	5.6	4.6
Non-Supply	50.5	41.6	33.3	24.1	15.7
Total	100.0	100.0	100.0	100.0	100.0

APPENDIX B
PROJECTION OF CONTRACEPTIVE USERS

Table B.1.
Contraceptive Users by Method for LDCs, 1970-2010
Baseline A: No New Methods *
(millions)

Method	1970	1980	1990	2000	2010
Sterilization	6.9	23.3	52.1	97.8	183.6
IUD	3.5	10.3	21.4	38.1	69.0
Norplant ^R	--	--	--	--	--
Injectable	--	--	--	--	--
Pill	11.8	29.5	52.6	84.1	136.8
Condom	1.6	5.2	11.1	20.6	37.3
Other Supply	2.6	7.4	14.3	24.4	42.3
Non-Supply	26.9	53.7	75.5	84.1	87.3
Total Users	53.3	129.4	227.0	349.1	556.3

* Note: Users by method generated through Bongaarts' family planning use methodology (Bongaarts and Stover, 1986) based on Baseline A method mix shift presented in Table A.4.

Table B.2.
Contraceptive Users by Method for LDCs, 1970-2010
Scenario B: Small Shift to New Methods *
(millions)

Method	1970	1980	1990	2000	2010
Sterilization	6.9	23.3	52.1	93.9	171.7
IUD	3.5	10.3	21.4	34.9	58.9
Norplant ^R	--	--	--	5.3	16.7
Injectable	--	--	--	5.3	16.7
Pill	11.8	29.5	52.6	80.6	125.0
Condom	1.6	5.2	11.1	20.6	37.2
Other Supply	2.6	7.4	14.3	24.4	42.2
Non-Supply	26.9	53.7	75.5	84.1	87.2
Total Users	53.3	129.4	227.0	349.0	555.5

* Note: Users by method generated through Bongaarts' family planning use methodology (Bongaarts and Stover, 1986) based on Scenario B method mix shift presented in Table A.5.

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Table B.3.
 Contraceptive Users by Method for LDCs, 1970-2010
 Scenario C: Moderate Shift to New Methods *
 (millions)

Method	1970	1980	1990	2000	2010
Sterilization	6.9	23.3	52.1	90.3	159.8
IUD	3.5	10.3	21.4	31.7	48.8
Norplant ^R	--	--	--	10.5	33.3
Injectable	--	--	--	10.5	33.3
Pill	11.8	29.5	52.6	76.7	113.2
Condom	1.6	5.2	11.1	20.6	37.2
Other Supply	2.6	7.4	14.3	24.4	42.2
Non-Supply	26.9	53.7	75.5	84.1	87.1
Total Users	53.3	129.4	227.0	348.5	554.9

* Note: Users by method generated through Bongaarts' family planning use methodology (Bongaarts and Stover, 1986) based on Scenario C method mix shift presented in Table A.6.

APPENDIX C

PROJECTION OF COMMODITY AND SERVICE DELIVERY COSTS

Table C.1.
Unit Costs for Contraceptive Commodities *

Method	Commodity Costs
Sterilization	\$ 9.60 per procedure
IUD (Copper T 380)	\$ 0.92 per unit
Norplant ^R	\$16.75 per unit
Net-90	\$ 2.75 per unit
Pill	\$ 0.12 per cycle
Condom	\$ 0.05 per piece
Other Supply	\$ 6.15 per unit
Non-Supply	\$ 0.00

* Note: The unit costs for IUD, Pill and the Condom are the prices paid by A.I.D. in 1988. The sterilization cost reflects only the price for the medical supplies associated with the procedure and is obtained from cost analysis by Profamilia in Colombia (Trias, 1988). The unit cost for "other supply" methods is an average of the annual unit costs for injectables, foam, tablets and diaphragms. To derive method-specific annual commodity costs, the unit costs are multiplied by the number of commodities needed to achieve one couple year of protection.

Table C.2.
Commodity Cost Estimates for LDCs
Baseline A: No New Methods *
(millions of 1988 \$)

Method	1970	1980	1990	2000	2010
Sterilization	11	28	47	75	132
IUD	1	2	4	7	13
Pill	18	46	82	131	213
Condom	7	23	50	93	168
Other Supply	16	46	88	150	260
Non-Supply	0	0	0	0	0
Total	53	145	271	456	786

* Note: CYP costs presented in Table C.1. are applied to the estimated number of users by method presented in Table B.1. to produce these cost estimates.

Table C.3.
Commodity Cost Estimates for LDCs
Scenario B: Small Shift to New Methods *
(millions of 1988 \$)

Method	1970	1980	1990	2000	2010
Sterilization	11	28	47	75	120
IUD	1	2	4	7	11
Pill	18	46	82	131	195
Condom	7	23	50	93	168
Norplant ^R	--	--	--	25	80
Injectable	--	--	--	58	183
Other Supply	16	46	88	150	260
Non-Supply	0	0	0	0	0
Total	53	145	271	533	1,016

Note: CYP costs presented in Table C.1. are applied to users by method presented in Table B.2. to produce these cost estimates.

Table C.4.
Commodity Cost Estimates for LDCs
Scenario C: Moderate Shift to New Methods
(millions of 1988 \$)

Method	1970	1980	1990	2000	2010
Sterilization	11	28	47	69	108
IUD	1	2	4	6	9
Pill	18	46	82	120	177
Condom	7	23	50	93	167
Norplant ^R	--	--	--	50	159
Injectable	--	--	--	115	366
Other Supply	15	45	87	150	260
Non-Supply	0	0	0	0	0
Total	53	144	271	602	1,245

* Note: CYP costs presented in Table C.1. are applied to users by method presented in Table B.3. to produce these cost estimates.

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Table C.5.
Contraceptive Commodity Cost Estimates for LDCs
(in million \$)

Scenario	1970	1980	1990	2000	2010
Baseline	53	145	271	456	786
Scenario B	--	--	--	533	1,015
Scenario C	--	--	--	602	1,245

Table C.6.
Annual Commodity Costs: New vs. Substitute Methods
Scenario C Market Shares
(millions)

Method	2000		2010	
	Change in Mkt Share	Change in Commod Costs	Change in Mkt Share	Change in Commod Costs
<u>New Methods</u>	+ 6.0 %	\$ 165.0	+ 12.0 %	\$ 525.7
Norplant ^R	+ 3.0 %	\$ 50.0	+ 6.0 %	\$ 159.4
Net-90	+ 3.0 %	\$ 115.0	+ 6.0 %	\$ 366.3
<u>Substitutes</u>	- 6.0 %	\$ 18.9	- 12.0 %	\$ 65.1
Sterilization	- 2.1 %	\$ 5.8	- 4.2 %	\$ 24.0
IUD	- 1.8 %	\$ 1.5	- 3.6 %	\$ 4.3
Pill	- 2.1 %	\$ 11.6	- 4.2 %	\$ 36.8
<hr/>				
<u>Annual Costs</u>				
Baseline A		\$ 456.3		\$ 785.9
Scenario C		\$ 602.3		\$1,245.4
Total Increase		\$ 146.0		\$ 459.5
<u>Percent Increase</u>				
Total		(32.0)		(58.5)
Due to Norplant ^R		(9.5)		(16.9)
Due to Net-90		(22.5)		(41.6)

Table C.7.
 Total Service Delivery Cost Estimates for LDCs *
 (millions of 1988 \$)

Method	1970	1980	1990	2000	2010
Baseline A	528	1,508	2,998	5,226	9,227
Scenario B	--	--	--	5,301	9,445
Scenario C	--	--	--	5,365	9,665

* Note: The service delivery cost (exclusive of commodities) is assumed to average \$18 per couple year of protection, regardless of method and is based on an aggregate estimate by Bulatao (1986). Total costs presented here include commodity costs.

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