Assessing Costs and Benefits Of Sexual and Reproductive Health Interventions

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Chapter 1

Introduction

In this current climate of financial constraints coupled with competing priorities among developmental goals, it becomes ever more critical for policymakers and others responsible for allocating resources to have first-rate tools available as a guide for effective decision making. The overall aim of this report is to inform such decision makers about the key findings of existing studies about the costs and benefits of investments in sexual and reproductive health, to identify what factors the studies encompass and what they leave out, and to provide a complete picture of what the costs and benefits would look like, including benefits that are hard to measure. This report is a technical companion to a shorter monograph.[1]

It has three parts: (1) a review and synthesis of what is known about the costs and benefits of investments in sexual and reproductive health; (2) a comprehensive outline that can be used by researchers and policymakers to view the gamut of costs and benefits, which, it is hoped, will lead to improvement in the measurement of costs and benefits of sexual and reproductive health investments; and (3) in order to demonstrate the advantages of taking a more comprehensive approach to measuring costs and benefits, a partial application of the framework in the reproductive and maternal health field, namely in the area of contraceptive services and supplies.

Benefits of Interventions: Medical versus Nonmedical Perspectives

A medical perspective regarding the benefits of health interventions has attained a predominant position in policy analysis over the last decade. Starting with the World Bank's World Development Report 1993: Investing in Health[2] and continuing with the Disease Control Priorities project,[3] the Global Burden of Disease project,[4] the World Health Organization's Commission on Macroeconomics and Health (CMH)[5] and ultimately the United Nations Millennium Development Goals (MDGs),[6] a major policy thrust has concentrated on the medical

benefits of more effective health care services and systems. The CMH report, however, broadened the scope of benefits beyond direct medical ones (deaths and disability averted) to economic gains from better health.

While it is only natural that the effectiveness of health interventions be primarily measured against gains in the health status of the affected population, there are important aspects of sexual and reproductive health, the focus of this project, that do not fit into this medical perspective. Bearing children is not an illness. Ideally, it is a healthy reproductive act voluntarily undertaken by women in their desire to build a family. Nonetheless—and aside from the health risks associated with pregnancy, delivery and the postpartum period—important and significant costs result from unplanned pregnancies. Unplanned pregnancies are those that occur to women who wish to have no more children or who wish to postpone childbearing to some future time. Not only do unplanned pregnancies lead to important negative medical outcomes in the form of death and disability, they also generate other important negative consequences in economic, social and psychological areas; ultimately, these outcomes negatively impact socioeconomic development and poverty reduction.

The consensus reached at the 1994 International Conference on Population and Development (ICPD) which resulted in the ICPD Program of Action,[7] called for concrete and quantitative improvement in many key components of sexual and reproductive health, including safe motherhood. At Cairo, governments agreed to a 20-year program to improve sexual and reproductive health and set intermediate benchmarks, which the global community committed itself to achieve. For example, by 2005 the unmet need for contraceptives is to be reduced by 50% by expanding access to a broad range of contraceptive methods; prenatal and basic obstetric care, as well as testing and treatment for sexually transmitted infections (STIs), are to be available in 60% of all primary health care facilities. Concrete targets were set to reduce maternal mortality, combat HIV

and increase child survival. The donor community agreed to provide $5.7 billion annually by 2000 and $6.1 billion by 2005 to achieve these goals, and developing countries themselves were to contribute $11.3 billion by 2000 and $12.4 billion by 2005.[8]

In 2000, however, the global expenditure on reproductive health was only $10.9 billion—$6.1 billion short of the total amount committed. Donor countries contributed $2.6 billion annually—less than half of their commitment. Developing countries contributed $8.3 billion—about 73% of what they committed at ICPD.[9] Despite the agreement at Cairo, competing demands for resources for development have led to financial shortfalls, which threaten the goals set at Cairo.

Cost-benefit Methodology

Several techniques are available for the economic evaluation of a proposed action – be it a project, intervention, investment or budget allocation.[10] Appendix 1.1 is adapted from a useful summary of different techniques.[11] As can be seen in the appendix, each analytical method has advantages and disadvantages, and each is best suited to particular situations.

The evaluative technique that is especially useful and that is a focus of this study is cost-benefit analysis (CBA). CBA can be a very useful evaluation technique in the area of sexual and reproductive health interventions. Together with cost-saving analysis, which can be considered an abbreviated form of CBA, CBA is capable of demonstrating both the intrinsic worth of a project or intervention and the relative benefits of the project or intervention vis-à-vis some other project or intervention. Because both costs and benefits are expressed in monetary units—usually dollars—it is possible to construct cost-benefit ratios, which can be used by themselves (any project whose cost-benefit ratio is greater than unity yields a net gain) or comparatively (whichever project has the highest cost-benefit ratio should have the highest priority).

Despite these advantages, several difficulties have been noted in CBA.[12] First of all, it is difficult, if not impossible, to include all benefits in the analysis. To the extent that important benefits are omitted, the result of the CBA may lead to an erroneous decision about undertaking the project. It is also possible that negative benefits (for example, unintended consequences) may also have been omitted from the analysis; in this case, the net value of undertaking the project may be overstated.

Secondly, some benefits may be hard to quantify monetarily, and those that lack adequate measurement methodologies may be omitted. If CBA is being used to compare projects from different sectors, this difficulty may bias results. For example, one researcher has pointed out that health benefits are "notoriously difficult to estimate,"[13] so that a CBA comparison between a health-sector and a nonhealth-sector project may easily be biased in favor of the nonhealth project.

A third problem encountered in CBA studies is the present valuation of future benefits.[14] The solution usually adopted is to apply an annual rate of discount. The choice of any rate of discount is to a certain extent arbitrary (rates from 0–15% have been noted in the literature), although attempts have been made to study public preferences for future benefits.[15]

Plan of This Report

This report consists of three major components:
• First, the report critically reviews and synthesizes results from the major approaches to measuring costs and benefits as currently applied to the three main areas of sexual and reproductive health: contraceptive services; STIs including HIV/AIDS (prevention, diagnosis and treatment); and maternal health (prenatal care, treatment for unsafe abortion and obstetric services).

The report reviews the strengths and weaknesses of the major methodological approaches which have been developed. This component includes an overview of the different measures through which costs and benefits are estimated. One common shortcoming of these estimates is the inclusion of only the medical benefits, and the exclusion of nonmedical benefits—for example, a medical benefit of increased contraceptive services is the prevention of unplanned births, whereas nonmedical benefits would include increased proportions of women completing their education, improvement in women's health by wider spacing of births and improved survival of infants, as well as better outcomes for other family members and for society at large.

There are also many disparities in the methodologies applied to assess costs. Some estimates include only direct economic costs—such as the fees or salary of the physician or midwife providing a specific service or the cost of purchasing drugs—and do not include indirect economic costs—such as the use of facilities and the recurring costs of clinic staff. When very different measures are employed by different studies to estimate the costs and benefits of interventions in reproductive and maternal health, results are not comparable and it is difficult to reach firm conclusions. Consequently, it is difficult to apply results from these analyses to decision making, and the usefulness of

these tools becomes limited.

• Secondly, the report presents a comprehensive outline of the benefits of investing in each of the three main areas of sexual and reproductive health mentioned above. Some of the benefits of these investments have not previously been measured and some are not measurable in quantifiable terms. Nevertheless, it is important to specify all aspects of costs and benefits so that, even as measurable and quantified estimates are calculated and utilized, policymakers are aware of gaps, weaknesses and the likelihood of under- or over-estimation. This comprehensive approach will illuminate areas for further research and improvement in cost-benefit methodologies, as well as ways to enhance the comparability of studies.

Through this framework, the report also addresses ways to overcome one of the major shortcomings of current methodologies—the lack of consideration given to how investments in one area of sexual and reproductive health can have a positive impact on another area. For example, family planning services have benefits not only for the health and social status of women but also for the health and survival of children. Similarly, the costs of investments in contraceptive services and supplies can have benefits for preventing STIs (by increasing condom use) and managing infections (through integration of STI and family planning services). The report identifies these spillover benefits in order to increase awareness of these benefits and of the need to measure them.

• Thirdly, the report provides new estimates—to the extent possible with available data—of the costs and benefits related to investing in one area of reproductive health, contraceptive services and supplies, to demonstrate the advantages of taking a more comprehensive approach to measuring costs and benefits. The report estimates the costs of increasing contraceptive services and supplies to meet the needs of both married couples and of unmarried, sexually active women. The benefits include births averted; total pregnancies averted; unsafe abortions averted; improvements in maternal health and survival achieved through the prevention of unsafe abortion and of unplanned and unwanted births and pregnancies; improvements in child health and survival achieved through better spacing of births and the prevention of high-risk pregnancies; and the number of children who would not lose their mothers.

In conclusion, the report points out that important work has been done to evaluate health interventions, but current approaches fail to account for all the benefits of sexual and reproductive health interventions and therefore underestimate the impact these interventions could have. The report offers recommendations for future research to improve existing methodologies.

Chapter 2

Major Approaches to Evaluating the Benefits and Costs of Sexual and Reproductive Health Programs

This chapter reviews and synthesizes results from major research endeavors that have focused on the measurement of the costs and benefits of sexual and reproductive healthcare. The first objective of the chapter is to summarize the key findings of the major studies in this area that have been carried out over the last decade or so. A second objective is to discuss the range of methodologies used in these studies to make clear the advantages as well as the assumptions and limitations of each of the methods employed. The goal is to stimulate more work and improve current methodologies by broadening the range of costs and benefits included in evaluating sexual and reproductive health interventions.

The review covers two large-scale, on-going research projects—the Global Burden of Disease (GBD) and Disease Control Priorities (DCP)—that have been sponsored by the World Bank and the World Health Organization (WHO).[16] First-phase results from both of these projects fed into a very influential report by the World Bank in 1993 on the economics of health strategies. The WHO's Commission on Macroeconomics and Health (CMH) carried the economic analysis of health one step further by examining nonmedical benefits of health programs in addition to medical ones. Meanwhile, WHO, the United Nations Population Fund (UNFPA) and the United Nations Programme on HIV/AIDS (UNAIDS) initiated costing studies of reproductive health interventions, including contraceptive services, safe motherhood and the prevention and treatment of HIV/AIDS.[17] Moreover, several computer-based models have been recently developed to help countries perform economic analyses of health systems more easily,[18] and several country-specific cost-benefit analyses of family planning programs have been carried out in the 1980s and 1990s.[19] All of these studies are reviewed in this chapter.

Studies fall into a number of different categories, and specific labels or terms are used to describe them (Cost Effectiveness Analysis, Cost-Consequence Analysis, Cost Utility Analysis, Cost Benefit Analysis; Cost Savings Analysis). Definitions and examples of each of these types of studies are given in Appendix 1.1. Finally, this chapter also reviews certain major studies examining only costs since they form an important source of costing information, a necessary building block in the analysis of costs and benefits.

The Global Burden of Disease

GBD[20] is an ongoing international initiative cosponsored by WHO and the World Bank. It sprang into prominence when the World Bank's influential *World Development Report 1993*[21] used the GBD approach to extensively evaluate priorities for resource allocation in the health sector.

GBD represents a large and important effort to reliably assess epidemiologic conditions and the burden of disease on the most detailed format possible. As Dean Jamison, editor of *Disease Control Priorities in Developing Countries* has stated: "Publication of the *Global Burden of Disease and Injury Series* marks the transition to a new era of health outcome accounting–an era for which these volumes establish vastly higher standards for rigor, comprehensiveness and internal consistency."[22] GBD provides detailed estimates of the burden of death and disability resulting from all major diseases and risk factors measured using the same metric, thereby providing a wealth of comparable policy-relevant data.

The World Development Report 1993: Investing in Health identified a number of priority health interventions based on GBD data and assessed the cost and effectiveness of curative and preventive health interventions known to reduce this burden. Both were measured in terms of disability-adjusted life years (DALYs), the burden of disease in terms of DALYs lost, and the cost-effectiveness of interventions in terms of cost per DALY gained. Interventions were classified as high

priority if the burden of disease was large and the cost-effectiveness of interventions high. The results of the GBD study were published by WHO in 1996,[23] and the cost-effectiveness information was reported in another volume.[24]

What are DALYs?

Although from a methodological point of view the GBD enterprise included several innovative approaches towards systematizing available data, especially where data were patchy or of uneven quality, the study has become best known for its promotion of the DALY as a standard indicator of disease burden. A discussion of the DALY and its component measures, years of life lost (YLLs) and years lived with disability (YLDs), is therefore in order.

The DALY is designed to quantify the burden of diseases by taking into account not only mortality but also morbidity. Based on the classifications of the *International Classification of Diseases* (9th revision), also known as ICD-9,[25] 107 diseases and 483 disabling sequelae were chosen in an effort to cover all possible causes of mortality and about 95% of the possible causes of disability. (The complete list of diseases included is shown in Appendix 2.1.) For all those diseases and their sequelae, the number of healthy life years lost due to premature mortality and morbidity were calculated.[26] DALYs have two components: an estimation of years of life lost by death and an estimation of years lived with disability after contracting a disease or developing a disabling condition.

To determine the number of YLLs due to premature mortality, the GBD study assigned each death to a particular disease category and grouped all deaths by age, sex and region. This exercise was based on death records where available and "expert judgment" where no records were available. The number of YLLs was estimated, by evaluating the differences between the actual age at death and an ideal standard life expectancy at that age. In the interest of equity, the same ideal life expectancy was used for all countries. Life expectancy at birth was assumed to be 82.5 years for females, and 80 for males.

For YLDs, the GBD study estimated the incidence of cases by age, sex and region on the basis of community surveys, or where those were not available, again on "expert opinion." YLDs were then obtained by multiplying the expected duration of the disability (to recovery or death) by a disability weight that measured the severity of the disease-induced disability compared with death.

• *Disability weighting.* In order to compare YLLs and YLDs, severity weights had to be assigned to years lived with particular disease sequelae. In fact, severity weights were assigned to all of the 483 disabling sequelae considered in the GBD study. Disability was considered in six broad classes, each with a severity weight between 0 (perfect health) and 1 (equivalent to death). The classification was carried out by an international panel of health experts who were asked to focus solely on functional disability. Thus, social, cultural or economic factors which might impact the overall "burden" or the ability of people to cope were explicitly excluded. For example, rectovaginal fistula was assigned a weight of 0.43 and infertility a weight of 0.18. By contrast, a leg amputation carried a weight of 0.30 and cretinism a weight of 0.80.

Once the YLL and YLD for a particular disease or condition were estimated, the corresponding DALY was calulated, simply: *DALY = YLL + YLD*.

Two further methodological considerations should be mentioned vis-à-vis the construction of DALYs: adjustments for age and time discounting.

• *Age Weighting.* In computing DALYs, time lived at different ages was valued differently; a year of life lived by a young or middle-aged adult was given a greater weight than a year of life lived by a child or an elderly person. Due to the lack of empirical data on age preferences, a formula for weighting life years lost at different ages was chosen somewhat arbitrarily by a group of health experts.* For example, one healthy life-year lost by a five-year-old was worth only 0.66 years, but a healthy life-year lost by a 25-year-old was counted as almost 1.5 years.

• *Time Preference.* DALYS were also adjusted for time preference. Similar to financial discounting, future life saved or improved by health interventions was given a lesser value than life saved today (using an annual discount rate of 3%). This follows the general observations (1) that people value, say, a $100 paid at a certain time in the future less than they value $100 paid today and (2) that the further into the future the payment is to be made, the less present value it has. Discounting future DALYs using a rate of 3% meant, for instance, that one year of healthy life was counted as approximately half a year if it occurred 22.5 years from now and as just three months if it occurred some 45 years into the future.

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*The weighting frequency distribution resembles a Poisson distribution.

Global burden of disease estimates

The GBD study estimated that the number of deaths worldwide was 50.5 million* in 1990 and 56.6 million in 2001[†] A variety of sources, from vital statistics to cause-of-death modeling, were used to estimate deaths by approximately 100 causes of death in eight regions, among sexes, and both by seven age-groups. Appendix 2.1 lists the diseases and conditions used in the GBD study. A series of steps were followed to adjust the disaggregated estimates to be consistent with cause-of-death models and with existing epidemiologic analyses. The authors acknowledged that, because data from some regions and about some causes of death are more complete and more accurate than from other regions and about other causes, the estimates had narrower or wider confidence intervals associated with them.[27] For instance, estimates from Sub-Saharan Africa are seen as the least reliable of all the regions. Appendix 2.2 shows the exact definitions used for identifying reproductive health conditions.

Burden of disease related to reproductive health in 1990 and 2001.
For 1990, the worldwide estimate of YLLs was 907 million, the estimate of YLDs was 473 million, and the worldwide estimate of DALYs lost was 1.38 billion. By 2001, total DALYs lost had grown to 1.47 billion.[28] For the diseases and conditions related to reproductive health estimated by the GBD study see Table 2.

Further analyzing the GBD results for 1990, the death and disability components of DALYs show distinct patterns between regions (see Table 2.2) and among age groups. Worldwide, about two–thirds of lost DALYs are due to premature deaths (i.e., the YLLs due to deaths from disease) and only one–third are due to disability. For STIs and abortion, however, these proportions are roughly reversed, and for maternal conditions as a whole, including abortion, only 45% of lost DALYs are due to death. In the case of HIV/AIDS, however, more than 70% of the total burden is contributed by premature deaths.

There are notable differences in the composition of DALYs between regions. Only 1% of STI-related DALYs are caused by premature death in the Americas and Europe, whereas 37% of DALYs in Africa, Eastern Mediterranean, South East Asia and the Western Pacfic regions combined are due to such deaths. Similarly, YLLs related to maternal conditions are a much larger factor in developing countries—contributing almost half of all DALYs—than in developed countries,

where YLLs contribute only 10%.

Looking at the disease burden by age group, there are some striking developing-developed world differences. The burden of premature death (YLLs) due to STIs is felt at much earlier ages in developing countries: 94% of YLLs among males and 74% among females happen to those younger than 15. In developed countries, the corresponding figures are 20% among males and 0% among females. In the case of the burden from HIV/AIDs, a similar pattern is found, although the size of the differentials is decreased. With regard to maternal conditions, on the other hand, the age patterns in the two regions are broadly equal.

According to WHO's 2001 estimates, sexual and reproductive health problems account for 18% of the total global burden of disease and 32% of the burden among women of reproductive age (15–44) worldwide:[29]

• Maternal conditions (hemorrhage or sepsis resulting from childbirth, obstructed labor, pregnancy-related hypertensive disorders and unsafe abortion) account for 2% of all DALYs lost (13% of all DALYs lost among women of reproductive age).

• Perinatal conditions (low birth weight, birth asphyxia and birth trauma) account for 7% of all DALYs lost.

• HIV/AIDS accounts for 6% (14% among women of reproductive age).

Other sexual and reproductive health conditions account for 3% (5% among women of reproductive age).[‡]

Burden of disease due to unsafe sex
The GBD initiative also reported on the burden of disease resulting from the practice of unsafe sex based on 1990 DALYs.[30] The diseases and conditions considered in this 1998 report include HIV/AIDS, STIs (gonorrhea, syphilis and chlamydia only), human papilloma virus (HPV), hepatitis B, complications in pregnancy and abortion.

The WHO *World Health Report 2002* has presented

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*The study did not refer to any other source for death estimates. Nevertheless, the current estimate by the United Nations Population Division of 50.35 million is quite close.

†In this section, both the original Global Burden of Disease study (see reference 22) and the most recent update of GBD (see reference 28) are referred to. Revisions to estimates of DALYS are in progress. Preliminary results show a small decline in DALYs due to HIV/AIDS/AIDS, overall and among women of reproductive age.

‡These include STIs other than HIV/AIDS, iron-deficiency anemia among women aged 15-44, breast cancer, ovarian, cervical and uterine cancer, and genito urinary diseases, excluding nephritis and nephrosis.

a more recent estimate updated to 2000 for deaths and disability due to sexual health risks, which were defined differently from the 1998 estimates. The 2002 report included HIV/AIDS, STIs and cervix uteri cancer as unsafe sex and lack of contraception.* Table 2.4 shows the estimates for 2000.

Two notable changes can be observed from the 1990 estimates to the 2000 estimates. First, due to the enormous increase in the burden caused by HIV/AIDS, the magnitude of the burden from the (revised) definition of unsafe sex more than doubles (from 40 million to 91 million DALYs) and because the HIV/AIDS burden is shared fairly equally between men and women, the proportionate burden of unsafe sex borne by women decreases substantially—women bore 80% of the burden in 1990 but only a little more than half in 2000. Second, the burden attributed to lack of contraception ("complications in pregnancy" in the earlier publication[†] increases significantly—by more than one-quarter, from 6.8 million DALYs in 1990 to 8.8 million DALYs in 2000. Probably most of this increase is due to different methodologies used in the two studies.

Critique of DALYs

Despite the wide acceptance of the DALY approach as an important advance in the health policy arena, there have been many criticisms, some methodological, some more conceptual.[31] The following is a summary of concerns expressed by other researchers.

Methodological criticisms:
• Many reproductive health complications were not adequately considered in the GBD DALY methodology. Approximately 100 major diseases and conditions that contribute to the vast majority of the health burden were studied, but many, less prevalent diseases were simply ignored and subsumed into the more important ones. For example, only three STIs were studied (syphilis, gonorrhea and chlamydia).
• Death (or disability) was always assigned to just

one cause, but the interaction between two or more conditions is often encountered in reality. For instance, indirect obstetric complications (e.g., malaria or anemia), gynecological morbidity (e.g., herpes or vaginosis), female genital cutting, rape and sexual abuse, puerperal psychosis, infertility and stillbirths did not get recorded as DALYs caused by reproductive risks, but rather as DALYs caused by malaria, anemia, etc.. Thus, many DALYs were ascribed to other causes when the underlying contributing cause was related to reproduction.[32]

• To measure disability, several methodological approximations had to be made given the paucity of data. One of these was the use of a panel of experts to determine the severity rating of functional disability due to specific diseases. Severity weights for seven classes of disease were developed, and all diseases and sequelae were categorized into these seven classes. Critics have argued that people themselves should have rated severity because there are many social, cultural and economic discomforts associated with particular conditions that may make the real severity greater or lesser than the mere functional aspect of the disease or condition.[33] It has been suggested that this may be particularly true in the case of reproductive health conditions.[34] The example of fistulas has often cited, because the social stigma may be far worse than the functional disability itself.[35]

• In determining YLLs, the GBD study very high life expectancies as the standard—the highest ever observed (Japanese females). Thus, in countries with low life expectancies, the number of years lost by premature death was estimated to be substantially higher than it would have been if the actual life expectancy of those countries were used as the standard. The criticism has therefore been made that the choice of a high standard life expectancy means that the DALY measures not only disease burden, but also the burden of "underdevelopment."[36] A counter argument to this criticism would be, however, that if most YLLs were eliminated by health interventions the underlying life expectancy would probably rise to a high level anyway.

• The GBD methodology also assumed a 2.5-year difference between male and female standard life expectancies. In fact, the difference in high-income populations is substantially more than 2.5 years. It has been argued, therefore, that this produces DALY estimates that are biased in favor of men.[37]

• Further criticism of the DALY methodology has questioned the study's choice of an age weighting

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*Note that the definitions of "unsafe sex" vary from the 1998 GBD publication to the WHO 2002 publication. For the WHO publication, unsafe sex is a risk factor for the following three conditions: HIV, STIs and cervix uteri cancer. In the 1998 GBD study, 90% of cervical cancer was attributed to Human Papillomavirus.

*The component "complications in pregnancy" (Berkley, 1998) refers to women who expressed an unmet need for contraceptives, but were not contracepting although sexually active. All DALYs caused by conditions related to pregnancy are multiplied by the proportion of women with unmet need, calculated from existing survey data, to produce estimates of DALYs due to unwanted or unplanned pregnancy.

scheme and a discount rate.[38] Basically, years lost by young children and adults older than 55 were given relatively less weight in the GBD study than those of other adults, because economic productivity and human capital investment should be reflected in the cumulative effect of disease. Also, a 3% discount rate was used. Research has indicated, however, that the way people discount the future value of human life is considerably more complex.[39]

Conceptual criticisms:
• A widespread criticism of the DALY measurement system is that distributional and equity concerns were not built into the measure but should have been. DALYs demonstrate the level of disease burden but do not indicate how the burden is shared among different economic groups within a country. For example, the difference between life expectancies of the upper and lower income groups in the United States is 15 years, but DALYs do not reflect this.[40] It has also been noted that people with higher incomes have 2–4 times the access to healthcare as do the poor, so estimates of costs of interventions should take this into account by looking at marginal costs, which might be substantially higher than average costs. The authors of the GBD agreed with the importance of equity and distributional issues, but wonder if it is perhaps better to have two measures and keep the two issues separate.[41]

a) The 1999 GBD results were also used by WHO to produce "league tables" that ranked the overall performance of national health systems. A country's ranking was determined by taking each measure of attainment and performance—disability-adjusted life expectancy, health equality in terms of child survival, responsiveness level, responsiveness distribution, fairness of financial contribution, performance on the level of health and overall health system performance—and assigning a ranking.[42] This approach has been criticized[43] by some who have said that there is nothing to be gained from the GBD efforts to quantify the burden of disease and the resultant "league tables". What is important is to focus on the most cost-effective methods in each health system, whatever the position of a country's health system in the league table.[44]* This criticism bears on how the World Bank's essential package was fashioned: The interventions in the package were selected on the basis of cost-effectiveness and magnitudes of disease burdens.
• *Self-critique of methodology.* The authors of the GBD study recognized that cause-of-death estimates mixed together data of very different qualities and degrees of completeness: "Substantial uncertainty will remain for many years about the precise distribution of mortality by cause for most of the developing world."[45] The benefits of having a complete and disaggregated set of cause-specific mortality estimates from the most complete compilation of available information were thought to outweigh these shortcomings.

With respect to disability estimates, the authors recognized that the uncertainties of data and conceptualization were much greater. The justification in this case, besides repeating the great need for comparable estimates, stressed the methodological refinements and advances that will be stimulated by the GBD's enormous efforts to compile and standardize such a large dataset on disabilities. They concluded that "research is required to improve the basic disease model used in this study; furthermore, extensive empirical work is necessary to create and field-test new instruments for collecting data and information on disability."[46]

Disease Control Priorities in Developing Countries (DCP-1)

This large review of the cost-effectiveness of health interventions was a project of the World Bank and served as a major source of information for the *1993 World Development Report.* DCP-2, a new project that will be a complete revision of DCP-1 is currently underway and is scheduled to be published in 2005. The three chapters from DCP-1 on excess fertility, maternal and perinatal health, and STIs and HIV/AIDS are of particular interest to this report, and we summarize each here. Note that the methodology of each chapter is different.

Disease Control Priorities: Chapter on Excess Fertility
As opposed to the rest of DCP-1, this chapter did not focus on any one disease, but rather on "excess fertility," a condition that has direct negative consequences

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*A simple example can illustrate how looking at the magnitude of disease burden, instead of cost-effectiveness, could distort health policy. Suppose there are only two illnesses, A and B, for a health system to confront. Illness A contributes 2,000 DALYs to the overall disease burden and an effective intervention to prevent/treat it costs $20/DALY. Illness B contributes 200 DALYs and an effective intervention to counteract it costs $10/DALY. Focusing only on the relative sizes of the burdens −and given a budget of $5,000−one policy option might be to allocate $4,500 to A and $500 to B (since illness A causes more than 90% of all DALYs). This policy would save 275 DALYs (225 + 50). Basing policy purely on cost-effectiveness, however, would save 350 DALYs (150 + 200) with the same budget.

for infants and children as well as for maternal health.[47] More significantly, however, excess fertility negatively impacts the health and social and economic well-being of families, community and society.

The first part of this chapter of DCP-1 estimated total excess fertility in developing countries.* Broadly, "excess fertility" can be equated with unplanned pregnancies (i.e, those not wanted at all or not wanted at the time they occurred). Three different estimations of excess fertility were made, which range from 12.9 million to 39 million births per year. The third method, using three "model" countries, yielded estimates of excess fertility in the range of 14–22% for women wanting to limit family size and 26–39% for those wanting to limit plus those wanting to increase spacing between births.

The study looked at both the health gains from reducing excess fertility and at some specific social-sector benefits. The health benefits included the survival of offspring, measured as the deaths and DALYs averted by eliminating excess fertility. The social benefits examined by the study were reductions in educational and health expenditures from births averted.

The study included a detailed discussion of several other indirect benefits that would flow from the reduction or elimination of excess fertility that were not included in the study (and for which data for quantitative estimation may not be available). "High fertility and close child spacing are a significant determinant of poor health of mothers and infants in the first week of life…. [They] also have consequences beyond the first week of life, at least up to age five, and have negative consequences beyond those immediate health consequences….on the health and economic and social well-being of the family by diluting resources available for each child and putting pressure on parents to work harder and save less….[It] may also have negative consequences to society as a whole."[48]

The negative consequences of excess or unwanted births, which would be mitigated by reducing or eliminating this excess fertility, include:

• lower rate of economic development (via reduced savings and investment, less technological change and changes in efficiency);

• greater resource depletion and pollution;

• in households, additional costs of food, clothing, medical care, schooling and housing;

• additional time spent caring for children but less time for each child;

• reduced expenditure per child leading to poorer health and reduced school participation;

• additional efforts to increase family income which may lead to child labor, added labor of parents or reduced household savings; if a child is "unwanted," the negative effects are probably even larger (impaired child development, infanticide, abandonment, neglect, less antenatal care, selective nutrition and medical care have been reported);

• if women are unmarried, having an unwanted or mistimed birth or pregnancy may result in less educational and employment benefits, and increased chances of abortion or fostering out; and

• greater societal burden, including higher expenditures on education, health, food subsidies, shelter and safe water.

Total global estimates of benefits
In the DCP-1 study, health benefits were estimated in terms of deaths and DALYs to both mothers and children.[†]

The study's analysis of the socioeconomic benefits focused on savings of public expenditures in primary education, secondary education and health. Three hypothetical countries with differing regional and mortality characteristics were presented for analytical purposes: Libana, high-mortality African, Banglapal, high-mortality non-African and Colexico, low-mortality. Using a 5% discount rate, benefits were estimated as shown in Table 2.5.

The basis for these estimations was not discussed at length, but footnote 3 of the study referred to World Bank "internal documents" used for estimating educational costs. Other World Bank sources provided per capita public health expenditure estimates ($6 for the high-mortality countries and $28 for the low-mortality country).[49]

Estimates of Costs
The study estimated "cost per birth averted" for a number of countries. A summary of the cost estimates is shown in Table 2.6. Note that the difference between the "low" and "high" estimates was not discussed in the chapter.

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*The study did not give a single definition of "excess fertility" but rather offered three different definitions: (1) a societal one —population growth above 2% can be considered harmful to economic development; (2) a medical one—too young, too old, too many or too close births increase mortality risks of women and their offspring; and (3) an individual one—self-reported excess fertility, from data either on actual fertility in excess of desired fertility or on desires to stop or postpone future births.

†The table in Cochrane and Sai (1993) giving the DALYs saved by reducing excess fertility is difficult to interpret. Repeated inquiries were unable to clarify the numbers found in the table.

Combining the above analyses, the costs and benefits of a family planning program to reduce excess fertility, using a 5% discount rate, is summarized using 1987 U.S. dollars in Table 2.7.

At a 10% discount rate, family planning programs would not be justified in Libana if the only benefits accruing to family planning programs were government savings in education and health.

Critique of methodology
In general, the methodology of the study was not explained in detail and used internal World Bank data and estimates that cannot be independently verified.

In the study, the two parts of the cost-benefit analysis were disjointed because socioeconomic benefits are calculated for three hypothetical countries, while program costs were presented for 16 actual countries. The authors noted that "the conclusions apply only to the economic benefits of family planning, and the health benefits, which are substantial, as shown above, would be additional."[50] The report gave no reason why a fiscal year of 1987 is used in a 1993 analysis. For instance, it stated that "the costs as collected refer to 1980, but they have been inflated to 1987 in Table 16-14."[51]

More detail is needed to be able to evaluate which costs were included in the delivery of family planning services and which were omitted. Were ancillary costs (e.g., information, education and counseling activities) included? Were economies of scale taken into account? The study did not discuss these issues.

Despite these shortcomings, this study is important because, in the context of the large DCP-1 initiative, which is primarily devoted to investigating cost-effectiveness in terms of illness avoided (i.e., DALYs), this study focused on nonhealth-related benefits, while still dealing with the benefits of preventing illnesses and health conditions.

Disease Control Priorities: Chapter on Maternal and Perinatal Health
This chapter of the DCP-1 volume attempts to relate the costs of providing maternal and perinatal care to several specific health benefits.[52] The health benefits are reductions in maternal and perinatal mortality, in maternal morbidity and in the incidence of low-birth-weight babies. The study is divided into two parts. The first consists of an introductory section discussing the risk factors that lead to increased maternal and perinatal mortality, detailed estimates of the extent of such mortality, and risk reduction strategies, including specific interventions at each stage (preconception, pregnancy, delivery and neonatal). The second part of the study presents a brief cost-effectiveness exercise using a hypothetical country called Himort. Another case is presented—"Lomort"—but no estimates of benefits are provided.

The Himort cost-effectiveness analysis does not present results in terms of DALYs, but rather in terms of births averted, maternal deaths averted, maternal morbidity averted, perinatal infant deaths averted and low-birth-weight babies averted. For Himort—a fictitious country with a population of one million, a contraceptive prevalence rate of 0%, and a maternal mortality ratio of 1,000—five scenarios for investments in women's health are presented. Three of these scenarios concentrate on one intervention alone, namely, family planning. The fourth and fifth scenarios combine a low increase in family planning (equal to the first scenario) with different levels of obstetric care. The expenditure items that make up the two levels of obstetric care are described in detail in the study. These are summarized in Table 2.8.

With regard to the three family planning scenarios, a program in South Korea, which resulted in a "20% increase in women who accepted contraceptives"[53] and cost $0.47 per capita, was used as the basis for the first scenario. No details were given, for the other two family planning scenarios.

The results of the cost-effectiveness exercise are summarized in Table 2.9.

Cost per death averted refers to both maternal and perinatal deaths. Cost per event averted refers to deaths, morbidity cases and low-birth-weight babies. One implication of these findings is that family planning interventions become increasingly costly as the level of contraceptive use rises. Another conclusion seems to be that a moderate family planning program and a program of moderate obstetric improvement would be about equally cost-effective.

The authors note that up to the time of this study (the early 1990s) there had been little empirical research on the outcomes of maternal health interventions. "We have found virtually no data on the effect of maternal health programs on maternal health…. The declines in adverse outcomes that we have suggested are no more than best estimates of the likely effect … based on the limited evidence available from the literature."[54] However, a recent study investigates the relationship between maternal health programs and maternal mortality, finding a significant inverse relationship.[55] The study compares programs across countries and uses a rating system devised by the authors and based on judgments of experts.

Disease Control Priorities: Chapter on HIV and STIs

This DCP-1 study is a detailed analysis of the prevalence of HIV and STIs, their effects in terms of DALYs and cost information on corresponding interventions.[56] As discussion concerning effective prevention and treatment strategies, particularly with regard to HIV/AIDS, has advanced since this article was published in 1993, only findings regarding cost-effectiveness will be summarized here.

• *STIs and information, education and communication (IEC) programs.* This section of the study summarizes information about cost-effectiveness according to type of STI, core or noncore group, and cost per year of protection of the program. The results point toward focusing IEC efforts on core groups. For instance, in the case of syphilis, an increase of one person-year of protection to the core group leads to averting 385 DALYs, but only 10 DALYs if the protection focuses on the noncore group. Similarly, the cost per year of protection for the noncore group is typically 4–7 times more expensive as for the core group. Again in the case of syphilis, the cost per year of protection for core groups ranges from $0.13 to $1.17, but for noncore groups the range is $0.52–4.64.[57]

• *Mother-to-infant transmission.* Gonococcal ophthalmia neonatorum infections can be prevented. One estimate in the study is that one DALY may be averted for the cost of a $6 silver nitrate treatment. Congenital syphilis can also be prevented, but no costs are suggested in the study.[58]

• *Infection through blood transfusion.* Estimates are presented for cost per discounted DALY* by blood screening. Again, the results are far more cost-effective for core groups than for noncore groups. The cost of a blood test which ranges from $2–10, is also a factor, as is the HIV prevalence in the population. If the HIV prevalence rate is 5%, for example, the cost per discounted DALY ranges from $0.74 to $3.71.[59]

• *STI treatment.* Estimates are presented according to the following variable factors: presence or absence of an HIV epidemic, cost per clinic hour ($2 to $30), type of STI, prevalence of the STI (1–25%), and core or noncore group. The range of costs per DALY saved is $0.02 (treatment of syphilis at 25% prevalence, core group, $2 per clinic hour, HIV epidemic present) to $2,460 (treatment of chancroid at 1% prevalence, noncore group, $30 per clinic hour, HIV epidemic absent). In general, treating core groups is the cost-effective option, as is treatment in the presence of an HIV epidemic, because STI infections increase the risk of HIV transmission, an interaction that leads to program synergy. High STI prevalence also increases cost efficiency. Treatments for syphilis and chlamydia (male) are most cost-effective, treatments for chancroid, chlamydia (female) and gonorrhea (female) are least cost-effective.[60]

World Development Report 1993: Investing in Health

The World Bank report elaborates three broad policy recommendations for improving health:

1. Foster an environment that enables households to improve health by pursuing economic policies that benefit the poor, investing in education and promoting women's empowerment.

2. Improve public spending on health by reducing spending on tertiary facilities and cost-inefficient interventions, implementing a package of interventions aimed at health "externalities," and improving management.

3. Promote competition by encouraging health insurance schemes, competition among suppliers and information dissemination.[61]

For the purposes of this report, we summarize those parts of the 1993 publication that deal with the development of a cost-effective package of interventions. The key inputs in this regard are (1) estimates of the magnitudes of various diseases and conditions taken from initial findings of the GBD and (2) estimates of the cost-effectiveness of interventions that prevent or treat specific diseases and conditions. The latter estimates were derived from the DCP-1 report and internal World Bank documents.

The 1993 report does not attempt to systematically present cost-effectiveness estimates for all health interventions. It states: "Only a small share of the thousands of known medical procedures has been analyzed, but the approximately fifty studied would be able to deal with more than half the world's disease burden."[62] Regarding its estimates of the costs of interventions, the report makes these clarifications:

1) Costs are based on actual conditions;

2) some fixed costs of health systems are omitted because they are general, but costs related to intervention-specific capacity are included;

3) costs are assessed at market prices;

4) indirect costs, being difficult to valuate, are "largely ignored";

5) the unit of study is sometimes a "package" rather than individual interventions;

6) data on real-life outcomes are used, taking into account actual levels of coverage and compliance; and

7) a 3% discount rate is used to evaluate future gains.[63]

Although the report does not systematically identify the 47 analyzed interventions, it does quote estimates of the cost-effectiveness of selected interventions.[64] These are listed in Table 2.10.

The "package of public health and essential clinical services" for low-income countries has an average cost-effectiveness of around $97 per DALY. For middle-income countries this rises to around $580 per DALY.[65] The public health part of the package[66] and the selected clinical services part of the package[67] are shown, along with cost-effectiveness estimates, in Tables 2.11 and 2.12.

Additional estimates are available; they are based on country-specific work and thus show a wide range of costs.[68] These costs were drawn from the DCP report, discussed earlier in this chapter, which also provided average costs for a wider range of preventive and treatment interventions. The report estimated that prenatal and delivery care costs $30–250 per DALY saved and prevention of breast and cervical cancer costs $50–100 per DALY saved. By comparison, the cost per DALY saved by other health interventions ranged from $5–20 for preventing deficiencies in iron, vitamin A or iodine, to $5–250 for prevention of malaria to $1,600–3,500 for environmental control of dengue.[69] Treatment generally costs much more than prevention—for example, prevention of cervical cancer costs $100 per DALY saved but treatment costs $2,500 per DALY saved. Preventing cardiovascular conditions costs $150 per DALY saved, treatment $2,000–30,000.[70] While both prevention and treatment are necessary, in Sub-Saharan Africa, interventions to prevent HIV are at least 28 times as cost-effective as antiretroviral therapy.[71]

Note that cost-effectiveness estimates for STI treatment assume the presence of an AIDS epidemic similar to the actual situation in Sub-Saharan Africa. "Limited care includes assessment, advice, alleviation of pain, treatment of infection and minor trauma, and treatment of more complicated conditions as resources permit."[72] It is worth noting that no methodological discussion is provided that would explain the development of these estimates of cost-effectiveness and the source cited is generally "World Bank calculations."

One critique of the essential package approach[73] lists the following methodological shortcomings: (1)

the package's focus on average rather than marginal costs may bias the results; (2) the package focuses on potential rather than actual costs — although the report says that it does focus on real costs; (3) the approach is biased against the introduction of new technologies which are typically cost-inefficient at first; and (4) it focuses on public expenditure, not total costs. The critique also details several practical drawbacks to the package as a policy instrument which, while important, need not be mentioned here.

Macroeconomics and Health

This major study is the main report of the WHO Commission on Macroeconomics and Health, chaired by Professor Jeffrey Sachs.[74] The report extends the World Bank's *World Development Report 1993* approach, advocating a compact health agenda similar to the "essential package," but with more emphasis on HIV (including an expensive component for treatment), malaria and nutrition. According to the analysis in this report, with a substantial increase in development assistance focusing on this health agenda, great progress would be achieved in lessening the burden of disease and reaping macroeconomic benefits.

It is noteworthy that high fertility gets particular mention in the report even though family planning is neither included as a priority health intervention nor subjected to macroeconomic analysis to gauge the extent of its economic benefits. The following quotes, nevertheless, make the importance attached to family planning clear:

"One of the most important health interventions is greater attention to reproductive health, not only to control STIs such as HIV, but also to limit fertility through family planning, including access to contraception."[75]

"Although we did not ourselves make cost estimates of the increasing need for family planning services and an adequate supply of contraception," a funding gap exists "though it represents only a modest proportion of total funding needs."[76]

"If more individuals are saved through health interventions, for what kind of life are they being saved? The answer, fortunately, is an optimistic one. Health interventions…will contribute to slower, not faster, population growth, but for this to occur it is important to combine health interventions with intensified efforts to offer family planning services and increased access to contraception."[77] This can cut the time of the demographic transition—the report cites the examples of Bangladesh, Tamil Nadu and Andhra Pradesh.

According to the framework adopted in the report,

there are three main ways that disease impedes economic well-being:

1. Healthy years lost because of disease cause direct economic loss, "a significant percentage of the national incomes of the low-income countries."[78]

2. Parental investments in children are lower in high-mortality settings. High infant mortality leads to high fertility. This, in turn, leads to less investment in the health and education of children (the quality-quantity trade-off).

3. Generally, there is a depressing effect on returns to business and infrastructure investment. "Whole industries…are undermined by a high prevalence of disease."[79]

This framework is succinctly summarized in the report as follows: "The cost-of-illness literature probably dramatically understates the costs of nonfatal chronic conditions at all stages of the life cycle. Healthier workers are physically and mentally more energetic and robust, more productive, and earn higher wages. Their productivity makes companies more profitable, and a healthy workforce is important when attracting foreign direct investment."[80]

The study concentrates on the poorest billion of the world's population and sets the following health agenda of priority interventions:[81]

- HIV prevention and treatment services;[82]
- malaria;
- tuberculosis;
- maternal and perinatal health;[83]
- causes of child mortality such as measles;
- malnutrition;
- other vaccine-preventable illness;
- tobacco-related disease.

The basis for selecting this set of priorities is the GBD initiative, which described the extent of the burden caused by specific diseases and conditions and the World Bank's *World Development Report 1993,* which estimated the cost-effectiveness of specific health interventions. Both the extent of burdens and the degree of cost-effectiveness were compared using a common currency, the DALY.

The macroeconomic part of the report attempts to quantify the economic gains from implementing the proposed health agenda. The approach taken does not attempt precise estimates of such gains but rather rough estimates based on a few broad assumptions and parameters. First, each "life year" saved by implementation of the health agenda is valued at 1–3 times the average annual earnings. For the purpose of estimation, the conservative estimate is used: One "life year" equals one year of average earnings.

Second, the effect on the economy is viewed in terms of the total size of the economy—i.e., (Gross National Product). The report uses the example of malaria in Sub-Saharan Africa to illustrate the macroeconomic gains possible through good health. In 1999, malaria accounted for an estimated 36 million DALYs. Valuing each DALY at the average per capita income for the region, an immediate economic effect is a loss of 5.8% of total GNP (36/616 = 5.8%).*

Third, with regard to per capita effects, the report cites econometric estimates that in economies where populations experience "high malaria risk," economic growth is about one percentage point less than otherwise.[84] The cumulative effect is an eventual per capita income only half of what it would be in a zero risk environment. Combining the total and per capita income effects, "dozens of percent of GNP" are lost to malaria, according to the report.

In the report, the phrase "scaling up" refers to the additional investments needed for the health agenda advocated by the CMH to be implemented. A rough cost-benefit analysis for low-income countries is attempted. On the one hand, the additional cost of scaling up is put at $66 billion in 2015. On the other hand, the economic benefits† are calculated at $186 billion in 2015 (330 million DALYs x $563 = $186 billion). This represents the total GNP benefit, yielding a cost-benefit ratio of about three to one.

However, improved health would also spur economic growth, known as the per capita income benefit. Faster growth, as mentioned, would occur due to a faster demographic transition, higher human capital growth, increased household savings, increased foreign investment and greater social and macroeconomic stability. At lower bound this can be estimated at an added $180 billion per year by 2020 (based on assuming an extra one-half percentage point of growth each year). Combining this benefit with the one based on total GNP, the economic benefits would grow to $360 billion by 2015–2020 "and possibly much larger,"[85] resulting in a cost-benefit ratio of 6 to 1.

At a microlevel, the report suggests—without providing quantitative findings—that for individual households a single disease episode can lead to asset deple-

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*Updating the analysis with 2001 data (42 million DALYs lost to malaria, 669 million population), the percent of total GNP lost becomes 42/669 = 6.3 percent.

†Assuming 2 percent growth for the period 2000-2015, per capita income of $563 in 2015 for that region and one DALY being the equivalent of one year of per capita income.

tion and, consequently, the household falling into a permanent poverty trap. Brazilian data are quoted that show a clear link between income and educational attainment (including cognitive ability), using height as a proxy.[86] Evidence also shows that good health and nutrition are precursors to educational attainment, including both attendance and cognitive ability.[87] With regard to business, high labor turnover lowers the profitability of companies, depresses tourism and may prevent economic use of land. The report cites the experience of businesses in high HIV prevalence areas that have to hire and train more than one person per position.[88]

The report advocates that AIDS treatment be given high priority in the health agenda, in addition to HIV preventive interventions. Estimating treatment costs at $500 to $1000 per year, the report suggests that around five million infected individuals could be treated by the end of 2006.[89]

• *Comment.* The CMH study sponsored a large number of background studies that fed into the final report. The report, however, does not make close references to these studies which makes it difficult to trace the specific assumptions behind various assertions. Therefore, many assertions in the report do not stand on their own. While it is likely that most findings are supported in these background papers, without specific references it is difficult to verify. The following are specific areas where the report could have usefully provided further details and clarification on the cost benefit analysis to make clear how rigorously it was done.

First, the criteria for selection of the diseases and conditions for priority action are not clearly spelled out in the report. We are only told that the report focused on diseases with "the greatest excess mortality in the poor countries relative to the rich countries."[90] There is no appeal to cost-effectiveness made in the report.

Second, the issue of what would happen to GNP per capita is not considered in the report. The report shows that total GNP would be bigger, but so would the population because of reduced mortality. A better approach would be to separate the YLL component from the YLD component of DALYs. The YLL component basically reduces both the numerator and the denominator of GNP per capita (and so its overall effect on GNP per capita is unclear), while the YLD component, it could be argued, reduces only the numerator.

Third, further explanation and discussion is needed, especially in terms of cost-efficiency, for the inclusion in the report of AIDS treatment interventions and support for a large investment in AIDS treatment, over and above HIV prevention interventions. A number of stud-

ies point out that prevention interventions are several times more cost-effective as treatment, although there is an ongoing debate on this point.[91]

As alluded to above, the report mentions the importance of, but nonetheless excludes from its analysis, the positive economic effects of reduced fertility through family planning programs. Separating family planning in practice from other health investments, though, may be neither feasible nor advisable. In many sociopolitical situations, family planning continues to be accepted largely within a health context not only as a rationale for policies but also as a conduit for services.

From the perspective of health policy also, the CMH report has been questioned.[92] The report advocates the influx of a large amount of mostly external donor funds. This could well distort the structure of the existing health system and work against its long-term sustainability. Focusing on a narrow range of diseases and corresponding interventions could also lead to a duality of the health system and the neglect of the ongoing delivery of care for diseases that are not in the priority agenda. A heavy reliance on donor funding could also lead to a bias toward vertical programming and commodity procurement instead of capacity building.

Current and Ongoing Research

In addition to the major works summarized above, several current research activities will produce findings in the future that will be of interest to the topic being reviewed here. The following lists briefly these ongoing efforts:

• *Disease Control Priorities Project— second phase (DCP-2).* DCP-2 began in 2002 as a joint initiative of WHO, the World Bank and the National Institutes of Health (Fogarty International Center), with funding from the Bill and Melinda Gates Foundation. The DCP-2 study will be a complete revision of the work done in the original project (DCP-1) reviewed above. A limited number of working papers are now available, and the full report is expected to be published in 2005.

• *Global Burden of Disease.* This is an ongoing project of WHO. A major updating of the methodology, particularly with regard to the estimation of YLLs is ongoing. More information can be found on the WHO Website: http://www3.who.int/whosis/ menu.cfm?path =evidence,burden.

• *Maternal-Newborn Health and Poverty.* WHO has begun an initiative to provide "an actualized overview of current knowledge and experience regarding the relationship between maternal health and poverty".[93] The scope of this research effort will include costs to indi-

viduals and families, macrolevel costs, cost-effectiveness of interventions, and strategies for benefits of investment in maternal health. Work is ongoing in 2004.

• *Millenium Development Goals—Task Force on Child and Maternal Health.* A multi-agency task force, under the auspices of the United Nations, has been formed to develop a strategy for implementing the MDGs covering child and maternal health. A final report is expected by June 2005. The following are targets and indicators of the task force:[94]

• Reduce child mortality:

• Reduce by two-thirds, between 1990 and 2015, the under-five mortality rate

• Indicators: Under five mortality rate, infant mortality rate and proportion of 1-year-old children immunized against measles

• Improve maternal health.

• Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio.

• Indicators: Maternal mortality ratio, proportion of births attended by skilled health personnel

• Improve maternal health.

• Reduce by three-quarters, between 1990 and 2015, the maternal mortality ratio.

• Indicators: Maternal mortality ratio, proportion of births attended by skilled health personnel

Cairo 1994: The Cost of Reproductive Health

The International Conference on Population and Development (ICPD) held in 1994 adopted a 20 year Program of Action (1994–2015) in the areas of population and reproductive health, and developed estimates of resource requirements for the success of this program.[95] The program had four elements: family planning services, other reproductive health services, HIV/AIDS prevention and basic research in population. Resource requirements totaled (in 1993 U.S. dollars): $17.0 billion in 2000; $18.5 billion in 2005; $20.5 billion in 2010; and $21.7 billion in 2015. Of this overall total, around 65% represents inputs to the service delivery system for reproductive health and family planning services. Table 2.13 summarizes the projected global resource requirements for the ICPD program.

Family planning and expanded reproductive health

For the estimation of the first component, family planning, costs per user of contraception are estimated according to the level of contraceptive prevalence. Contraceptive prevalence is projected in subregions separately and depends on levels of unmet demand for family planning services. Current contraceptive prevalence rates and estimates of regional levels of unmet demand for family planning are used to project how prevalence will increase and further demand will be generated as access to reproductive services increases and becomes universal.

The assumption is made that the historical pattern of reductions in annual unit costs per contraceptive user will continue due to economies of scale, improved technical performance and specialization of the relevant institutions (governmental, nongovernmental and private sector) in particular areas, thereby maximizing efficiency. Other underlying assumptions are that specialized providers will also ensure universal access to services and that specialization will be the outcome of increased competition.

The second component of the integrated program aims at further improving the quality of care and providing family planning as part of a broader package of reproductive health services and referrals. It is estimated to cost an additional $1.03 per capita per year. Total resources needed amount to (in 1993 U.S. dollars): $5.0 billion in 2000, $5.4 billion in 2005, $5.7 billion in 2010 and $6.1 billion in 2015. Roughly 65% of this component consists of additional inputs to basic service delivery systems; the remaining 35% represents specialized inputs particular to reproductive health programs.[96]

HIV/STI prevention

A draft document prepared by the WHO Global Program on AIDS presents estimates of global resource requirements for HIV prevention in developing countries.[97] Three of the program's seven components—mass media, school education and condom distribution—are elements of an integrated population program with service delivery based at the primary-health-care level. WHO estimates the annual resource requirements for these components to be between $1.1 billion and $1.6 billion (between $0.26 and $0.43 per capita) depending on the chosen scenario for intensity of the HIV epidemic. The ICPD estimation adopts the lower per capita estimate. The lower per capita calculations adopted leads to the estimations of the ICPD Program of Action, namely that resources required annually for HIV/STI prevention programs will increase from $1.3 billion to $1.6 billion between 2000 and 2015.

Additional population data, policy and analysis requirements

Pre-ICPD estimated resource requirements, based on earlier time periods when the coverage of censuses was not as complete as it has become and before the development of the numerous additional needs for decentralized, regional and local population databases, were considered too low. Additional population and development policy analysis needs existed. One such need is the building up of national capacity for data collection and analysis, research, policy development and training in demographic as well as program-relevant areas. Moreover, census costs, which are a sizeable component of population data and population and development research expenditures, are not directly related to the number of users of contraception but depend on the size of the total population.

The ICPD calculation conservatively assumes that demographic and other population and policy-relevant research activities will cost $1 per capita in many developing countries, spread over a multiyear period. The proportion of these costs will be highest during years of census collection and analysis. Using these assumptions, this component's total cost is estimated at between $260 million and $670 million per year, depending on where the year is in the decennial census cycle.

UNFPA Costing Initiative

In 2002, UNFPA undertook an extensive review of costing information from empirical studies on reproductive health services.[98] This work built on previous reviews in the same or allied areas.[99] Over 500 published and unpublished reports were reviewed, mainly from 1990–2002. The reproductive components covered included family planning, maternal health, postabortion care, STI prevention and treatment, HIV prevention, behavior change communication and other reproductive health components. In turn, each of these components was broken down into several subcomponents. The resulting body of information probably represents the most current and complete synthesis of data on the costs of reproductive health interventions available at one source.

This resource currently resides on UNFPA's intranet site. The site is accessible to all UNFPA offices and can be made available to researchers upon request. Summary tables from the costing initiative are given in Appendix 2.3. In developing this site, attention was given to systematizing the data and condensing it to increase its usability. To the extent possible, costs were broken down into subcosts including costs of drugs and supplies, staff costs, overhead costs and capital costs. At the subcomponent level, tables and summaries were made available that synthesize and standardize the data from all related studies, thus increasing the usability of the information.

In terms of content, the most comprehensive costing data are available for family planning, followed by maternal health and STIs. Almost no costing studies were found in the area of behavior change communication. The HIV/AIDS subcomponent is relatively less developed, given the vast amount of information being collected by UNFPA's sister agency, UNAIDS.

The Effect of Family Planning Programs

An ongoing debate contrasts the effect of family planning programs on fertility versus the effect of socioeconomic development. The question is to what extent publicly supplied contraceptive services merely substitute for private consumption of contraceptives in populations where socioeconomic progress has made contraceptives affordable as well as making smaller families more desirable. Answers to this question have relied on cross-national comparisons using program effort scores.[100] Although it is found that in relatively well developed countries program effort seems to be more correlated with fertility decline, family planning has a strong and independent effect. For example, "Bangladesh, one of the world's 20 poorest countries, has a program rated among the best in the developing world and has seen a substantial decline in fertility over the last decade."[101] The evidence from an intensive microstudy in Matlab, Bangladesh[102] confirms this independent effect.

Although some skeptics have argued that the program effect is less than most research has indicated,[103] a careful analysis subsequently put the reduction in fertility in developing countries due to family planning programs at more than 40 percent of the total from the 1960s to the end of the 1980s.[104] The consensus view at present is that, while socioeconomic progress does lead to reduced fertility, a very substantial part of the reduction, independent of socioeconomic factors, is due to public efforts in family planning.[105]

UNAIDS Cost Estimates

A recent UNAIDS report[106] provides, *inter alia,* a global estimate of costs of interventions needed to confront the HIV epidemic. Twenty-five key interventions "required to achieve the overall goals laid out in the De-

claration of Commitment on HIV/AIDS, which was signed by 189 countries at the United Nations in June 2001"[107] are given cost estimates. The estimates cover 135 low- and middle-income countries for the 2001–2007 and take into account the "maximum feasible coverage" as governed by existing physical infrastructure and human resources.[108]

Globally, resource requirements rise from $3.2 billion in 2001 to $10.5 billion in 2005 and $15 billion in 2007. Table 2.16 summarizes the distribution of needed resources by type of intervention over the period, antiretroviral treatment costs are estimated to increase from 14% to 25% of total cost.

The report does not discuss methodology, but it apparently uses a straightforward estimation of costs of providing services calculated by multiplying population in need of coverage by unit costs.[109]

WHO Mother-Baby Package

The Mother-Baby Package (MBP)[110] is a model that can be used to assess and analyze the costs associated with implementing maternal health care interventions at the district level. Such interventions include: antenatal care, delivery care, treatment of obstetric complications (e.g., hemorrhage, sepsis, eclampsia, Caesarean section, and family planning. The model can be applied to locally collected data to estimate the actual cost of current services as well as the cost of upgrading the district health system to meet MBP standards. The model calculates total, per capita and per birth costs. Estimates are presented by intervention, by input (e.g., drugs, vaccines, salaries and infrastructure) and by service location or level (hospital, health center and health post).

The model estimates the cost of providing to a given target population a package of maternal and newborn interventions (Table 2.17).

The information that needs to be collected can be grouped into three main categories:

1) demographic and epidemiologic information (such as population, birth-rate, incidence of pregnancy and delivery-related complications, contraceptive prevalence and mix);

2) Costs of inputs (drug prices, salaries of medical and support personnel, building, equipment and supply costs); and

3) Information about current treatment practice (if current treatment cost is to be assessed).

In terms of the model's outputs, the package provides the user with a cost estimate for the implementation of the whole MBP, but also breaks down the total

cost in a variety of ways. For example, cost estimates are given by individual interventions, different types of input (drugs, salaries, etc.), different types of costs (recurrent and capital costs), various rates (per facility, per capita and per birth) and local cost and imported cost (foreign exchange requirements).

The MBP is basically a costing tool that helps health system managers organize costs in a comprehensive and coherent way so that recurrent costs, capital costs, overheads and so on are all entered into the costing calculus. The package also provides for cost breakdowns by level of facility. The MBP spreadsheets are particularly useful in cases where costing data are deficient, because they contain a variety of default values for specific costs.

An example of an application of the MBP in Uganda is illustrative. The Ugandan government wanted to implement a comprehensive safe motherhood program in an effort to reduce high levels of maternal and neonatal morbidity and mortality in the country. The MBP was used to set standards regarding the scope and quality of the health care provided to pregnant women and newborn babies. To provide program planners with a better appreciation of the costs entailed in implementing the MBP, a costing study was undertaken. In the two districts studied, it was found that the Ugandan government spent about $0.50 per capita on maternal and newborn health care. To upgrade this care to conform to MBP standards and guidelines would cost approximately $1.40 per capita, representing an incremental cost of $0.90. The inclusion of capital and overhead costs would raise the cost to approximately $1.80 per capita, bringing the incremental cost up to $1.30.

Cost-Savings Analyses by The Alan Guttmacher Institute

In the 1990s, The Alan Guttmacher Institute (AGI) undertook a number of studies on the costs and benefits of publicly funded family planning services.[111] These studies are of particular interest because the methodology employed serves as a starting point for the cost-benefit analysis of contraceptive services in the developing world presented in Chapter 3 of this report.

Forrest and Singh in 1990[112] examined federal and state expenditures in family planning in the United States for fiscal year 1987. The study found that if the $412 million spent on contraceptive services had not been spent, other public programs (medical care, welfare and supplementary nutrition) would have expended an additional $1.2–2.6 billion—on average $4.40 expended for each dollar saved—to cover additional

demand generated by the extra pregnancies and births by women who would be denied access to contraceptives. The methodology used in the study consisted of four steps: (1) determining the number of women using publicly-funded contraception; (2) estimating the additional unintended pregnancies and their consequences if public funding were cut using four different scenarios depicting possible behavior; (3) calculating the additional expenditures in social services as a result; and (4) comparing costs from step three to savings from step two. The four behavioral patterns referred to possible contraceptive use following cuts in public funding and were based on differing evidence of past behavior.

A later study by Forrest and Samara in 1996[113] re-estimated the earlier work using newly available contraceptive use data to refine the methodology. An important improvement was the availability of use data disaggregated by specific contraceptive method. Again, four scenarios were explored: (1) the use pattern of women affected by funding cuts would resemble that of nonsubsidized women; (2) it would resemble that of women who discontinue pill use; (3) the pattern would revert to the behavior prior to first clinic visit; and (4) no method at all would be used.* For 1988, an estimated additional 1.3 million unplanned pregnancies would occur if funds were cut, resulting in 0.6 million induced abortions and 0.5 million unintended births. For every dollar saved through defunding, an average of $3.00 would need to be spent in Medicaid services.

Another study by AGI in 2000[114] examined the non-monetary costs of a potential reduction in U.S. funding for family planning aid to developing countries. The methodology of the study was similar to the U.S. studies described above. Based on indirect evidence, funding cuts, which would hit poor women already using subsidized public clinics, would change modern contraceptive users into either users of traditional methods with high failure rates or nonusers. Unintended pregnancies, unplanned births, induced abortions, and infant and maternal mortality were the physical costs estimated in this cost-benefit exercise.

A further study measured the benefits of an increase in family planning assistance from the U.S. Agency for International Development in terms of lives saved. The study estimated that a $169 million increase in family planning funding in 2001 would save the lives of 15,000 women (8,000 who would have died as a result of unsafe abortion and 7,000 who would have died from other pregnancy-related causes) as well as the lives of 92,000 infants.[115]

Cost-Benefit and Cost-Effectiveness Models in Reproductive Health

A number of cost-benefit and cost-effectiveness models have been developed to examine aspects of reproductive care. These are computer-based simulation models that incorporate certain assumptions and empirical relationships. Intended for health-policy development work, they generally require users to enter country or program-specific input information before generating a series of different output scenarios. This section lists these models and briefly describes a set of representative ones (Table 2.18). The objective is to give a comprehensive overview of recent methodologies that are at least partially related to the determination of cost-benefit in the area of sexual and reproductive health.

• GOALS Model. This model[116] is associated with attempts to cost the global resources that would be needed to achieve the goals of the Declaration of Commitment on HIV/AIDS (June 2001).[117] The model is very detailed, covering five care and treatment interventions, 14 prevention interventions and seven other interventions. The basic question that planners can address with GOALS is what level of funding is required to achieve the goals of the national strategic plan for combating HIV/AIDS. An alternative question is how far the goals can be achieved with a given amount of resources. The effectiveness of different interventions can also be assessed by the model so that a budget can be devised that achieves an optimum allocation of resources.

The costs in the model are the costs of a set of interventions. The benefits are the number of potential HIV infections averted, future health expenditures averted and years of life gained as a result of the set of interventions.

One application of GOALS has been reported for Lesotho.[118] Lesotho had a strategic plan and estimated a budget to fulfill the plan. The GOALS model showed that the three-year budget for HIV ($1 billion) was grossly overestimated. GOALS showed that $40.5 million per year would lead to a drop in prevalence from 35% to 30% over three years.

• BenCost Model. The main purpose of this model[119] is to conduct a public-sector cost-benefit analysis of family planning programs in order to evaluate the financial savings to governments as a result of

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 *This last scenario, no contraceptive use, was used for comparative purposes only and was not used to arrive at average estimates.

providing the same level of services to a smaller group of people. Public cost-benefit analysis looks at such public-sector services as primary, secondary and tertiary education, health, food subsidies, social welfare, housing, utilities and infrastructure. BenCost is capable of examining the financial savings generated in all or any subset of these services as a result of expenditures in a family planning program.

Three main issues in cost-benefit analysis are: (1) what the proper enumeration of costs and benefits are, (2) how benefits are valued and (3) what discount rate is appropriate. BenCost avoids some of these difficulties by restricting its analysis to public financial savings rather than trying to explore all possible benefits. The study notes that noneconomic benefits such as maternal and child health are "in practice very difficult to measure. Even if they can be measured correctly, it is still difficult to convert them into monetary units so that they can be combined with other economic benefits."[120]

• The Injecting Drug User Model. IDU model is one of five simulation models developed by the London School of Hygiene and Tropical Medicine (LSHTM) in a consortium led by UNAIDS to show the impacts of different HIV preventive interventions.[121] The model can show the number of HIV infections averted by a particular intervention. Neither the IDU model nor any of the other models in the suite is designed to link benefits—infections averted—to intervention costs.

• Costing the Essential Health Package Spreadsheet. This training-oriented, spreadsheet-based model is still under development by the World Bank.[122] The data built into the model come from an amalgam of cost and output data from Zambia and Bangladesh, and thus represent a low-income setting.* The essential services consist of family planning, HIV/AIDS prevention and management, antenatal care, nutrition, delivery care, postnatal care, reproductive tract infections and STIs control and management, immunization (EPI plus), management of childhood diseases, tuberculosis control, malaria control and curative care.

The hypothetical country in the spreadsheet has a population of 10 million. The health system comprises community level facilities, dispensaries, clinics and district level hospitals. The model places specific interventions at each level of service, fixes the coverage for every intervention-service-level point and assigns

costs in a similarly disaggregated fashion. The embedded data yield a total annual cost of $11.3 million or a per capita cost of $11.30. This amount approximates the estimated $12 per capita cost for low-income countries for the essential care package proposed in the World Bank's *World Development Report 1993*.[123]

Summary. Each of the models discussed covers one or more aspects of reproductive health. Several models cover both costs and benefits—sometimes in physical terms, such as numbers of infections averted, and sometimes in monetary terms. The LSHTM models only look at benefits. One thing all the models have in common, however, is that they are a rich source of detailed data on costs and parameters and linking interventions to results.

Selected Country-Level Cost-Benefit Studies of Family Planning Services

Several cost-benefit analyses have been carried out on family planning programs at the country level. Policy decisions to invest in one type of intervention rather than another are commonly taken at the country level, and cost-benefit studies of national programs have often proved to be useful inputs to these decisions. Although such studies are primarily meant to influence national policies and their application outside the national context must be approached cautiously, examination of a representative set of them is an important means of demonstrating the methodologies involved and how they might be adapted to other countries. This section reviews a few of the most significant national cost-benefit studies with these objectives in mind.

Mexico 1972–1984

This study[124] evaluated whether the costs of the Mexican Social Security System (IMSS) family planning services yielded a net savings to IMSS by reducing the load in its maternal and child health services. Based on the average cost per case, the analysis disclosed that for every peso that IMSS spent in family planning services to its urban population between 1972 and 1984, the agency saved nine pesos. The analysis focused on the urban clientele of the IMSS system, some 5.3 million women.

The evaluation looked at the following:
• Cost for contraceptive recruitment and supply;
• Annual number of births averted;
• Estimate of annual number of IMSS treatments for incomplete abortions; and
• IMSS expenditures per pregnant and postpartum

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*Personal communication from Tom Merrick, reproductive health adviser, the World Bank.

woman, per incomplete abortion treated, and per child cared for during the first year of life.

Of the 539 billion pesos spent in 1984, 70 billion went to family planning and maternal and infant care. Had the agency not instituted family planning services in 1972, an additional 51 billion pesos would have been expended on maternal and infant care in 1984. As a consequence of its family planning program, IMSS has been able to divert a total of 318 billion pesos (1983 pesos) during 1972–1985 from maternal and infant care to payments for pensions and general health services.

• *Comment.* This study looks at a very specific subset of all the possible benefits flowing from family planning programs, namely, savings in maternal and child health services due to avoidance of unwanted or unplanned births. Presumably, the total benefits would be far larger, but by concentrating on maternal and child health services covered within the IMSS insurance system itself, the study avoided the need to ascribe monetary amounts to non-valued benefits. The study is notable, too, for the completeness of the data used and the large size of the population analyzed.

Thailand 1970–2010

This study[125] found that the average return on each dollar invested in Thailand's family planning program is more than $7 for the first nine years of the program's existence (1970–1980) and more than $16 over a 40 year period (1972–2010).

The cost-benefit estimates are derived from a projection over 40 years of government expenditures for family planning and government expenditures averted as a result of births averted by the family planning program. It is projected that between 1972 and 2010, 16.1 million births will be averted by the program; this number of births averted will be achieved at a total estimated cost of $536 million in family planning expenditures, but will in turn yield estimated cumulative savings of $11.8 billion in government expenditures in social services. Using a discount rate of 13.5% the total cost of the program becomes $68 million, and the total benefit generated becomes $1.1 billion. The savings for specific years of the project period are shown in Table 2.19.

The effect of the program is to lower spending on social services by 13% in 1980, by 25% in 1990, by 17% in 2000 and by 23% at the end of the projection period.

Egypt 1992–2015

This study[126] combined a cost-savings analysis of the public sector with an econometric model of the Egyptian economy.

Cost-benefit analysis. The usual cost-benefit analysis approach is used in this study to compare the costs of the family planning state program in Egypt to savings from births averted in other sectors (e.g., food subsidies, education, water, sewage, housing and health). A table summarizing the findings shows an overall cost-benefit ratio of 31 to one. In other words, one dollar invested in the family planning program saves the government from spending $31 in the six other sectors analyzed. This ratio is higher than any found in similar studies in other countries. The relative contributions to the accumulated public savings from the six sectors considered are as follows: education (31%); food (7%); health (7%); housing (21%); water (19%); and sewage (15%).

The projection period used in the study was 1992–2015, and the discount rate used was 0%. However, even if a 15% discount rate were used, the cost-benefit ratio would be reduced only from 31 to one to 25 to one. The study includes a good comparison of these results with several other similar studies and analyzes the reasons that the greatest cost-benefit ratios were found in Egypt. The greater number of sectors and the 0% discount rate are two simple reasons for the high cost-benefit ratio in Egypt, but sector coverage and relative sector costs also contribute to the result.

Macroeconomic model. A model of the same sectors was also developed in this study. The model is a Computable General Equilibrium model based on a social accounting matrix. The model was run for the period 1992–2010. At the end of the period, Gross Domestic Product increased by 4.5% percent under the lower fertility simulation, GDP per capita increased by 8% and investment increased by 20%.[127]

Vietnam 1979–2010

This study[128] analyzed Vietnam's national population and family planning program using data from 1979 to 1996 and projecting costs and benefits through 2010. The study compared the impact of a strongly funded family planning program with a weak program with little government support.

In 1979, the combined total family planning expenditures by the ministry of health and donor agencies in Vietnam was Vietnam Dong (VND) 47 billion (in constant 1995 VND). By 1989, national program expendi-

tures had risen to VND 79 billion and reached VND 406 billion by 1996.

The benefits analyzed were savings in the provision of health, education and other social services due to prevented births. Future costs and benefits were estimated using a 10% discount rate.

The study showed that for every one VND invested at the national level in population and family planning, by 2010 VND 7.6 in social sector spending would be saved. However, the initial start-up phase of the program did not show immediate net benefits. For the years 1979 through 1995, the benefit-cost ratio was below the break-even level of 1. Only after 1995 did the annual ratio rise above this threshold.

Cumulating the benefits over the 31-year study period, it was found that 90% of total social sector savings resulting from averted births and slower population growth will accrue in the education sector. Nearly 5% of social sector savings will be from lower maternal child health expenditures, another 3% from population-based services and 2% from avoided social security expenditures.

India 1956–1987

This study[129] evaluated the family welfare program of the Tata Iron and Steel Company in Jamshedpur, India. The benefit-cost ratio was calculated by reviewing the total program of benefits provided to employees by TISCO, isolating those benefits which could be impacted by fertility, computing the financial impact of one birth and then calculating the total financial impact of the birth averted. TISCO provides a comprehensive service package to its employee and their families, including maternity care, inpatient hospitalizations for dependents, outpatient hospitalization for dependents and education for dependent children.

The study found that for each rupee spent on family planning, 2.39 rupees were returned in cost savings over the life of the program. For 1987–1988 each rupee expended resulted in 3.50 rupees saved, showing an increasing trend of the benefit-cost ratio. Overall, by 1987, 43,872 births had been averted since the program began in 1956.

Table 2.1 Burden of disease related to reproductive health

	YLLs (m.)		YLDs (m.)		DALYs (m.)		% of all DALYs	
	1990	2001	1990	2001	1990	2001	1990	2001
STIs	6.5	5.4	12.0	7.0	18.5	12.4	1.3%	0.85%
HIV	8.8	80.0	2.3	8.4	11.2	88.0	0.8%	6.0%
Maternal conditions	13.3	15.0	16.5	15.9	29.8	30.8	2.2%	2.1%
Total	28.6	100.4	30.8	31.3	59.5	131.3	4.3%	9.0%

Table 2.2. Percentage of DALYs, YLLs and YLDs lost by cause, according to region*, 2001

	World	Africa	Americas	Europe	Eastern Mediteranean	South East Asia	Western Pacific Region
DALYs							
STIs excluding HIV/AIDS	0.8%	1.4%	0.4%	0.2%	1.0%	1.0%	0.2%
HIV/AIDS	6.0%	18.8%	1.9%	0.6%	1.3%	3.2%	0.8%
Maternal conditions	2.1%	3.2%	1.3%	0.5%	3.0%	2.4%	1.1%
Perinatal conditions	6.7%	6.1%	4.9%	1.9%	9.1%	9.4%	5.7%
Other sexual and reproductive health conditions	2.7%	1.7%	3.5%	3.7%	2.5%	2.8%	3.0%
Percent	18.4%	31.3%	12.0%	6.9%	16.9%	18.9%	10.8%
Total DALYs (000's)	270	112	17	10	23	79	28
YLLs							
STIs excluding HIV/AIDS	0.6%	1.2%	0.1%	0.0%	0.7%	0.5%	0.1%
HIV/AIDS	8.7%	22.2%	3.2%	0.8%	1.8%	4.6%	1.1%
Maternal conditions	1.6%	2.5%	1.0%	0.1%	2.3%	1.7%	0.5%
Perinatal conditions	9.0%	6.9%	8.1%	2.8%	11.7%	12.8%	8.5%
Other sexual and reproductive health conditions	2.5%	1.3%	4.4%	4.2%	2.1%	2.6%	3.0%
Percent	22.4%	34.1%	16.9%	8.0%	18.5%	22.2%	13.1%
Total YLLs (000's)	207	95	11	7	17	60	18
YLDs							
STIs excluding HIV/AIDS	1.3%	2.4%	0.7%	0.5%	1.6%	1.9%	0.4%
HIV/AIDS	1.6%	7.3%	0.7%	0.4%	0.2%	0.8%	0.4%
Maternal conditions	2.9%	5.3%	1.5%	1.0%	4.5%	3.7%	1.9%
Perinatal conditions	2.7%	3.4%	2.0%	0.8%	4.2%	3.5%	2.4%
Other sexual and reproductive health conditions	3.1%	3.2%	2.6%	3.0%	3.3%	3.2%	3.0%
Percent	11.6%	21.6%	7.7%	5.7%	13.9%	13.0%	8.1%
Total YLDs	63	17	6	4	6	20	10

Table 2.3 HIV/AIDS has become a major cause of sexual and reproductive ill-health worldwide.

	1990	2001
HIV/AIDS	11.2	88.0
STIs, excluding HIV/AIDS	18.5	12.4
Maternal conditions	29.8	30.8
Perinatal conditions	92.3	98.3
Other sexual and reproductive health conditions	42.5	23.0
Total	194.3	252.5

*See Appendix Table 2.3 for a list of countries included in each region.

Table 2.4 Deaths and DALYs in developing countries due to unsafe sex and lack of contraception, 2000

Risk Factor	Deaths (000s)	DALYs (millions)
Unsafe sex	2,830	90.0
Lack of contraception	149	8.7
Total	*2,978*	*99.0*
% of burden borne by women	**55%**	**58%**

Table 2.5 Savings per birth averted (US$ 1987)

Libana	Banglapal	Colexico
$440	$480	$1,600

Note: Estimates are government savings in primary and secondary education and in health services.

Table 2.6 Costs of averting a birth through family planning, 1980 (US$ 1987)			
Country	Cost per user	Cost per averted birth (low)	Cost per averted birth (high)
Sri Lanka	$8	$31	$41
Colombia	$7	$21	$29
Peru	$10	$34	$38
Panama	$36	$136	$231
Nepal	$80	$330	$364
Kenya	$100	$350	$386
Libana		$238	$259
Banglapal		$191	$213
Colexico		$121	$144
Note: Out of 16 countries, only those with the three lowest and three highest costs are shown here.			

Table 2.7 Benefits verses costs in three hypothetical countries			
Country	Benefits	Costs	Ratio
Libana	$440	$248	1.8 to 1.0
Banglapal	$480	$202	2.4 to 1.0
Colexico	$1,600	$133	12.0 to 1.0

Table 2.8 Components of two obstetric care models	
Limited effort model	**Moderate effort model**
Upgrading existing facilities for maternal health care; four centers with surgical capacity	Establishment of community outreach system
Emergency transportation: one vehicle for each center	More health posts (one per 10,000 population); training traditional birth attendants
Risk screening; three mobile units; maternity villages	Five new referral centers
Training traditional birth attendants; provisioning and fees for family planning services	Ten maternity beds in district hospital; 1 maternity operating room
Coordination of outreach services	Training for regional network of maternity services
Operational research	Development of emergency transportation system
Other components	

Table 2.9 Costs and benefits of five hypothetical programs in "Himort," a country with a population of one million and a high rate of mortality						
	No Inter-vention	Family planning only (20% cost per user)	Family planning only (40% cost per user)	Family planning only (60% cost per user)	Family planning and limited obstetric	Family planning and moderate obstetric
Maternal mortality ratio	1,000	1,000	1,000	1,000	800	600
Perinatal mortality rate (%)	52	49	46	44	48	37
Maternal deaths	495	412	342	284	329	247
Maternal morbidity	7,900	6,600	5,500	4,500	5,300	4,000
Perinatal infant deaths	5,600	2,000	1,600	1,200	2,000	1,500
Low-birth-weight babies	7,400	5,800	4,400	3,400	5,400	4,900
Births averted	n/a	8,300	15,000	21,000	8,300	8,300
Maternal deaths averted	n/a	83	153	211	166	248
Perinatal infant deaths averted	n/a	540	970	1,300	590	1,000
Total program cost (US$)	$0	$500,000	$1,500,000	$4,500,000	$980,000	$2,000,000
Cost per capita (US$)	n/a	$0.50	$1.50	$4.50	$0.98	$2.00
Cost per death averted (US$)	n/a	$810	$1,300	$3,000	$1,300	$1,600
Cost per event averted (US$)	n/a	$140	$230	$510	$180	$260

Table 2.10 Estimates of the cost-effectiveness of selected interventions, *World Health Report 1993*	
Vitamin A supplementation	$1–2/DALY
Chemotherapy for tuberculosis	$1–3/DALY
Family planning, community based distribution, Mali	$4–5/DALY
Iodization, entire population	$8/DALY
Iron supplementation, pregnant women	$13/DALY
Measles immunization	$15–19/DALY
Food supplementation, pregnant women	$24/DALY
Family planning, community based distribution, Colombia, Thailand	$25+/DALY
Management of diabetes	$250/DALY
Treatment of leukemia	$1,000–2,000/ DALY
Environmental control of dengue	$4,000–5,000/DALY
Source: see reference 64.	

Table 2.11 Elements of public health component of essential package		
	Low-income	Middle-income
Expanded Program on Immunization Plus	$12-17/DALY	$25-30/DALY
School health program	$20-25/DALY	$38-43/DALY
Tobacco and alcohol control program	$35-55/DALY	$45-55/DALY
AIDS prevention program	$3-5/DALY	$13-18/DALY
Source: see reference 66.		

Table 2.12 Elements of Clinical Services Component of Essential Package		
	Low-income	Middle-income
Chemotherapy for tuberculosis	$3-5/DALY	$5-7/DALY
Management of sick child	$30-50/DALY	$50-100/DALY
Prenatal and delivery care	$30-50/DALY	$60-110/DALY
Family planning	$20-30/DALY	$100-150/DALY
Treatment of STIs	$1-3/DALY	$10-15/DALY
Limited care	$200-350/DALY	$400-600/DALY
Source: see reference 67.		

Table 2.13 Resource requirements for the ICPD Program of Action (billions of US$)

	2000	2005	2010	2015
Population and family planning programs	10.2	11.5	12.6	13.8
Reproductive health	5.0	5.4	5.7	6.1
HIV/STI prevention	1.3	1.4	1.5	1.5
Data/policy/analysis	.6	.3	.7	.3
Total	17.0	18.5	20.5	21.7

Table 2.14 Estimated average costs per contraceptive user by major region (US$/user)

Region	2000	2005	2010	2015
Sub-Saharan Africa	28.33	24.65	20.61	19.57
Latin America	14.43	14.15	13.97	13.85
North Africa/Western Asia	14.21	13.52	12.98	12.58
East Asia	12.07	12.02	12.00	11.98
South-East Asia	8.37	8.19	8.10	8.05
Southern Asia	13.18	12.80	12.59	12.47
Former Soviet Union and Eastern Europe	12.04	11.99	11.96	11.93

Table 2.15 Resource requirements by major region (billions of US$)

Region	2000	2005	2010	2015
Sub-Saharan Africa	1.2	1.7	2.1	2.7
Latin America	1.1	1.3	1.4	1.4
North Africa/Western Asia	.4	.5	.6	.7
East Asia	3.5	3.6	3.7	3.7
South-East Asia	.7	.7	.8	.8
Southern Asia	2.5	3.0	3.3	3.7
Former Soviet Union and Eastern Europe	.7	.8	.8	.7
Total	10.2	11.5	12.6	13.8

Table 2.16 Resource requirements for global HIV/AIDS program (billions of US$)

	2001	2007
Prevention interventions	1.4	6.6
Care/treatment interventions	1.7	7.5
Orphan care interventions	0.1	0.9
Total	*3.2*	*15*

Table 2.17 Interventions included in the Mother-Baby Package

Care during pregnancy	Care during and after delivery	Postpartum family Planning
Antenatal care Treatment of severe anemia Treatment of syphilis Treatment of other STIs such as gonorrhea and chlamydia	Delivery by a skilled birth attendant, including clean and safe delivery and routine newborn care Management of eclampsia Management of postpartum hemorrhage Management of obstructed labor/caesarean delivery Management of sepsis Management of basic newborn complications Postpartum care Management of abortion complications	Condom Depo-Provera IUD Norplant Oral contraceptives Sterilization

Table 2.18 Recent cost-benefit and cost-effectiveness models in reproductive health

Title	Date	Developed by:	Description
GOALS Model	2003	Futures Group International (FGI)	Estimates the effects of resource allocation decisions on achieving the goals of an HIV/AIDS strategic plan.
Resource Needs for HIV/AIDS	2002	FGI	A simplified version of GOALS, estimates resource needs for prevention, care and mitigation of HIV/AIDS.
MBP Package (MBP)	1999	WHO	Relates costs to outputs for a maternal health delivery system.
Safe Motherhood Model	Under develop-ment	FGI	Builds on MBP to examine the cost-effectiveness of interventions and the resources required to attain certain levels of maternal mortality.
Cost-Estimate Strategy (CES)	1999	Management Sciences for Health	A planning, budgeting and management tool to help decision makers in reproductive health commodity management.
BenCost, Version 4	1999	FGI	Estimates the financial benefits and costs of family planning programs.
Prevention of Mother-to-child transmission, Version 1	2002	TFGI	Evaluates strategies to prevent mother-to-child transmission of HIV.
IDU: Injecting drug user intervention impact model, Version 2.0	2000	London School of Hygiene and Tropical Medicine (LSHTM)	Models benefits (reduction in infections)of strategies to reduce HIV transmission among injecting drug users; does not measure costs.
SexWork: Sex worker intervention impact model, Version 3.0	1999	LSHTM	Models the impact of HIV prevention interventions (condom use and improved STI treatment) on sex workers and their clients.
School: School intervention impact model, Version 2.0	1999	LSHTM	Models the impact of school-based education projects, simulating the patterns of HIV and STI transmission between in-school youth and older age groups.
Blood: Blood transfusion impact model, Version 3.0	1999	LSHTM	Models the impact of interventions to strengthen blood transfusion services for HIV prevention.
Costing the Essential Health Package Spreadsheet	Under development	World Bank	Extends MBP to include all interventions in the World Bank's "Essential Package".(see *World Development Report, 1993*).
CET, cost-effectiveness tool for Mother-to-child transmission interventions, Version 1.0	1999	Health Strategies International (for UNAIDS)	Evaluates the cost-effectiveness of interventions to prevent mother-to-child transmission of HIV.

Table 2.19 Savings in government expenditures in Thailand (millions of US$)

Year	Education	Health	Housing	Other	Total
1980	129	23	1	12	165
1990	361	38	3	25	426
2000	210	54	33	38	336

Chapter 3

New Look at the Benefits and Costs of Contraceptive Services in Developing Countries

This chapter uses the best and most up-to-date data available from numerous sources on the current patterns of reproductive behavior, services and outcomes across all areas of the developing world. Over the past three decades, surveys of women in developing countries and projects that monitor and analyze reproductive outcomes and health status have yielded valuable information on key aspects of sexual and reproductive health. These include union status and childbearing preferences; contraceptive use patterns, effectiveness and service costs; pregnancy outcomes; and the pregnancy-related health status of women and infants.

We use these data to put together information on reproductive behavior and care for countries where data are available and by making estimates for countries without data by using information from similar countries. In this chapter, we assess the benefits and costs of reproductive health services from two perspectives. First, we estimate the current contribution of contraceptive use toward preventing unintended pregnancies, including abortions, and the extent to which mortality and morbidity thus avoided. Next, we focus on women and their partners who have unmet need for contraceptive care (i.e., are using no method or a traditional method even though they are at risk for unintended pregnancy). Using current patterns of reproductive behaviors and outcomes and current contraceptive service costs, we estimate the benefits and costs that could be achieved if all these couples had access to and used modern contraceptive methods.

These estimates are limited to the impact of contraceptive services and supplies, in large part because relevant data for this aspect of sexual and reproductive health care are most readily available. They are conservative figures: As discussed in earlier chapters, these estimates do not encompass all of the impacts of inadequate contraceptive services and supplies. They are limited by available data to those that are most directly tied to unintended pregnancies and their immediate health outcomes. The estimates are further limited in that they do not include impacts from services that often accompany contraceptive care, such as the prevention of HIV and other STIs through use of condoms, or improved infant health from birth spacing. The focus on contraceptive use and service costs is not meant to imply that these are the sole determinants of pregnancy levels, outcomes or health effects. For example, education of girls and their future life prospects help determine their childbearing goals and reproductive behavior. Effective contraception is necessary, but not sufficient, to allow couples who want to delay or stop future childbearing to do so. Similarly, preventing unintended pregnancies can improve the health of some women and children, but other steps are also needed: for example, providing access to emergency care to women giving birth and improving the nutritional status of infants. Thus, the approach and estimates presented here provide first steps toward more comprehensive identification of the benefits and costs of investing in sexual and reproductive health care.

Methodology

• Selection and classification of countries: The estimates encompass all developing countries. The "more developed countries" of Europe, Northern America, Australia, New Zealand, Japan and the former Soviet Union were excluded, except for countries in Central Asia. Countries were classified by region and subregion according to the schemas used by the United Nations Population Division (Appendix Table 3.1a).[130,131] To classify countries by economic status, we used categories defined by the World Bank for 2001, which are based on per capita gross national income (Appendix Table 3.1b).[132] The groups are: low income, $745 or less; lower middle income, $746-2,975; upper middle income, $2,976-9,205; and high income, more than $9,205.[133]

When using regional and subregional data from other sources-for example the World Health Organization (WHO)-values for the appropriate regional and

subregional groupings were applied to countries within those groupings. While the calculations were made at the country level, data are aggregated and presented here for regional and income groups of countries to lessen the potential variation in measures that can result from small numbers and estimation. In the tables, developing countries in Oceania and Micronesia are included in the Southeast Asia subregion (see Tables 3.1a and 3.1b for details on the classification of countries according to both geographic region and income groups).

• *Total population and number of women of reproductive age.* Population numbers for each country were estimated as of July 1, 2003, by straight-line interpolation between data for 2000 and 2005.[134] Women aged 15-49 were defined to be women of reproductive age. In the source data, some countries with very small populations are sometimes missing from detailed country listings, but included in the regional totals. Populations in these countries were assigned the relevant subregional average for purposes of estimation.

• *Marital status of women aged 15-49.* Women were classified according to whether they were currently married,* formerly married or never married using several sources, listed here *in order of priority:*

1. The most recent Demographic and Health Survey (DHS) or other national survey for a country.[135]

2. Proportions of women aged 15-49 who were currently married, compiled in a recent report that draws from data from the United Nations Population Division and various national surveys.[136] The proportion of unmarried women were distributed into formerly married and never married according to the distribution of unmarried women aged 15-49 in the United Nations marriage database (see below, item 3), if available. Otherwise, they were distributed based on the unweighted average distribution from countries in the subregion with DHS surveys or from a similar country.

3. United Nations Population Division, Database on Marriage Patterns, an unpublished compilation of census and survey data on marital status by age and sex over the past 40 years, provided June 5, 2002. For our estimates, distributions of women by marital status for the most recent available year (1990 or later) were used.

4. Estimates based on the unweighted average percentage distribution by marital status of countries

with DHS data in the relevant subregion.

5. Estimates based on the DHS data available for a country in the region that has similar marriage patterns.

• *Women at risk for unintended pregnancy.* This was defined to be all women using modern contraceptive methods (including sterilization), as well as those with unmet need for effective contraception-i.e., women using a traditional method and those using no contraceptive method who are sexually active, able to become pregnant and who do not want more children ("limiters") or do not want a child in the next two years ("spacers").

• *Contraceptive method use.* Categories for contraceptive method use were sterilization, male or female, modern reversible methods-IUD, long-acting hormonal methods (injectable and implant), the pill, the condom, vaginal barrier methods and spermicides-and traditional methods, including periodic abstinence, withdrawal and other nonmodern methods. Most women using long-acting hormonal methods use injectable contraceptives.

• Distribution of women aged 15-49 by risk for unintended pregnancy, contraceptive method use and fertility-preference status (spacing or limiting), according to marital status.

1. Several sources were used to estimate the percentage distributions of women aged 15-49 in each marital status category by risk for unintended pregnancy, contraceptive method use and fertility-preference status. The type of source and estimation methodology varied according to what data were available:

a. For all countries with a DHS survey from 1990 or later that was available as a public-use file, the most recent DHS was used. These percentages were obtained by special tabulations of DHS surveys.[137]

In some cases, the percentages of women with unmet need and using no method differ slightly from those published by Westoff.[138] For one country, this is due to an error in the DHS report. For the others, differences apparently are due to revisions in the data files after the DHS reports were prepared.

All formerly married women using no method who had had sex in the last month and half of those who had had sex in the last year but not in the last month were considered to be sexually active. It was assumed that the other half of formerly married women who had unmet need, were not using contraceptives and had had

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* In this report, "married" includes women in consensual unions.

sex in the last year but not in the last month were not at risk for unintended pregnancy.

b. For countries with no recent DHS survey, but for which published information was available by marital status on the percentage of women not in need, the percentage with unmet need using no method and the percentage using contraceptive methods, the published information was used and, if necessary, the distribution of users according to method was estimated by applying the unweighted average distribution of countries in the subregion with DHS data.[139]

Information for all unmarried women was applied to never married and formerly married women if data for these two categories were not separately available. Since estimates published in DHS reports exclude unmarried women who had not had sex in the month before the interview from the category of women with unmet need using no contraceptive method, the reported percentage of women in this category was inflated by the ratio of the percentage of all never married women (or formerly married women) with unmet need using no method to the percentage of never married women (or formerly married women) with unmet need using no method who had had sex in the last month, according to spacing or limiting status, based on the unweighted average of countries for which special tabulations were done, in the relevant subregion (see above, item 1.a.).

c. For countries with no recent DHS survey available, but with information from a published source for women aged 15-49 by marital status on the percentage with unmet need and using no method, the percentage not in need and the distribution of method use, by spacing and limiting, was estimated from unweighted average distributions for countries in the subregion with DHS data.[140] If information by spacing and limiting status was not available, it was assumed that all women using sterilization were seeking to limit births and that half of women using other methods were spacing and half were limiting.

d. For China, it was estimated that 2% of currently married women aged 15-49 had unmet need for spacing and were not using any method and 2% had unmet need for limiting and were not using a method. Based on the percentage distribution of need and method use among all married women from the 1992 National Fertility and Family Planning Survey,[141] it was estimated that 12.6% of married women aged 15-49 were not in need of contraceptives. Further, it was assumed that all couples using sterilization were limiting further childbearing, that half of IUD users were limiting and half

spacing and that all users of pill, injection, condom and traditional methods were spacing.

e. For each country that did not have a nationally representative fertility survey or for which data were not available for a particular marital status, either the unweighted average distribution of its subregion based on countries in the subregion that had surveys, or the distribution from a country at a similar level of demographic transition in the same subregion or region was used.

2. Based on the above assumptions, the estimated numbers and percentages of women with unmet need and using no contraceptive for the developing world as a whole (minus China) in 2003 are shown below. They are close to the estimates made for 2000 by Ross and Winfrey (see Table 3.1).[142]

3. The estimated percentage distribution of currently married women according to contraceptive method used is similar to the proportions estimated among couples of reproductive age in less developed regions for 1998 by the United Nations Population Division.[143] However, the actual number of married women of reproductive age using some method has grown substantially, by about 11 million, between 2000 and 2003 (see Table 3.2).

• The cost of contraceptive services. The cost of contraceptives ranges widely across available studies, even within the same country, often reflecting different service settings and differing cost components. The estimates in this report use the average costs available from the UNFPA Costing Initiative database to represent annual cost across all regions.[144] These average costs summarize results from a large number of studies, separating costs for each method into components of drugs and supplies, labor, overhead (including capital costs, although these are likely to be incompletely reported) and other costs such as hospitalization for tubal ligation. Summary tables of this information are given in Appendix 2.3 of this report. Given the variation seen in costing studies, even within the same country, the small numbers of studies in some regions and the roughness of the cost estimates, we did not adjust the UNFPA Costing Initiative figures by region.

Costs of long-term methods were annualized using standard assumptions: 10 years for sterilization and three years for the IUD to take into account the average length of coverage from these methods.[145] For other methods, the estimates are based on supplying 13 cy-

cles of oral contraceptives, 96 condoms or four injections per year. The UNFPA Costing Initiative estimated average costs in 2001 dollars. These were projected to 2003 dollars using an inflation factor of 4%.

The annual method-specific cost estimates used (in 2001 dollars) were as follows:

1. IUD: Average total cost per user was $26.43.

a. Drugs and Supplies: An average cost of $4.05 was used. This was based on visit costs for insertion, follow-up and removal. The average drug and supply cost for IUD insertion is adjusted from $1.37 to $2.50, based on footnote 1 of UNFPA Costing Initiative noting that the $1.37 average cost was low, in large part because of very low drug and supply costs of $0.21 and $0.72 in a Turkish study, but that the median drug and supply cost would be $2.50 without the Turkish study. The UNFPA Costing Initiative averages of $1.02 for follow-up visit and $0.53 for removal visit were used.

b. Labor: $3.35 ($1.46 for insertion, $1.30 for follow-up and $0.59 for removal visit).

c. Overhead: $19.03, based on available studies showing that drugs, supplies and labor accounted for 28% of total costs and overhead for 72% of total costs.

2. Injectables cost an average of $30.35 per user per year.

a. *Drugs and supplies:* $1.41 for acceptance visit and $1.21 for follow-up visit.

b. *Labor:* $0.65 for acceptance visit and $0.43 for follow-up visit.

c. *Overhead:* $6.90 for acceptance visit and $5.49 for follow-up visit, based on assumption that drugs, supplies and labor accounted for 23 percent of total costs and overhead for 77%. These proportions were estimated as the average of percentages from available studies for IUDs and for pills.

d. For *total cost,* this study assumed one acceptance visit ($8.96) and three follow-up visits (3x $7.13).

3. Oral contraceptives cost an average of $35.70 per user per year.

a. Drugs and supplies: $0.84 for acceptance visit (on average 2 cycles and other materials) and $0.78 for follow-up supply visits (2-3 cycles).

b. Labor: $0.52 for acceptance visit and $0.36 for follow-up supply visits.

c. Overhead: $6.42 for acceptance visit and $5.29 for follow-up visits, based on available studies showing that drugs, supplies and labor accounted for 18% and overhead for 82% of total costs.

d. For *total cost,* we assumed one acceptance visit ($7.78) and 4.4 follow-up visits ($6.43) for a total of 13 cycles.

4. Condoms were estimated at an average annual cost per user of $13.56.

a. Drugs and supplies: $0.79 per visit (12-20 condoms and other materials; the assumed average number of condoms dispensed was 16 per visit).

b. Labor: $0.34 per visit.

c. Overhead: Estimated at $1.13, assuming that overhead accounted for half of total cost.

d. Total cost: We assumed six visits, for a total of 96 condoms per year (6x$2.26).

5. Female sterilization: Average total cost was estimated at $88.70. This includes $80.10 for surgery, $5.73 for an evaluation visit and $2.87 for a follow-up visit.

a. Drugs and supplies: $20.39 for surgery visit.

b. Labor: $22.21 for surgery visit, $3.26 for evaluation visit and $1.63 for follow-up visit. Estimated average costs for evaluation visit and follow-up visit assumed the same distribution between labor and overhead as for surgery visit.

c. Overhead: $16.82 for surgery visit; estimated $2.47 for evaluation visit and $1.24 for follow-up visit, assuming the same distribution between labor and overhead as for surgery visit.

d. Hospitalization: $20.68 for "bed" or hospitalization costs for the overnight stay required for some procedures.

6. Vasectomy: Total cost averaged $59.42. For vasectomy, we assumed the same drug and supply, labor and overhead costs as for tubal ligation, but no other or hospitalization costs. The UNFPA Costing Initiative gives information for only one study, a Brazilian vasectomy campaign, at $9.30 per couple year of protection. Acharya cites Janowitz, Bratt and Fried in estimating a unit cost of $100 for both female sterilization and vasectomy.[146]

• Pregnancies averted. The number of pregnancies averted by current use of modern contraceptive methods was estimated by subtracting the number of pregnancies occurring to current users of modern contraceptives from the number that would occur if they used no method.

The number of pregnancies that would be averted by serving all those with unmet need for contraceptives (i.e., those using no method or those using a traditional method) was estimated as the difference between the

number of pregnancies currently occurring to women with unmet need and the number that would occur if they used modern contraceptives in the same distribution as women in their country who are current users, by fertility-preference status and marital status.

• Pregnancy rates for women using each method and for women at risk of unintended pregnancy using no method were estimated from method-specific use-failure rates, which were adjusted to be consistent with estimates of the number of unintended pregnancies in 2003 in each major region.

1. There were an estimated 75.9 million unintended pregnancies in developing countries in 2003. To calculate this, the estimated number of unintended pregnancies in developing countries circa 1999 (74.7 million)[147] was projected to 2003 by multiplying the number in 1999 by the ratio of 2003 births (120.6 million) to 1999 births (118.7 million).[148] Similar calculations were done by major region to estimate the number of unintended pregnancies in each region in 2003. A further proportional adjustment was made so that the estimated regional figures totaled to 75.9 million.

2. Annual pregnancy rates for users of each method and for women at risk of unintended pregnancy using no method were estimated in multiple steps. Base use-failure rates were estimated for each method.

Reversible methods: We used median method-specific cumulative probabilities of failure per 12 months of use provided by Cleland.[149] These were calculated from DHS data from married women in 13-18 countries, depending on the method. Across the surveys, the total number of abortions (induced and spontaneous) was assumed to be underreported. The base failure rates are:
• Pill: 6.9%
• IUD: 1.8%
• Injectables (also used for implants): 2.9%
• Condom (also used for other supply methods): 9.8%
• Periodic abstinence: 21.6%
• Withdrawal: 15.1%
• Other non-supply/traditional methods: Used average of rates for periodic abstinence and withdrawal: 18.35%

Sterilization: We used pregnancy rates from Trussell et al.:[150]
• Tubal ligation: 0.5%
• Vasectomy: 0.2%

No method: an initial annual pregnancy rate of 40% was assumed.

This 40% estimate is much lower than the 85% annual pregnancy rate that Trussell et al. estimate for couples continually sexually active throughout a year's time. Some studies have suggested, however, that couples at risk of unintended pregnancy who are using no contraceptive method are not continually sexually active.[151]

3. The base annual pregnancy rates were adjusted so that the total number of unplanned pregnancies to women at risk of unintended pregnancy in developing countries equaled the estimated total of 75.9 million. First, the numbers of nonusers and users of each method were multiplied by the base relevant pregnancy rates, with no adjustment for differences in failure rates by union status, intention for future pregnancy or age. These calculations yielded a total of 82.1 million unintended pregnancies, distributed across regions as shown in Table 3.3. Adjustment factors were calculated for each region as the ratio of the expected number of unintended pregnancies to the estimated number before adjustment. These regional adjustment factors were applied to the method-specific pregnancy rates for each country in the region.

Pregnancy Outcomes: It was assumed that all pregnancies to women at risk for unintended pregnancy would be unplanned pregnancies. Pregnancies were distributed according to outcome (unplanned births, induced abortions and spontaneous abortions or miscarriages) based on the estimated distribution of outcomes of unplanned pregnancies for subregions.[152] Subregional averages were applied to all countries within that subregion.

In these calculations, it was estimated that the number of induced abortions in Southeast Asia outside of China was 0.5 million, that there were 10.6 million abortions in China and that there were 50,000 abortions in Oceania. The total number of induced abortions in North Africa was estimated in 1995[153] as 600,000, but the number of unsafe abortions in the region was estimated by WHO as 700,000. These estimates assumed that the total number of abortions in the region was 750,000.[154]

• Maternal deaths: The numbers of maternal deaths due to abortion and to all other pregnancy-related causes were estimated by drawing on data from several sources:

1. The number of maternal deaths due to all pregnancy-related causes for each country in 2003 was es-

timated by multiplying the number of deaths in 2000 (526,000)[156] by the ratio of the number of births in 2003 to the number of births in 2000.[157] The resulting total for 2003 was 530,000.

2. Maternal mortality due to abortion:

The estimated number of unsafe abortions and associated maternal mortality includes abortions provided in countries where the procedure is highly restricted, and those provided under unsafe conditions in countries where abortion is permitted under broad legal grounds.

a. Numbers of abortions in unsafe settings and in legal medical settings: Estimates of the number of unsafe abortions, by subregion, were taken from WHO estimates for 2000 (18.33 million unsafe or nonlegal abortions in 2000 in developing countries) because the 2000 estimates were very similar to estimates for 1995, they were used as the 2003 estimates without change.[158] The number of safe abortions in legal settings was estimated for each subregion by subtracting the estimated number of unsafe abortions[159] from the estimated total number of abortions in 2003.[160] Abortions in each setting were distributed across countries in each subregion based on the legal status of abortion so that the total number equaled the total unintended pregnancies ending in induced abortion in each country. The country-level estimates of abortions by setting are consistent with the estimated total number of induced abortions in each country and with the regional totals from the original sources of data. However, they are still rough estimates.

b. Maternal mortality from abortion: Estimates of the number of maternal deaths from unsafe abortion per 100,000 unsafe abortions, by subregion, were taken from WHO estimates for 2000 and applied to all unsafe abortions in countries in each subregion.[161] Mortality rates per 100,000 abortions in legal and medical settings were based on experience in developed countries.[162] We used the average rate of 0.5 deaths per 100,000 legal abortions from seven Western European countries 1976-1995 for East Asia, Israel, Singapore, Tunisia, Turkey and Vietnam. For other countries, we assumed that the mortality rate was 1 death per 100,000 abortions in legal and medical settings.

3. Maternal mortality from causes other than induced abortion. The estimated number of maternal deaths from induced abortion were subtracted from the total number of maternal deaths from all pregnancy-related causes in each country estimated by WHO[163] to esti-mate the number of maternal deaths from causes other than induced abortion. Maternal mortality ratios from causes other than induced abortion were calculated for each country as the number of maternal deaths from causes other than induced abortion per 100,000 live births.

• *Infant deaths:* The infant mortality rate (deaths under age one per 1,000 live births) for 2000-2005, by country, was applied to the relevant number of births to calculate the number of infant deaths.[164]

• *Children who would not lose their mothers:* The number of maternal deaths was multiplied by the average number of living children women have had to estimate the number of children impacted by maternal deaths. Estimates are based on the average number of living children women have had, according to whether they are spacers or limiters and according to type of method use (sterilization, reversible modern, traditional or no method), by union status. DHS data were used when available. When DHS data were not available, subregional unweighted averages were used. When DHS data were not available for computing subregional averages, estimates of the mean number of living children were based on results for similar countries in the subregion or in a similar region. For China, we assumed that currently and formerly married women delaying or spacing future births have an average of 0.25 children, that currently and formerly married limiters average 1.0 child and that never-married women at risk for unintended pregnancy average zero children.

• *Disability-Adjusted Life Years (DALYs):* The number of DALYs lost among infants and children was estimated by using the number of DALYs lost per 1,000 births due to perinatal conditions, by subregion, in 2001. These rates were then applied to unintended births in 2003 in each country in the subregion, according to subgroups of women (e.g., current contraceptive users and nonusers).

The number of DALYs lost among women because of maternal conditions other than induced abortion was estimated by using the number of DALYs lost per 1,000 births from all maternal conditions except induced abortion, by subregion, in 2001. These rates were then applied to unintended births in 2003 in each country in the subregion, according to subgroups of women (e.g., current contraceptive users and nonusers).

The number of DALYs in 2003 lost among women

because of induced abortions was estimated from the number of DALYs lost due to induced abortion per 1,000 births in 2001, by subregion, multiplied by the ratio of 2003 births to 2001 births.

DALYs lost in 2001 by specific cause or condition, by subregion, were obtained from WHO.[165] Births in 2001 and 2003 were from United Nations Population Division, 2003.[166] Abortions in 2003 were from the Alan Guttmacher Institute estimates.[167]

Years of Life Lost due to premature mortality (YLLs) were calculated from the same sources and in the same manner as DALYs. Years Lost due to Disability (YLDs) were calculated by subtracting YLLs from DALYs.

• *Notes and limitations.* These estimates present a variety of measures of outcomes of contraceptive use and are not necessarily additive. DALYs, for example, incorporate estimates of maternal and infant mortality.

Costs to provide contraceptive services and supplies were average costs and were not increased for the presumed higher costs associated with setting up new services or serving rural acceptors who may become clients at later stages of a delivery program, nor decreased for economics of scale that may result from increased numbers of users relative to service infrastructure and staffing or increasing cost-efficiency resulting from competition among service providers.

The outcomes and costs estimated here are one-year measures and are not discounted for future value. No adjustments were made to take into account benefits or costs of contraceptive use in terms of longer birth intervals or births occurring more in line with couples' preferences.

Rows and columns may not sum to totals because of rounding. In most tables, numbers are shown in thousands. However, estimates of maternal and infant deaths and numbers of children losing their mothers are shown without rounding to make them useful for possible calculations combining numbers. When presented as absolute numbers, they should be rounded as appropriate.

Estimates
In 2003, 5.1 billion people were living in developing countries, 3.8 billion of them outside of China (see Appendix Table 3.2). One in four people in developing countries-1.3 billion-were women aged 15-49.
• Almost half (46%) of these women lived in the lowest income countries, where average per capita annual

income was $745 or less.[168] One-fourth (27%) live in China, 46% lived in other Asian countries, 15% in Africa and 11% in Latin America and the Caribbean.
• Roughly two-thirds of women of reproductive age in developing countries were in a union, ranging from 72% of women in low-income countries to 60-61% in upper-middle and high-income countries. Twenty-seven percent had never married and 5% were formerly married.
• The proportions of women aged 15-49 currently in union were highest (71-74%) in low-income countries and in countries in Middle and Western Africa and in China and South Central Asia. They were lowest in Southern Africa (43%) and in Northern Africa and Latin America and the Caribbean (58-60%).

Among all women aged 15-49 in developing countries in 2003, more than half were at risk for unintended pregnancy because they were sexually active, able to become pregnant if they and their partner used no contraceptive method and they did not want more children ("limiters") or did not want a child in the next two years ("spacers").
• Forty-seven percent of all women aged 15-49 were not at risk because they were not sexually active, they or their partners were infertile or they wanted a child within the next two years. More than half of women in the lowest-income countries were not at risk for unintended pregnancy, as were 60% or more of all women aged 15-49 in all of Sub-Saharan Africa except Southern Africa.
• Eighteen percent of all women were at risk and seeking to delay or space future births. Roughly one quarter of women in Middle, Southern and Western Africa were at risk and trying to delay or space future births.
• Thirty-six percent of all women aged 15-49 in developing countries were at risk of unintended pregnancy and seeking to limit future childbearing. This proportion rose to more than 40% of women in lower-middle income countries, in China and in South America.

An estimated 183 million women in developing countries were pregnant in 2003, and 76 million of these women were pregnant even though they had wanted a birth at a later time or not at all (Appendix Table 3.3).
• There were a total of 121 million live births, 35 million induced abortions and 28 million miscarriages in developing countries in 2003.
• Some 107 million women had intended pregnancies (including a small proportion who had no preference

regarding the timing of the pregnancy). Of these, 89 million women gave birth and 18 million had miscarriages.

Sixty-four percent of the 76 million unintended pregnancies were to women in Asia, 21% to women in Africa and 15% to women living in Latin America and the Caribbean.

• An estimated 108 out of every 1,000 women at risk for unintended pregnancy in 2003 became pregnant when they had not wanted to. More than 20% of women at risk became pregnant unintentionally in Sub-Saharan African countries other than those in Southern Africa. Rates of unintended pregnancy were lowest in East Asia, including China, and in high-income countries.

• Among women with unintended pregnancies, 31 million gave birth, 35 million had induced abortions and 10 million miscarried. Forty-two percent of all unintended pregnancies ended in birth, 46% were terminated by induced abortion and 13% were miscarried.

• Unintended pregnancies accounted for 41% of all pregnancies to women in developing countries. More than half of all pregnancies were unintended among women in Southern Africa, and in Latin America and the Caribbean. Only 34% of pregnancies in Middle and Western Africa were unintended.

More than half a million women (530,000) in developing countries died in 2003 from causes related to pregnancy (Appendix Table 3.4). About one-third of all maternal deaths were to women who had become pregnant when they did not want to be.

• Of the 184,000 women with unintended pregnancies who died from pregnancy-related causes, 69,000 died from complications of induced abortion. Almost all of these women had abortions in unsafe or nonlegal conditions. The other 115,000 women died from pregnancy-related causes other than induced abortion.

• Across all developing countries, an average of 382 women died from pregnancy-related causes other than induced abortion for every 100,000 births that occurred. The highest rates of maternal mortality from nonabortion causes were in low-income countries (570 deaths per 100,000 births) and in Sub-Saharan Africa outside of Southern Africa. In these African countries, 754-870 women died for every 100,000 births.

• Mortality among all women who had induced abortions was 199 deaths per 100,000 abortions. It was highest in subregions of Sub-Saharan Africa, with 583-834 women dying per 100,000 induced abortions. Again, rates of abortion-related death rates were highest in low-income countries.

More than 7 million of the 121 million babies born in developing countries died before their first birthday, a rate of 61 infant deaths per 1,000 live births.

• 5.5 million infants who died in their first year had been intended conceptions, while 1.8 million had been born from unintended pregnancies.

• Infant mortality was highest in Middle Africa, where 116 of every 1,000 babies died before their first birthday. Infant death rates were lowest in East Asia, including China, and in Latin America and the Caribbean.

• The risk of infant death was more than 10 times as high in low-income countries (78 deaths per 1,000 births) as in high-income areas (6 deaths per 1,000 births).

In 2003, pregnancy and childbirth in developing countries resulted in the loss of an estimated 126 million DALYs, 30 million among women and 96 million among infants (Appendix Table 3.5).

• Almost three-quarters of all maternal DALYs and two-thirds of all infant DALYs are accounted for by women and children in Sub-Saharan Africa and South Central Asia.

• Among women, mortality and morbidity from causes other than abortion accounted for 25 million DALYs. These included 4 million DALYs from maternal hemorrhage and 4 million from maternal sepsis, 3 million from obstructed labor, 2 million from hypertensive disorders of pregnancy and 12 million DALYs from other maternal conditions (data not shown).

• Maternal DALYs from causes other than abortion are almost evenly split between 13 million YLLs and 12 million YLDs.

• Causes related to abortion result in 5 million DALYs among women in developing countries. DALYs from abortion-related causes are more likely than those from other pregnancy-related causes to be linked to disability. These include 2 million YLLs (36%) and 3 million YLDs (64%).

• The major causes of the 96 million perinatal DALYs are low birth weight (48 million DALYs), birth asphyxia and trauma (33 million), and other perinatal conditions (15 million).

• Rates of DALYs among women from causes related to pregnancy and infant DALYs were highest in low-income countries. The highest rate of DALYs from nonabortion maternal causes was in Southern Africa (382 DALYs per 1,000 births), while the highest abortion-related rate was in Middle Africa (589 DALYs per 1,000 abortions). The rate of perinatal DALYs was

highest in South Central Asia (1,028 DALYs per 1,000 births).

Among the 705 million women in developing countries in 2003 at risk of unintended pregnancy, 504 million used modern contraceptives and 201 million used either a traditional method or no method at all (Appendix Table 3.6).
• Almost half (47%) of all women using modern contraceptives relied on sterilization (female, 204 million; male, 32 million). One-third were using long-acting methods, predominantly the IUD (137 million) or injections or implants (32 million). Twelve percent used oral contraceptives (62 million), and 7% relied on condoms or other supply methods (37 million).
• More than two-thirds of the 201 million women with unmet need for contraceptive services were using no contraceptive (137 million). Some 13% of these women were using periodic abstinence (27 million), 14% withdrawal (28 million) and 4% other nonsupply methods (9 million).

Patterns of method choice vary across regions of the world and according to women's fertility-preference status.
• Female sterilization is the most commonly used method in developing countries, with 204 million users, followed by the IUD, with 137 million.
• Female sterilization is the most common method in East Asia, including China, as well as in South Central Asia and Latin America and the Caribbean. The IUD is the predominant method in Northern Africa. Long-acting hormonal methods are the most commonly used contraceptives in Eastern and Southern Africa and in South East Asia. Periodic abstinence is the predominant method in Middle and Western Africa, while withdrawal is most common in Western Asia.
• Among women and their partners who are trying to space future pregnancies, the most commonly used method is the IUD, while female sterilization predominates among those trying to limit future births.
• The IUD is the most commonly used method among spacers in Northern Africa and in East Asia, including China. Long-acting hormonal methods are the most common in Southern Africa and in Southeast Asia, while oral contraceptives are predominant in Eastern Africa and Latin America and the Caribbean. Couples in Middle Africa and Western Africa are most likely to use periodic abstinence, and those in Western Asia are most likely to use withdrawal.
• Among women at risk who do not want to have any

more children, female sterilization is the most commonly used method overall and in East Asia, including China, in South Central Asia and in Latin America and the Caribbean. Women in Northern Africa and Southeast Asia are most likely to use IUDs, while long-acting hormonal methods are the most commonly used contraceptives among limiters in Eastern and Southern Africa. In contrast, traditional methods are the most commonly used contraceptives among couples in Northern Africa (periodic abstinence) and in Western Asia (withdrawal) who do not want to have any more children.

Seventy one percent of all women in developing countries at risk for unintended pregnancy and their partners are using a modern contraceptive method; the remainder (29%) have unmet need for modern family planning services. Forty-four percent of women trying to space future births and 21% of those seeking to limit childbearing have unmet need (Appendix Table 3.7).
• More than four in 10 women at risk for unintended pregnancy in low-income countries have unmet need for modern contraceptive services.
• Almost two-thirds (63%) of women at risk in Sub-Saharan Africa are using no contraceptive (47%) or a traditional method (16%). More than half of women at risk in Eastern and Western Africa are using no method.
• Roughly two-thirds of women at risk in low-income countries who are trying to space future births have unmet need and almost a third of those trying to prevent all future births have unmet need for modern contraception.
• In Sub-Saharan Africa, 70% of women at risk who are spacing have unmet need for modern contraceptives, as do 51% of those at risk who are trying to limit all future births. Levels of unmet need are also especially high among women who do not want a child soon in South Central and Western Asia (61-69%) and in Central America (54%) and among women in Western Asia seeking to limit all future childbearing (56%).

Services and supplies for the 504 million women and their partners in the developing world currently using modern contraceptives cost an estimated $7.1 billion annually, averaging $14 per user (Appendix Table 3.8).
• Drugs and supplies for contraceptive services cost an estimated $1.3 billion annually; labor to provide services costs $1.1 billion; and hospitalization costs associated with female sterilization cost an estimated $435

million, prorated to take into account the typical length of contraceptive coverage from sterilization.

• An estimated $4.3 billion of the service costs are for the overhead and capital needed to provide buildings, infrastructure and other staff necessary for service provision. (Overhead costs, especially capital costs, are most likely underestimated since not all costing studies in the UNFPA database that underlies these estimates, measure them fully.)

• Costs for current services total an estimated $850 million in Africa, $5.2 billion in Asia ($3.0 billion in Asia outside of China) and $1.0 billion in Latin America and the Caribbean.

• Apparent differences in the average cost per user ($13 in Asia, $18 in Latin America and the Caribbean and $24 in Africa) reflect different patterns of method use because available data did not support making country- or region-specific cost estimates for each method. While the aggregate estimates are broadly representative because they are based on studies in many countries, local-level costs will vary due to other factors, such as start-up costs and economies of scale. If new cost data become available, these estimates can be improved.

Because contraceptive methods can be difficult to use perfectly, women relying on modern contraceptives experience almost 16 million unintended pregnancies annually, but if they were using no contraceptive this number would rise to 203 million (Appendix Table 3.9).

• An estimated 8.8 million women who become pregnant while using contraceptives (because of incorrect use or method failure) have induced abortions, 5.0 million give birth and 1.9 million miscarry.

• While women using modern methods represent 71% of all women in developing countries at risk for unintended pregnancy (Table 3.7), they account for only 21% of all unintended pregnancies, 16% of all unintended births and 25% of all abortions (Table 3.9).

Use of modern contraceptives annually averts 187 million unintended pregnancies, 215,000 maternal and 2.7 million infant deaths. These averted pregnancies prevent 685,000 children from having to grow up without their mothers and avert 60 million DALYs (Appendix Table 3.10).

• The difference between the number of unintended pregnancies that would occur if modern contraceptive users were using no method (203 million) and the number that now occur (16 million) represents the number of unintended pregnancies that are prevented annually by use of modern contraceptives-187 million.

• By averting 187 million unintended pregnancies, contraceptive use in developing countries is preventing an estimated 60 million unintended births, 105 million induced abortions and 22 million women from having miscarriages.

• Contraceptive use is averting 2.9 million deaths each year, 215,000 pregnancy-related deaths of women and 2.7 million infant deaths. Another 685,000 children are spared having to grow up without their mother.

• An estimated 60 million DALYs are saved by averting these unintended pregnancies, 16 million among women and 44 million among infants and children.

The 201 million women at risk for unintended pregnancy but with unmet need for modern contraceptive services represent 15% of all women aged 15-49 in developing countries (Appendix Table 3.11). Most are married and using no contraceptive method, and they are fairly equally split between women who want to delay or space future births and those who want no more children (Appendix Table 3.11).

• Women with unmet need account for 20% of all women aged 15-49 in low-income countries, 22% of women in Africa, 14% of those in Asia and 16% of women in Latin America and the Caribbean.

• Women in low-income countries are more likely to be in need of contraception to delay or space births than to limit them, while the opposite is true in higher-income countries.

• Almost two-thirds of women in Africa with unmet need want a child in the future, compared with 47% of women in Asia and 46% of those in Latin America and the Caribbean.

• While 88% of all women with unmet need in the developing world are currently in union, 9% have never been married; however, 13% of women with unmet need in Africa and 13% in South America are unmarried.

• More than two-thirds of all women with unmet need are using no contraceptive method, ranging from 74% of those in low-income countries to 55% of women with unmet need in high-income areas; the rest are using traditional methods.

• More than 75% of women with unmet need are currently using no contraceptive in Africa other than Middle and Western Africa, in East Asia, including China, and in the Caribbean and Central America.

An estimated 60 million unintended pregnancies occur annually to women with unmet need for con-

traceptive services (Appendix Table 3.12). Women with unmet need account for 79% of all unintended pregnancies that occur each year in developing countries.
• An estimated 32 million unintended pregnancies occur annually to women with unmet need who wanted to have children at a later time, and 28 million are to women who had not wanted any more children at all.
• The 137 million women at risk of unintended pregnancy but using no contraceptive method account for 50 million unintended pregnancies annually (two-thirds of the 76 million total unintended pregnancies) and the 64 million women at risk of unintended pregnancy using traditional methods have 10 million unintended pregnancies each year.
• Unintended pregnancies to women with unmet need annually result in an estimated 26 million births, 26 million induced abortions and 8 million miscarriages.

Unintended pregnancies to women with unmet need annually cause 1.8 million deaths, including 166,000 women who die from pregnancy-related causes, leaving 578,000 children to grow up without their mothers. These pregnancies also lead to 1.6 million infant deaths. A total of 32 million DALYs result annually from unintended pregnancies to women with unmet need (Appendix Table 3.13).
• Each year, 166,000 women in developing countries die because of unintended pregnancies while they were using no contraceptive or a traditional method, 104,000 women who were carrying their pregnancy to term or who had a spontaneous abortion and 63,000 women who sought induced abortions, mostly under unsafe conditions.
• Some 1.6 million women with unintended pregnancies give birth to infants who die before their first birthday, and mothers dying from pregnancies that resulted from their unmet need leave behind an estimated 578,000 children.
• Eighty percent (1.4 million) of deaths caused by pregnancies to women with unmet need occur in low-income countries.
• Pregnancies to women with unmet need result in an estimated 31.5 million DALYs lost, 10.3 million among women and 21.2 million among infants and children.

If all 201 million women in developing countries with unmet need adopted modern contraceptive methods, there would be substantial numbers of new users to be served (Appendix Table 3.14).
• The numbers of additional women and men needing

contraceptive services represents a significant challenge to current providers of family planning care and supplies.
• If those with unmet need adopted modern methods in proportions similar to those among women in their country or subregion who are using modern contraceptives to space or limit childbearing, there would be over 42 million new users of female sterilization, 43 million of the IUD, 48 million of oral contraceptives, 43 million of the condom and 23 million of long-acting hormonal methods (injectables and implants).

The service costs to provide women with unmet need with modern contraceptive methods would total an extra $3.9 billion annually (Appendix Table 3.15).
• Drugs and other supplies would cost an estimated $696 million annually; labor would cost $413 million; and hospitalization for women being sterilized would cost $90 million. Overhead and capital costs would total $2.7 million, though some of this might be realized through more intensive use of existing buildings, personnel and service structures.
• More than half ($2.4 billion) of the costs to serve those with unmet need would occur in the low-income countries least able to afford them.
• If method-mix patterns observed among current users were followed by women with unmet need, almost half of the total costs would be for providing oral contraceptives (Appendix Table 3.16).

If all 201 million women with unmet need received the services they need and used modern methods of contraception, instead of the 60 million pregnancies they currently have each year, they would have an estimated 8 million pregnancies, averting 52 million unintended pregnancies annually (Appendix Table 3.17).
• An estimated 26 million pregnancies that now occur at a time when women do not want to have a child would be averted to a later time and another 26 million would be averted among women who want no more children.
More than half of all these unintended pregnancies that could be averted occur in low-income countries.

Averting 52 million pregnancies to women who currently have unmet need for contraceptive services would prevent 23 million unintended births, 22 million abortions and 7 million miscarriages (Appendix Table 3.18).
• Preventing 52 million unintended pregnancies would

reduce the number now occurring to women in need of modern contraception from 76 million to 24 million.
• The number of unintended births would be reduced from 31 million to 9 million and the number of induced abortions from 35 million to 12 million.

By preventing those 52 million unintended pregnancies that now occur to women with unmet need, 1.5 million lives would be saved each year and 27 million DALYS would be saved (Appendix Table 3.19).
• An estimated 142,000 pregnancy-related deaths to women would be prevented by these averted pregnancies: 89,000 maternal deaths not related to induced abortion and 53,000 deaths from unsafe abortion. Averting these deaths would prevent an estimated 505,000 children from losing their mothers.
• There would be 1.4 million fewer infant deaths annually if women with unmet need were all using modern contraceptive methods.
• Eight in 10 of the lives saved would be in low-income countries.
• Providing contraceptive services to all women with unmet need for modern methods would result in savings of 27 million DALYs, 9 million among women and 18 million among infants and children.
• Three-quarters of the DALYs saved would be to women and children in low-income countries.

Providing contraceptives to all women with unmet need would cost an average of $19 per user per year, providing substantial benefits in terms of saving lives and preventing years of disability. It would cost an average of $74 for each pregnancy averted.
• Each life saved would cost an average of $2,500.
• For every $144 invested in sexual and reproductive health services in developing countries, one DALY would be saved.

Table 3.1 Estimated number and percent of women with unmet need and using no contraceptive, 2003	Estimates from	Estimates from
	this report (2003)	Ross & Winfrey (2000)*
Currently Married Women		
Number of women 15–49 (000s)	**649,000**	**615, 234**
Unmet need, using no method	111,676	105,205
Spacing	57,962	55,402
Limiting	53,714	49,803
Percentage of women 15–49		
Unmet need	17.2	17.1
Spacing	8.9	9.0
Limiting	8.3	8.1
Unmarried Women		
Number of women 15–49 (000s)	**312,540**	**263,813**
Unmet need, using no method	11,065	8,442
Spacing	8,763	na
Limiting	2,272	na
Percentage of women 15–49		
Unmet need	3.5	3.2
Spacing	2.8	na
Limiting	0.7	na

* Estimates for year 2000: distribution by use for 1998 applied to 2000 population for married women of reproductive age for developing countries as reported in United Nations, *Levels and Trends of Contraceptive Use as Assessed in 1998*, New York: UN, 2000.

Table 3.2 Married women of reproductive age

	Estimates for 2003	Estimates for year 2000*
Total (millions)	905.4	873.2
Number using a method (millions)	530	519
Percentage using method:	58.5%	59.4%
Female Sterilization	22%	23%
Vasectomy	4%	3%
Pill	6%	6%
IUD	14%	15%
Injectables/Implants	3%	3%
Condom	3%	3%
Other supply methods	<0.5%	<0.5%
Traditional methods	6%	6%

* In this report, "married" includes women in consensual unions.

Table 3.3 Number of unintended pregnancies by region

	Number of unintended pregnancies (000s)		
Region	Before adjustment	After adjustment	Adjustment factor
Total	82,063	75,922	0.925
Africa	17,224	15,781	0.916
China	13,040	14,965	1.148
Other East Asia	953	773	0.811
Rest of Asia	41,339	32,775	0.793
Latin American and the Caribbean	9,355	11,399	1.218
Oceania	153	230	1.503

Table 3.4 Estimated distribution of unplanned pregnancies according to outcome[155]				
	Unplanned births	Induced abortions	Spontaneous abortions	Total
All developing countries	**41%**	**46%**	**13%**	**100%**
Africa	*54%*	*32%*	*14%*	*100%*
Eastern Africa	52%	34%	14%	100%
Middle Africa	54%	32%	14%	100%
Southern Africa	62%	23%	15%	100%
Western Africa	52%	34%	14%	100%
Northern Africa	59%	27%	14%	100%
Asia	*36%*	*52%*	*12%*	*100%*
East Asia-China	24%	65%	11%	100%
China	18%	71%	11%	100%
South Central Asia	48%	39%	13%	100%
Southeast Asia	26%	62%	12%	100%
Oceania	63%	22%	15%	100%
Western Asia	51%	35%	14%	100%
Latin America and the Caribbean	*49%*	*38%*	*13%*	*100%*
Caribbean	37%	50%	13%	100%
Central America	55%	31%	14%	100%
South America	48%	39%	13%	100%

Chapter 4

A Broader Approach to Measuring Benefits and Costs

Clearly, there already exists a substantial body of work on the costs and benefits of interventions to improve health conditions worldwide. Researchers across disciplines have developed a number of different approaches and methodological techniques to assess and quantify these costs and benefits. Within the particular perspective of each field and within the limits of what can be quantified and measured, this existing body of work has provided useful information and guidance to policymakers regarding the relative value of investments in health care services. It has also demonstrated a high level of awareness that the merits and importance of such services, when measured against their costs, must be proven and cannot be taken for granted.

Many of the existing studies are deficient in one important respect: They fail to acknowledge the nonmedical benefits of reproductive health care services, with very few exceptions.[169] These nonmedical benefits may be usefully categorized into three aspects: personal, social and economic. Though these benefits are often unacknowledged and extremely hard to quantify, they represent a large and important component of the potential gains from services to improve sexual and reproductive health; these gains are additional to the kind of benefits that are typically measured—reductions in mortality and morbidity.

One of the best known of these cost-benefit approaches—the Disability Adjusted Life Years (DALYs) quantification of the burden on societies and individuals imposed by disease and ill-health coupled with the costing of specific health interventions—has come under some criticism.[170] Suggestions have been made both by those who developed DALYs and by others that the definition of ill-health that underlies the estimation of DALYs—disability in terms of physical functioning and survival—should be substantially expanded. Moreover, various efforts have been made to do so, as summarized in Chapter 2. In addition, the World Health Organization (WHO) has proposed alternative and much broader classification systems. One involves the measurement of the contribution of health care services to improved well-being in eight areas of an individual's life: physical functioning, physical roles, emotional roles, social functioning, mental health, general health perceptions, bodily pain, and vitality. Some researchers have pointed out that even this much broader WHO system needs further expansion to include nonmedical benefits in additional areas of experience, such as reduction in an individual's level of shame, embarrassment, stigma and fear as a result of preventing or reducing the severity of disease and ill-health.[171]

Whatever the limitations of current measurements and methodologies in this area, the earlier cost-benefit efforts provide a good starting point and a strong basis to build on. However, to advance cost-benefit analysis in the area of sexual and reproductive health, some further steps are necessary. One is the development of a comprehensive outline of the medical and nonmedical benefits of sexual and reproductive health interventions which would serve to clarify gaps in coverage of existing studies and approaches in representing the benefits from sexual and reproductive health interventions, and also to make clear whether such approaches and studies are comparable and which of them come closer to providing a more comprehensive assessment of benefits. At the same time, it may also stimulate and guide new research in this area.

In this chapter we outline the expanded medical and nonmedical benefits—in some cases nonquantifiable or hard to quantify, direct and indirect—that could be hypothesized or expected to result from health interventions in each of the three main areas of reproductive health care: contraceptive services; services related to sexually transmitted infections (STIs) and HIV/AIDS, and gynecologic and urologic services; and pregnancy-related care. To do so, we synthesize and expand upon the work of other researchers. We then comment briefly on the need for greater uniformity or comparability in approaches for estimating the costs involved in

the provision of sexual and reproductive health care services in general.

Benefits of Sexual and Reproductive Health Services

For each of the three main areas, services are defined to include information, education and counseling, as well as medical or clinical services. Clinical services comprise preventive, diagnostic and treatment measures. For convenience, we include gynecologic and urologic services with STI-related care, though it can arguably be in a category of its own. The principal components of care in each of these three groups are outlined in general terms in Table 4.1.

The evidence base for demonstrating the effect of health interventions on medical or health outcomes varies across the different areas of sexual and reproductive health but is not extensive for any of the three main areas. Probably the most extensive effort to measure the impact of health interventions on outcomes was carried out in the early 1990s by the World Bank, in which the cost-effectiveness of 47 health interventions, spanning all areas of health, was investigated.[172] As mentioned in Chapter 2, this study found that interventions in all of the three main areas of sexual and reproductive health (family planning, maternal care and prevention and treatment of STIs and HIV/AIDS) were cost effective. A new assessment of effectiveness of interventions and priority needs in regard to disease control is currently underway under the World Bank's coordination.*

Others have developed theoretical models and approaches to measure the relationship between contraceptive use and nonmedical outcomes for women and families. These approaches have begun to be implemented with empirical research and have identified some significant effects of contraceptive use on a number of aspects of women's lives—physical health, education, work, income, self-esteem, decision making and role in the family and community.[173] Examples from this body of work are cited below, as relevant.

Health benefits from sexual and reproductive services

Contraceptive use and family planning services. The use of contraception can affect the number, timing and spacing of pregnancies and births, and thereby may directly benefit women's and infants' health in a number of respects (see Table 4.2).

• Contraception may be used to lengthen the inter-

val between births and to prevent unwanted pregnancies and unwanted births. A longer interval between births (3–5 years) is associated with a number of health benefits for women and for infants. For example, studies find a strong negative relationship between spacing of births and the infant mortality rate: the longer the average birth interval, the lower the infant mortality rate.174 Longer intervals also decrease the impact of pregnancy on women's health.

• By enabling control of timing of pregnancy, contraceptive use can prevent high risk births and improve timing to minimize risk (those at very young and older ages, those to women who have already had many births and those to women suffering from preexisting medical conditions).

• The use of contraception can prevent unwanted pregnancies and abortions, including some that are unsafe, and thereby prevent short-and long-term health impacts on women.

• Contraception also prevents unwanted births, which leads to direct health benefits for women and infants. Maternal and infant deaths and ill-health due to maternal causes are prevented in proportion to the prevalence of contraceptive use.

STI-related and gynecologic and urological services. Services (including information and counseling) to prevent and treat STIs, including HIV/AIDS, and to monitor gynecologic and urologic health, can increase protective behaviors and thereby prevent infections, reduce the duration of infection, cure bacterial STIs and reduce the severity of symptoms of viral STIs, including HIV, achieve early diagnosis and increase the likelihood of curing various conditions and cancers (see Table 4.2). Specific health benefits are listed below include:

• Prevention of STIs and HIV can bring large reductions in ill-health and in deaths (particularly due to HIV/AIDS).

• Prevention and treatment reduce transmission of infections from mothers to infants and among sexual partners.[175]

• Prevention and treatment of gonorrhea would reduce the prevalence of its consequences, which include septicemia, arthritis and endocarditis in men, and eye infections and possible blindness in newborns delivered by women with the infection.

• Prevention and treatment of STIs lower the prevalence of pelvic inflammatory disease and reduce infertility among women.

• Prevention and treatment of human papilloma viruses (HPV) reduce prevalence of genital warts and

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* See Chapter 2, section on DCP-2.

cervical cancer. In fact, sexually transmitted strains of HPV have a role in the development of most of the half million cases of cervical cancer that occur each year—65% of the cases in developed countries and 87% of those in developing countries.[176]

• Appropriate antiretroviral drug treatment of those who are HIV positive can yield significant gains in years of productive life.

• Gynecologic and urologic health care can improve prevention and enable early diagnosis and treatment of several conditions and illnesses including: cervical cancer, breast cancer, prostate cancer, endometriosis, fibroids and ovarian tumors; reproductive tract infections (including pelvic inflammatory disease, urinary tract infections, genito-urinary tract infections and vaginal infections); disorders of the reproductive system (e.g., menstrual disorders); and sexual dysfunction (vaginismus, dyspariunia and erectile dysfunction).[177]

Maternal health services. Benefits from these services include those experienced by women themselves, those that apply to infants in the perinatal period, some that occur before and others that occur after the childbearing years (Table 4.2). Perinatal outcomes are those that occur in the late fetal period (28 weeks of gestation or later) and in the first month of life. The postpartum period is generally defined to be the first 42 days after delivery. Pregnancy-related care yields health benefits in a number of ways:

• Prenatal care provides education and counseling on healthy behaviors, especially with regard to diet and nutrition during pregnancy which can benefit women's and infants' health, even in low-income settings. Monitoring health during pregnancy can lead to prompt intervention in case of complications and provide the opportunity for ongoing management of such conditions as hypertension.

• Obstetric care provides the means of treating serious complications that occur during delivery and the postpartum period, thereby reducing long-term or chronic pregnancy-related sequelae. Obstetric care can reduce the probability and severity of delivery-related conditions, such as hemorrhage and sepsis, and also of the more chronic consequences, such as obstetric fistula, urinary or fecal incontinence, scarred uterus and pelvic inflammatory disease.[178]

• Pregnant women with certain preexisting conditions and diseases may experience increased risks of mortality and morbidity because these conditions are worsened due to the physiological effects of pregnancy. Examples of such conditions include anemia, malaria, hepatitis, tuberculosis and cardiovascular disease. With appropriate medical care during pregnancy, such health

complications can be managed and minimized.

• Medical care for complications due to unsafe abortion can reduce mortality and the extent and severity of morbidity. Unsafe abortion accounts for an estimated one-seventh of total maternal mortality in the developing world.[179]

Several of the benefits described above involve integration of services—for example, when regular antenatal care service is combined with treatment of malaria or management of hypertension. The costing of the separate interventions would have to take into account the synergistic nature of such benefits to assure that costs are accurately assigned to the resulting benefits.

Nonmedical benefits of sexual and reproductive health services

There is also a range of nonmedical benefits—personal, social and economic—that can result from use of contraceptive services, maternal health services, STI-related services and other gynecologic and urologic care. Many of these benefits have tremendous direct value in themselves, particularly for individuals and households. Even more compelling for policymakers are the benefits at the societal level and the contributions of these interventions to a range of development goals.

Contraceptive use and family planning services

• *Personal benefits.* Women who give birth when they want and who have the number of children they want are likely to experience a number of personal benefits that can lead to gains for their household and for society as a whole (Table 4.3).

A first birth at a young age (younger than 20) can limit a woman's prospects for education,[180] training and employment, and, in the longer term, her earning power and financial security. Although this has not been shown to be a causal relationship,[181] the uniformity and strength of the association worldwide suggests that delaying motherhood through the use of contraceptive services is likely to be an important factor contributing to women's achieving higher education.

More education and work experience would also increase women's status and improve their decision making role within the family. For example contraceptive users in the Philippines are more likely than nonusers to join their husbands in making household decisions.[182] A woman's increased ability to take advantage of opportunities that can improve her life (schooling, work, etc.) is also likely to result in increased personal income, and the household's economic status is likely to improve.

Contraception enables couples to have fewer children. The benefits of small families in reducing poverty at the household level and in improving educational and health outcomes for children have been supported by empirical studies.[183] In smaller as compared with larger families, more resources tend to be devoted to each child. There is less differential spending (often gender-based) among children and hence less gender discrimination within households. One study in Ghana found that children, particularly girls, in larger families were less likely to attend school and experienced greater inequality within the household than those with fewer siblings.[184] By contributing to smaller families, contraception may contribute to female education and equality.

Contraceptive use can improve women's self-efficacy, confidence, satisfaction with life, self-esteem and decision making autonomy. Some of these benefits result from the greater involvement of women in the labor force, their ability to earn an income and their financial contributions to the household, benefits that are partly a result of greater control over fertility. Contraception can also bring about improvements in the quality of life of the family as a whole by reducing stress and worry about unwanted pregnancies. By giving couples greater freedom from fear of unplanned pregnancy, family planning can also improve relationships between spouses.

Women of all ages report that using contraceptives to time births and avoid unintended pregnancies improves their personal well-being and status in the household. Qualitative research shows that contraceptive use reduces stress about the risk of unplanned pregnancies and improves relationships between partners. In Bolivia, for example, women using contraceptives demonstrate greater self-esteem than nonusers, and in the Philippines, contraceptive users have reported greater overall satisfaction with their lives than nonusers. Women point out that delayed childbearing and smaller families, which are achieved through contraceptive use, allow more leisure time as well as educational and economic opportunities.[185]

Men and women who are healthy and have fewer children to care for have more time for other things, including civic activities. In a survey of older married women in two urban areas of Indonesia, half the women reported that family planning enabled them to spend more time in community activities.[186] An increased sense of power and confidence conferred by family planning may help women take a more active role in community and political life. Contraception and smaller families may have a cumulative effect: As women gain time and freedom to become involved in social and political issues, they increasingly advocate for and take advantage of contraceptive services.[187]

• *Economic benefits at the personal and household levels.* As family planning increases women's participation in work and other income-generating activities, it leads to increased financial security for women and increases household income. Women are able to work longer hours and for a greater proportion of their productive lives. With increased health and functioning (given the decrease in morbidity from prevented high-risk births and unsafe abortions and the increase in psychological well-being) women are likely to enjoy increased productivity. Benefits also accrue to children in terms of future productivity: In smaller families parents are better able to feed and house their children, provide health care and make more intensive inputs into their physical, social and intellectual development; school participation of children (male and female) is also likely to be higher when families are smaller. Also, as shown in Chapter 3, reducing unwanted pregnancies would substantially reduce the number of children who lose their mothers through pregnancy-related deaths.

Better health and smaller household workloads may lead to new economic possibilities and allow more opportunities for productive investments for poor women. For example, a study of women in Kenya found that the main reasons for late repayment of microcredit loans included expenses related to having a large family, including diversion of funds to pay for medicines, school fees or housing costs.[188] Contraceptive services and maternal health care would help these women continue their entrepreneurial activities.

• *Economic benefits at the societal level— the "demographic window."* Access to contraceptives offers powerful macroeconomic benefits by opening the "demographic window."[189] As a country goes through the demographic transitions toward lower levels of mortality and fertility, a large cohort of young workers, born when birthrates were higher, enter their productive years. At the same time, parents are choosing to have fewer children and invest greater resources in each child. There are relatively few older people to support. With relatively few dependents for each worker the country has the opportunity to boost economic growth through higher short- and medium-term savings and investment. If the quality of savings translates into efficient and productive investments, the gains can be large and long lasting.

This window of opportunity is highly significant for

a country's potential for macroeconomic growth. Contraceptive services play an important role in opening up this demographic window because they facilitate fertility decline. The environmental benefits of reduced population growth and lower population density have also been extensively studied,[190] although interactions with technological change and consumption behavior make the attribution of effects to particular causes difficult in this area.

• *Economic benefits at the societal level— other mechanisms.* Smaller families contribute to economic growth in other ways. Higher levels of household savings are possible in families with fewer children. Consequently, greater savings can lead to higher levels of investments and faster economic growth. Lower fertility also improves the economy's capacity to absorb educated youth into the labor force, as the numbers of youth are reduced and as economic growth increases opportunities. In addition, public expenditures that would otherwise be spent on basic education, health care and other less productive expenditures are averted as the size of youthful cohorts is reduced.

STI-related and Gynecologic and Urologic Services

• *Personal and household benefits.* Potential benefits from education and information services in this area include more accurate knowledge of means of transmission and prevention, increased ability to prevent infection, and reduction in social stigma attached to having an STI, particularly HIV (Table 4.3). Such services also lead to improvements in the social functioning of infected people, increased willingness to be tested and treated in the general population, and increased likelihood of using effective methods to protect partners from infection. Prevention of infertility and sterility, which may also result from preventing certain STIs, can have a large positive impact on the lives of women. Increased survival of parents, both fathers and mothers, through prevention and treatment would have great benefits for children in the short and long term by increasing income and resources available to support the family. The number of children who become orphans or who have only one parent alive would be reduced, which would improve the well-being of families and decreasing the burden on the public sector of supporting orphans and families in need.

Reduction in disability and illness due to the prevention of STI and HIV infection and other gynecologic or urologic health problems is likely to increase quality of life and standard of living through increased labor-force participation, higher levels of productivity

and, consequently, higher income.

Information, education and counseling services regarding STI and HIV prevention are also likely to have personal benefits as well. Women free of such infections would exhibit increased confidence and efficacy in protecting their sexual health as well as their partners' (based on improved knowledge about preventing infections, and increased ability to recognize symptoms and obtain services); they would also exhibit greater participation and equality in decision making (resulting from improved skills of communicating with sexual partners). By reducing infections good health care for the prevention, diagnosis and treatment of STIs and HIV would improve the quality of sexual health and of sexual relationships, as would treatment of sexual dysfunction, which is part of gynecologic and urologic care.

• *Economic benefits at various levels.* At the individual level, reduced STI, HIV, gynecologic and urologic morbidity would improve work participation, earnings and income. Families and households would benefit through increased household income, higher rates of savings and improved living conditions (better housing, nutrition, health care, etc.). With increased survival from STI and HIV prevention and treatment, families would have additional working-age members to support the household and provide economic security.

At the societal level, greater household savings and increases in labor productivity would result in higher levels of investment and faster economic growth. In addition, prevention (and shorter duration) of ill-health due to curable and incurable conditions and infections is likely to save public resources that would otherwise be spent on treatment and care. Moreover, because STIs and HIV/AIDS are diseases that are highly prevalent among young people and among people of reproductive age, the economic impact would be magnified, because these are the ages of maximum labor force participation.

Maternal health Services

• *Personal benefits.* Certain medical conditions resulting from pregnancy may have social consequences beyond their physiological effects, depending on values and attitudes in a given culture (Table 4.3). For example, in societies where a woman's position and status in the family and community and her probability of being or continuing to be married depend upon her ability to bear children, an infertile woman will be accorded low social status and her inability to bear children will be stigmatized. Involuntary infecundity can have severe consequences for women, equivalent to the burden of a severe disease in some social settings. Similarly, the

restrictions on a woman's ability to engage in normal activities because of incontinence, obstetric fistula and menstrual bleeding can, in some settings, have severe consequences for women's lives. While some of these conditions lead to measurable physical consequences that can be included in current measures of disease burden, their psychosocial consequences, which can be large, also need to be measured. Medical care that treats these conditions, and information and education programs that change attitudes regarding such conditions, can greatly reduce the adverse and sometimes tragic social consequences of these types of conditions.

The reduction of stigma in other areas—for example, in the cases of pregnant women who are HIV-positive, and women experiencing premarital pregnancy or abortion—would also bring about significant gains in women's social functioning. Through information and public education, maternal health care programs contribute to reductions in these types of stigma.

Maternal health care services also provide opportunities to screen women for gender-based violence and offer counseling. Pregnant women, especially, are subject to physical abuse;[191] prenatal care providers are in a good position to help women assess the danger to themselves and their children, and to consider how to protect themselves.

Reductions in maternal mortality would increase the availability of mothers to care for their children and families. Enabling more families to continue intact is likely to have other benefits for society as well, such as reducing the burden on the public sector of supporting families in need.

Improvements in postabortion care can reduce mortality due to complications of unsafe abortion and reduce the severity of subsequent ill-health and promote subsequent contraceptive use. Reduction of pregnancy-related ill-health and death as well as specific services like postpartum counseling can result in further psychological benefits for women and families. For example, postpartum depression or psychosis is likely to be reduced if counseling is available when needed. Maternal ill-health (particularly aspects such as infertility, pregnancy loss or death of an infant) is likely to negatively affect women's mental health. Reduction in the emotional toll that maternal and pregnancy-related morbidity or death has on men (as husbands, fathers, sons and relatives) is also a significant benefit that should be taken into account.

• *Economic benefits—personal and household levels.* By improving survival and reducing disease burden, pregnancy-related care improves physical, psychological and emotional health, well-being and functioning; these benefits in turn translate into increased time spent in productive, paid work and into improved productivity of the labor force through a reduction in days lost to ill-health, death or maternal depletion, and better physical functioning (increasing production per time unit). With greater productivity and less time lost to ill-health, individuals and households benefit from increased incomes and higher standards of living, all other things being equal.

• *Societal benefits.* At the aggregate level, economic benefits result from improved maternal health and survival. Direct savings accrue to the public sector as maternal health services reduce the resources spent on treatment for pregnancy-related morbidity, both in the short- and the long-term. Increased household savings, as healthy households earn more, result in higher levels of investment. Greater productivity and higher levels of investment result in increased rates of economic growth.

Synergistic benefits

It should be born in mind that the division of services into three areas of sexual and reproductive health care is, in a sense, artificial or arbitrary. None represents a discrete or self-sufficient group of services, and a great deal of overlap and synergy among the three branches exists. Services given in one area can produce outcomes that are often additive to the benefits hypothesized to result from services in another. An obvious example of overlap is contraceptive services that improve access to condom use for contraceptive purposes, a practice that also substantially reduces levels of STIs if used by people at high risk of STIs, and in turn, by reducing unplanned pregnancy, significantly improves pregnancy and delivery outcomes for women and newborns. Similarly, postpartum or postabortion services that offer contraceptive services to women have been shown, not surprisingly, to increase birth-spacing intervals and to reduce the number of unsafe abortions. Classifying such services under one of the two relevant categories of services—contraceptive supply or pregnancy-related health care—may result in either not measuring all benefits or in attribution of all benefits and costs to only one category of services.

There are significant synergies between contraceptive services and STI and HIV related services that result in increased prevention of negative outcomes in both areas. The benefits flowing from the provision of family planning services are greater to the extent that these services also contribute to the prevention of STIs

and HIV. In cases where family planning providers also provide STI diagnosis and treatment services, the benefits again increase synergistically. There are also synergistic or spillover benefits between STI services and HIV services: Given the increased risk of contracting HIV among individuals who have certain STIs, early diagnosis and treatment of STIs will reduce the probability of HIV infection.

Where family planning services are the first point of contact that women have with modern health care, an additional benefit of using family planning services is to increase the likelihood that women receive prenatal care, use modern maternity care and take their children to health clinics for well-baby care. In some settings, the converse situation may apply. Pregnancy-related medical care may provide a woman with her first connection to the modern health care system. As such, through postpartum or postabortion counseling, it can provide a link to contraceptive services and well-baby programs, thus improving child health conditions and to gynecologic or STI services, offering women the possibility of better protection against STIs and other reproductive conditions. Pregnancy-related care may also provide a link to nonmedical services, such as counseling regarding domestic violence. Women's needs are more likely to be promptly met, and negative outcomes averted, either through efficient referral mechanisms or through greater integration of family planning and pregnancy-related services within health facilities.

In all of these examples of synergistic effects, the attribution of costs also becomes more difficult. Overall benefits may be greater due to synergism, but costs may also be greater. The challenge is be able to relate costs to benefits accurately and so be in a position to accurately measure cost-benefit ratios.

Measurement of costs: how can it be improved?

Not only must measurement of *benefits* be comprehensive, as argued above, but in addition, measurement of costs of providing interventions must be comprehensive, if we are to have robust cost-benefit estimates. In addition, it would be useful if definitions of components of costs and methodologies to be used in cost estimation were subject to accepted standards. Currently, studies use a wide range of definitions, approaches and methods, making comparability across the studies difficult. Understanding what costs are included and the methodology used to calculate these costs is crucial for interpretation and use of the results of a cost-benefit study, whether used on its own or for comparison with other studies, and whether studies are being com-

pared across different interventions within the area of sexual and reproductive health, across areas of health care or across different dimensions of development.

Main components of costs of interventions

The principal categories of the monetary costs of providing health interventions have been comprehensively outlined in an ongoing, large-scale effort by the United Nations Population Fund to integrate and synthesize results from existing studies of costs and benefits of sexual and reproductive health services.[192] In this compilation, ideal costing estimates should be built up from the following five cost components:

• supplies, including devices, drugs, test kits and materials;
• direct labor, including all levels of personnel;
• number and type of visits per complete procedure;
• facility overhead; and
• capital expenditures.

Although there is general consensus on these categories, there are many factors that differ across and affect the actual estimates of costs. To help users interpret results and to enable comparisons across studies, researchers need to report in detail on each of these factors.

In considering costs, the focus here is on costs to public programs or projects. It should be kept in mind, however, that reproductive health services are not cost-free to users. Besides clients' opportunity costs, there are private or out-of-pocket costs which public programs do not cover.* Both opportunity costs and out-of-pocket costs should ideally be addressed in costing studies.

Context-specific factors

Apart from the specific estimation methodology, contextual or environmental factors can affect how the results of a cost study should be interpreted. Key areas to consider include the following:

• *Structure and content of services.* Related costs, not directly attributable to the service that is being delivered, may be included in the calculation. For example, if a clinic-based system offers a range of sexual and reproductive health (or even general health) services but attributes all personnel costs to family planning, it will overstate the actual cost of providing family planning. Services may also be integrated in one setting and separated in another, raising questions about how to allocate and compare costs across settings. Or services

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*For more information on private costs see the case studies of the UNFPA/NIDI project on resource flows for population programs at the following web site: www.nidi.nl/resflows/casestudies.html.

with similar names may vary in content (e.g., the mix of contraceptive methods or the type of procedure to treat an abortion complication) or in quality (e.g., health care providers may spend more or less time with each client, use different levels of counseling or apply different protocols).

• *Program phase.* A new program will often have high start-up costs and a low volume of users, and thus will have a higher unit cost (e.g., per visit or per user) than an established program with mainly operational costs and a high volume of clients. On the other hand, a closely monitored pilot program may have lower unit costs than a large-scale program coping with real-world conditions, such as underutlization of capacity, poor coordination or corruption.[193]

• *Number and types of clients.* Programs serving high-risk or hard-to-reach populations often have higher average costs than others. Programs with large numbers of clients and more visits often enjoy economies of scale, putting available facilities and personnel to full use and making bulk commodity purchases feasible.

Conclusion

In this chapter, we outlined the major categories of benefits for each of the three main areas of sexual and reproductive health care. While the goal was to be inclusive and broad in coverage of potential benefits, the outline is by no means exhaustive. The chapter also examined in some detail the factors involved in cost estimation in the area of sexual and reproductive health.

Key Points

Measurement of the nonmedical—whether personal, social or economic—benefits from sexual and reproductive health services is much weaker and much less acknowledged than that of medical benefits. Nonmedical benefits are difficult to measure but are extremely important for human welfare and for economic development. They include improvements in women's status and greater equality between men and women, as well as economic benefits at all levels—individual, household and societal.

Synergies and interactions in the impact of interventions on outcomes must be taken into account in allocating benefits to particular services or programs. For example, increasing contraceptive use will reduce maternal and infant mortality and morbidity through a number of mechanisms, including reducing unsafe abortion, spacing births at longer intervals and a reduction of late childbearing. The full breadth of the impact of contraceptive use in achieving even *medical*

benefits is often not recognized.

If all potential benefits and costs cannot be given monetary value, the field must accept that some factors—both costs and benefits—cannot be expressed in terms of dollars. The direction ahead would then be to seek measures that are in different metrics, but nevertheless to find ways to summarize and compare the relative and absolute costs and benefits of different health investments.

Problems of measurement must not be allowed to defeat new efforts. There is a crucial need for innovative efforts to determine how best to operationalize the measurement of benefits and costs in the area of sexual and reproductive health care in a way that is comprehensive but also sufficiently similar across studies and across interventions so that comparison is possible. Measurement issues should not be ignored: Clarity is necessary and where possible, such studies should provide guidance on the likely direction and magnitude of measurement problems.

Better cost-benefit studies are needed at all levels—global, regional, national and local—as each meets the needs of decision makers at these different levels.

Providing needed services and interventions within resource constraints may not be feasible even when such services and interventions have been proven to be cost-effective.

Chapter 5

Summary and Conclusions

Poor sexual and reproductive health accounts for a substantial share of the global burden of disease.

This report shows that poor sexual and reproductive health accounts for a substantial share—nearly one-fifth—of the global burden of disease, based on analysis of recent estimates of DALYs.[194] The large contribution of sexual and reproductive health problems to the worldwide burden of ill-health and premature death argues that interventions to reduce these problems should be a high priority. Sexual and reproductive health interventions are defined here as including contraceptive services, maternal health services (including abortion-related care), prevention, diagnosis and treatment of sexually transmitted infections (STIs) including HIV/AIDS, and other gynecologic and urologic health care.

Important analyses, undertaken over the past 10–15 years, such as the Global Burden of Disease, the Disease Control Priorities for Developing Countries project, the World Bank's *World Development Report 1993,* and the report of the Commission on Macroeconomics and Health have made significant contributions toward quantifying the benefits of health interventions as well as some of the costs. Much has changed in health service provision and in the world's health since these extensive assessment efforts began in the 1990s. Health-sector reforms have changed the cost of services, who pays for them and whom they cover, as well as the content and structure of services available. The HIV/AIDS pandemic has shifted the burden of disease and disability, both overall and within the area of sexual and reproductive health. Nevertheless, the studies of the last decade provide a firm base for future research and action.

Reflecting the demand for these types of analyses, a decade after publication of the first edition, a new Disease Control Priorities project is underway. The planned report will provide an updated assessment of the burden of disease due to all illnesses and health problems, including those related to sexual and reproductive health.[195] In addition, ongoing work has provided updated information on the Global Burden of Disease.[196]

The impact of poor sexual and reproductive health falls hardest on the most disadvantaged groups, especially women and children, and disproportionately affects people in low-income countries.[197] For example, poor sexual and reproductive health accounts for nearly two-thirds of disability-adjusted life years (DALYs) lost among women of reproductive age in Sub-Saharan Africa, compared with about one-third worldwide.[198] Other research shows that particular groups, for example adolescent women, both married and unmarried, are at high risk of poor sexual and reproductive health outcomes; married adolescents in particular may lack power to use contraceptives or to avoid acquiring an STI from their husbands and partners who are often much older.[199] Both married and unmarried sexually active adolescent women also experience significant levels of unplanned pregnancy and unmet need for contraception.[200]

These findings raise the question of whether it is appropriate to look only at benefits for the population as a whole—that is, the situation may be very different for particular subgroups, and assessments of key subgroups would be extremely helpful to program planners and policymakers. Whatever metric is used to measure benefits, if governments want to address inequity, these findings suggest that researchers should be looking at whether investment in a given intervention benefits some group or groups disproportionately given variation in the level or prevalence of poor outcomes for different population groups. Such group-specific assessments, hardly addressed by existing studies, would be crucial for helping governments to implement their goals of increasing equity, by guiding priority-setting across groups and interventions. This is an area in need of research—assessment of differences in the benefit of interventions across subgroups. A further area of great need is assessment of the relative benefit of sexual and reproductive health interven-

tions as compared to other health interventions for poor women. This need will be greatly helped if there is increased standardization in methodologies for cost-benefit studies.

The benefits of sexual and reproductive health interventions are far-reaching.

The present report builds on prior work and provides a comprehensive definition of the range of benefits that result from sexual and reproductive health interventions. These and other studies show that current approaches to cost-benefit analysis largely fail to recognize the nonmedical benefits of sexual and reproductive health interventions and thus undervalue these interventions. For example, in addition to its medical benefits, maternal health care, by lowering death and disability due to pregnancy-related causes, helps families remain intact, enables higher household savings and investment, and encourages higher productivity. Prevention of and treatment for STIs, and treatments for conditions like fistula and infertility, also reduce social stigma and help parents remain healthy so they are better able to care for and invest in their children.

Current methods of evaluating costs and benefits are more likely to undervalue contraceptive services than the other components of sexual and reproductive health because pregnancy—the condition contraceptive use prevents—is not a disease. Contraceptive services do have important medical benefits but, in addition, they have the broadest nonmedical benefits of the three areas of sexual and reproductive health interventions.

In terms of medical benefits, contraceptive use (together with maternal health services) minimizes the adverse health effects of unintended pregnancy and high-risk births, including unsafe abortion, hemorrhage, infection, anemia, low birth weight and malnutrition. This report (Chapter 3) shows that if modern contraceptive services were available to all 201 million women in the developing world with unmet need, 1.5 million lives would be saved each year. Approximately 27 million additional DALYs would be saved, opening the way for higher productivity, additional education and enhanced family care. And each year, some 502,000 fewer children would lose their mothers.

As striking as these numbers are, the personal, social and economic benefits of contraceptive services may be even more important. Unintended pregnancy, which contraceptive use prevents, can harm individuals, families, communities and societies in ways that are difficult to measure in dollars or DALYs.

A broader approach to measuring costs and benefits is needed.

Future research should concentrate on finding the approaches and methodologies to quantify the full range of the benefits that accrue from sexual and reproductive health care, and to do so in ways that are sufficiently similar across studies and across interventions to allow results to be compared. While sexual and reproductive health care provides clear and valuable medical benefits, its personal, social and economic benefits are much less acknowledged or even recognized. These benefits are difficult to measure but extremely important for human welfare and for economic development. They include improvements in women's status and greater equality between men and women, as well as economic benefits at the individual, household and societal levels. As seen above, studies already document some of these broader benefits, but much more needs to be done.

In part, researchers and decision makers need to be more flexible and open to a range of outcomes and ways to measure them. This means including health measures beyond loss of life or loss of physical functioning, such as measures of emotional or mental functioning. It also means looking to measurable nonhealth outcomes and developing and implementing research designs that can test the relationship between service inputs and such outcomes. For example, contraceptive use makes possible various measurable behaviors, such as delaying a first birth or spacing births. The ability to delay and space births, in turn, has potential impact on measurable outcomes at the individual level (such as job stability or a career path) and at the household level (such as standard of living, activities available to children, or amount of time parents spend with each child).

Some benefits of health interventions may not be possible to quantify by documenting a causal relationship, but can nevertheless be shown through statistical evidence on the strength of relationships between two factors. For example, even though it has not been proven that this is an outcome of contraceptive services, women who delay their first birth until after age 18 tend to have higher levels of education and more stable employment patterns. Qualitative research methodologies can also help to document some benefits, such as the effect of improved maternal health on children's well-being, or the impact of reduced social stigma on the functioning of affected individuals.

It may well be that certain factors—both costs and benefits—cannot be expressed in terms of dollars or DALYs. Nevertheless, we must find ways to summa-

rize and compare the relative and absolute costs and benefits of different health investments without restricting analysis by simply excluding these factors. Failure to include the full range of costs and benefits means that those who must allocate resources will not have the best evidence to inform their decisions about the most cost-effective, as well as the most valuable, policies and programs to support.

More comprehensive cost and benefit studies are needed at all levels to meet the needs of decision makers. Policymakers, for their part, must keep in mind the breadth and synergies of sexual and reproductive health benefits, and when they use existing studies, add due weight for indirect and nonmedical and nonmonetary benefits, even if measures to compare them with financial and medical benefits are lacking.

Sexual and reproductive health undergirds the Millennium Development Goals

With the Millennium Development Goals, world leaders have outlined an ambitious framework for action on the part of both rich and poor countries. Sexual and reproductive health is essential to achieving nearly all eight of the Millennium Goals. Indeed, some of the indicators chosen to measure progress toward the Millennium Development Goals assess selected sexual and reproductive health achievements. For example, the proportion of births attended by skilled health personnel is an indicator of progress toward the maternal health goal; the HIV prevalence rate among 15–24-year-old pregnant women and the condom prevalence rate among married women aged 15–49 are indicators of progress in the fight against HIV/AIDS.[201]

Other aspects of sexual and reproductive health also underlie the Millennium Development Goals but are not explicitly mentioned. This is in part because many of the indirect benefits of sexual and reproductive health are difficult to measure. For example, contraceptive services help couples to have smaller families, and in this way enable poor families to invest more resources in each child. This additional investment improves nutrition in the short term and over the longer term helps children prepare to support themselves through education and training. In this way, contraceptive services certainly promote the first Millennium Goal—"eradicate extreme poverty and hunger"—although no measure has been developed to evaluate their contribution.

Poor sexual and reproductive health is largely preventable, but sustained support is needed.

Contraceptive services offering a choice of methods, including condoms, as well as education and counseling can help individuals and couples protect themselves from unintended pregnancies and STIs, including HIV. Regular gynecologic and urologic care can prevent and treat reproductive cancers and other disorders. Pregnancy and childbirth do entail health risks, even when they are planned, but these can be mitigated through prenatal and obstetric care. Effective sexual and reproductive health services could save a substantial proportion of the DALYs lost each year.

It is also important for policymakers and planners to take into account the fact that, unlike needs in many other aspects of health, prevention in the area of sexual and reproductive health is a lifetime need. The risk of unintended pregnancy, for example, can span decades of a woman's life, and people are at risk of exposure to STIs for as long as they are sexually active. Health improvements and progress toward larger development goals that have been achieved can be greatly weakened and possibly reversed if current levels of interventions are not sustained.

Sexual and reproductive health interventions are a good investment.

This report makes the case for mobilizing new resources to invest in improved sexual and reproductive health services for women and men worldwide. Individuals, nongovernmental organizations and governments in developing countries already account for more than 75% of current expenditures.[202] While the developing countries must continue investing in sexual and reproductive health services, it is time for developed countries to live up to the pledges they made at the 1994 International Conference on Population and Development (ICPD). In 2000, these countries provided $2.6 billion for sexual and reproductive health services in developing countries—less than half of what they had pledged at ICPD for that year.

Turning back the HIV/AIDS pandemic, helping women balance work and family, and preventing maternal deaths, sterility and infertility are ambitious aims, but they are realistic. They are also necessary for achieving the Millennium Development Goals by 2015.

Appendix

Definitions, Methodology and Data Sources

Women of reproductive age, by country and by marital status: The number of women of reproductive age (15–49) in 2003, by country, was estimated from the United Nations Population Division, Department of Economic and Social Affairs, 2002 World Population Prospects, New York: United Nations, 2003. Marital status (currently married, formerly married and never married) of women 15–49 was taken from several sources, listed here, in order of priority.

1. The most recent *Demographic and Health Survey* (DHS) for a country, from ORC Macro, MEASURE DHS+STATcompiler, 2003,<http://www.measuredhs.com/statcompiler" www.measuredhs.com/statcompiler>, accessed May 28, 2003.

2. Ross J, Stover J and Willard A, 1999, *Profiles for Family Planning and Reproductive Health Programs,* Glastonbury, CT, USA: The Futures Group International, Appendix Table A-7.

3. United Nations Population Division, Database on Marriage Patterns, unpublished data provided June 5, 2002.

4. Estimates based on the (unweighted) average of countries with DHS data within the relevant subregion.

5. Estimates based on DHS data available for a country in that region that has similar marriage patterns.

Women at risk for unintended pregnancy was defined as all women who are sexually active, are able to become pregnant, and either do not want any (more) children (limiters) or do not want a child within the next two years (spacers).

Contraceptive method use categories were sterilization (male or female); modern reversible methods-IUD, long-acting hormonal methods (injectable and implant), the pill, the condom, vaginal barrier methods and spermicides; and traditional methods-periodic abstinence, withdrawal and other nonmodern methods.

Unmet need for contraceptive services was defined as women at risk for unintended pregnancy who were using a traditional method or no method.

Distribution of women 15-49 by risk for unintended pregnancy, contraceptive method use and unmet need for contraceptive services was tabulated from several sources.

1. For all countries with a DHS survey from 1990 or later that was available as a public use file, the most recent DHS was used.

2. For countries with a relevant survey, but without a public use file (in most cases surveys implemented by the U.S. Centers for Disease Control and Prevention; in a few cases, recent DHS or independently conducted surveys), proportions available from published reports were used.

3. For any other country that did not have a nationally representative fertility survey, either the unweighted average distribution of its subregion based on countries in the subregion that had surveys, or the distribution from a country that is at a similar level of demographic transition in the same subregion, was used.

Cost of contraceptive services: Average costs per method are from United Nations Population Fund (UNFPA), Compilation of costs of sexual and reproductive health interventions, unpublished data from over 500 studies worldwide, UNFPA: New York, 2002, http://bbs.unfpa.org/spcd/costing/group_gc.cfm?category=GC&component_id=77, accessed with permission from UNFPA on Feb. 28, 2003 (public access planned at www.unfpa.org/rhcosting). For each method, the average cost includes labor, drugs and supplies, overhead (including capital costs, although these are likely to be incompletely reported) and other costs.

Costs of long-term methods were annualized, applying standard assumptions. (These assumptions-10 years for sterilization and three years for the IUD-are outlined in Janowitz B, Bratt JH and Fried DB, *Investing in the Fu-*

ture: A Report of the Cost of Family Planning in the Year 2000, Research Triangle Park, NC, USA: Family Health International, 1990.) For other methods, the estimates are based on supplying 13 cycles of oral contraceptives, 96 condoms or four injections per year. Costs were provided in 2001 dollars, and were adjusted by a factor of 4% to 2003 dollars.

Pregnancies averted: The number of pregnancies averted by current use of modern contraceptive methods was estimated by subtracting the number of pregnancies occurring to current users of modern contraceptives from the number that would occur if they used no method.

The number of pregnancies that would be averted by serving all those with unmet need for contraceptive services was estimated as the difference between the number of pregnancies currently occurring to women with unmet need and the number that would occur if they used modern contraceptive methods (in the same distribution as women in their country who are current users, by fertility-preference status).

Pregnancy rates for women using each method and women using no method were estimated from method-specific use-failure rates, which were adjusted to be consistent with estimates of the number of unintended pregnancies in 2003 for each major region. The number of unintended pregnancies was taken from The Alan Guttmacher Institute (AGI), *Sharing Responsibility: Women, Society and Abortion Worldwide,* New York: AGI, 1999, Appendix Table 3, p. 53; and AGI, unpublished tabulations by region. These estimated numbers were adjusted to 2003 based on the ratio of 2003 births (see "Number of women of reproductive age," above) to 1999 births.

Base use-failure rates for sterilization are from Trussell J et al., Contraceptive failure in the United States: an

update, *Studies in Family Planning,* 1990, 21(1):51-54. Initial use-failure rates for reversible methods are from Cleland J and Ali M, Dynamics of contraceptive use, in: United Nations, *Levels and Trends of Contraceptive Use as Assessed in 2002,* New York: United Nations, 2003 (forthcoming). For no method use, an initial annual pregnancy rate of 40% was assumed.*

Pregnancy outcomes: It was assumed that all pregnancies to women at risk for unintended pregnancy would be unplanned pregnancies. They were distributed according to outcome (unplanned births, abortions and miscarriages) based on the distribution of outcomes of unplanned pregnancies for major world regions from AGI, 1999 and AGI, unpublished tabulations (see "Pregnancy rates," above). Regional averages were applied to all countries within that region.

Maternal deaths: The numbers of maternal deaths due to abortion and to all other pregnancy-related causes were estimated by drawing on data from several sources. **The number of maternal deaths** from all pregnancy-related causes for each country in 2003 was estimated by multiplying the ratio of the number of births in 2003 to the number in 2000, estimated by the United Nations Population Division, 2003 (see "Number of women of reproductive age," above) times the number of maternal deaths in 2000 estimated in AbouZahr C and Wardlaw T, *Maternal Mortality in 2000:* Estimates Developed by WHO, UNICEF and UNFPA, Geneva: World Health Organization (WHO), 2003. Maternal mortality from unsafe abortion: Estimates of the **number of maternal deaths from unsafe abortion,**[†] the number of unsafe abortions and the rates of deaths per 100,000 unsafe abortions, by region, were taken from estimates for 2000 from _hman E and Shah I, Unsafe Abortion: *Global and Regional Estimates of the Incidence of Unsafe Abortion,* Geneva: WHO, 2003 (forthcoming), Table 3. Regional averages were applied to all countries in a region. **Maternal mortality from abortion where it is legal and/or in medical settings:** The number of abortions in legal settings in each region was estimated by subtracting the number of unsafe abortions (from Åhman and Shah, 2003) from the total number of induced abortions (from AGI, 1999, and AGI, unpublished tabulations-see "Pregnancy rates," above), and distributed across countries based on the legal status of abortion. Mortality rates per 100,000 abortions in safe and legal settings were based on experience in developed countries reported in AGI, 1999. **Maternal mortality ratios from causes other**

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*This 40% estimate is much lower than the 85% annual pregnancy rate that Trussell et al. estimate for couples continually sexually active throughout a year's time. Some studies have suggested that couples at risk of unintended pregnancy who are using no contraceptive method are not continually sexually active. See, for example, Blanc AK and Grey S, Greater than expected fertility decline in Ghana: Untangling a puzzle, *Journal of Biosocial Science,* 2002, 34:475-495 and Grady WR, Hayward MD and Yagi J, Contraceptive failure in the United States: Estimates from the 1982 National Survey of Family Growth, *Family Planning Perspectives,* 1986, 18(5):200-204 & 207-209.

†The estimated number of unsafe abortions includes those provided in countries where the procedure is highly restricted, and those provided under unsafe conditions in countries where abortion is permitted under broad legal grounds.

than induced abortion were estimated for each country by subtracting maternal deaths related to abortion from maternal deaths from all pregnancy-related causes and expressed as a rate per 100,000 live births.

Infant deaths: The infant mortality rate (deaths under age 1 per 1,000 live births) for 2000-2005, by country, was applied to the relevant number of births to calculate the number of infant deaths. United Nations Population Division, 2003 (see "Number of women of reproductive age," above).

Children who would not lose their mothers: The number of maternal deaths was multiplied by the average number of living children women have had to estimate the number of children impacted by maternal deaths. Estimates are based on the average number of living children women have had, according to whether they are spacers or limiters and according to type of method use (sterilization, modern reversible, traditional or no method), by union status. DHS data were used when available. When DHS data were not available, subregional (unweighted) averages were used. When DHS data were not available for computing subregional averages, estimates of the mean number of living children were based on results for similar countries in the subregion or in a similar region.

Disability-Adjusted Life Years (DALYs): The number of DALYs lost among infants and children was estimated based on the number of DALYs lost per 1,000 births because of perinatal conditions, by subregion, in 2001. These rates were then applied to unintended births in 2003, in each country in the subregion, according to subgroups of women, for example, current contraceptive users and nonusers.

The number of DALYs lost among women because of maternal conditions other than induced abortion was estimated based on the number of DALYs lost per 1,000 births from all maternal conditions except induced abortion, by subregion, in 2001. These rates were then applied to all unintended births in 2003, in each country in the subregion, according to subgroups of women, for example current contraceptive users and nonusers.

The number of DALYs lost among women because of induced abortion was estimated from the number of DALYs lost due to induced abortion per 1,000 births in 2001, by subregion, multiplied by the ratio of 2003 births to 2003 abortions.

Appendix 1.1. Methods of economic evaluation[203] (adapted from Byford and Sefton, 2002, pp. 5–7)

1. Cost-effectiveness analysis (CEA) is the most commonly adopted approach to economic evaluation in healthcare. Benefits of an intervention are measured by a single 'natural' or 'condition-specific' outcome, e.g., level of blood pressure. The benefits of two or more interventions are combined with their respective costs to provide a measure of cost-effectiveness.

Advantages: The use of natural units of outcome makes CEA easily transferable into social welfare research, where natural units would include such things as jobs created, crimes prevented or measures of social exclusion. CEA, moreover, avoids the need to valuate benefits since 'natural' units of outcome are used.

Disadvantages:(1) CEA cannot be used to make comparisons across diverse interventions with non-comparable outcomes. Thus, CEA might be used to determine which of three condom distribution schemes is most efficient in terms of subsidized condoms purchased by clients, but it cannot determine whether the same money would be better spent on a scheme to modernize first-referral clinics. (2) It is difficult to capture all possible effects of an intervention on a single outcome scale. Reproductive health services may produce many outcomes, some direct and some indirect, but combining costs with multidimensional outcomes with distinct measurements would make interpretation of results difficult. To illustrate, provision of contraceptive services may lead to measurable changes in, say, infant mortality, but it may also have an impact on the educational attainment of existing children, the economic prospects of the family, and on other psychological and social conditions.

2. Cost-Consequence Analysis. Where the omission of other outcomes could be misleading, studies may present a range of outcomes (or consequences) alongside the costs, using cost-consequences analysis (CCA). No attempt is made to formally combine costs with benefits and the decision maker is left to form his or her own opinion regarding the relative importance of the alternative outcome scales presented.

Advantages: CCA has been used to evaluate complex interventions where outcomes cannot easily be summarized in a single measure. The presentation of all costs and consequences can greatly enhance the understanding gained from a CEA .

Disadvantages: CCA is limited by the inability to rank interventions in terms of cost-effectiveness.

3. Cost-Utility Analysis. An alternative solution to multiple outcomes is to condense them into one generic measure, which is the approach adopted in cost-utility analysis (CUA). As with CEA, a cost-effectiveness ratio can be calculated, but outcomes are measured in terms of utility (level of satisfaction, wellbeing or quality of life). One example of a utility-based measure is the quality adjusted life year (QALY). The calculation of QALYs involves the use of quality adjustment weights for different health states.

Advantages: Once generated, the utility weights are multiplied by the time spent in each state and then summed to provide the number of quality adjusted life years, thereby incorporating the effects of an intervention on the quantity and quality of life. The results are expressed in a cost-utility ratio in terms of the additional cost per QALY

gained from undertaking a particular intervention. This provides a common measure of output that allows comparisons to be made between any number of diverse interventions.

Disadvantages: (1) Conceptually, the idea of condensing the benefits of a particular developmental scheme into a single outcome measure may be unrealistic. Such a scheme may be area-based, for instance, rather than being focused on a specific group of individuals. (2) In addition, utility scales have been criticized for their conceptual foundations, the methodology employed, their lack of sensitivity to change and for ignoring equity considerations. (3) The use of CUA in the evaluation of social welfare interventions is limited by the lack of utility scales appropriate to the field. Although a significant quantity of research has been carried out into the development of utility scales for use in health economics, these measures tend to be health focused and may not be broad enough to capture the full impact of social care policies such as the non-illness aspects of reproductive health.

4. Cost-Benefit analysis (CBA) is a method of economic evaluation that is used less often in health care than CEA or CUA, although it is more common in some policy areas, such as transport and environment. CBA requires both costs and benefits to be valued in monetary units.

Advantages: (1) Using CBA, it is possible to directly compare the costs with the benefits of an individual project (i.e., calculate the net benefit) to see which is greater, without the need for a comparator. The intrinsic worthiness of proceeding with a project or intervention can be analyzed without comparing it to other projects or interventions. (2) Like CUA, CBA allows the comparison of any number of diverse interventions. (3) In addition, it is possible to make comparisons across different sectors, such as health care, education or defense.

Disadvantages: (1) Difficulties arise when attempting to value benefits in monetary terms. Methods do exist, such as willingness to pay or observed preferences, but they are difficult to apply and can be a time consuming and costly addition to an evaluation. Hence CBA in health care is relatively rare and the extent of its use in the wider social welfare field is as yet unknown. (2) It is difficult to be sure that all relevant benefits have been included. Also, there may be negative benefits (unintended consequences) inadvertently omitted from the analysis. (3) Discounting future benefits to the present can pose conceptual difficulties.

5. Cost-Savings Analysis. One technique (related to CBA) that is and may continue to be more commonly used in the evaluation of social welfare services is the analysis of 'cost-savings' (CSA). This is a limited form of CBA that involves the comparison of costs and benefits that are easily converted into monetary units. The costs of an intervention are compared to the savings that are generated through reductions in specific social services. CSA has been used to evaluate family planning programs in many settings.

Advantages: (1) 'Outcomes' of this type can be converted into monetary units relatively easily since they involve known and observed costs. (2) CSA can help avoid knotty methodological problems of valuating certain benefits.

Disadvantages: (1) Such analyses are less scientifically sound than CBA since they do not attempt to value *all* relevant outcomes, in particular final outcomes for the individuals involved. (2) Other difficulties mentioned above for CBA apply here equally.

Appendix 2.1: Diseases/conditions included in the Global Burden of Disease (1990)[204]

All Causes

I. Communicable, maternal, perinatal and nutritional conditions	II. Noncommunicable deficiencies	III. Injuries
Infectious and parasitic diseases	Malignant neoplasms	Unintentional
Tuberculosis	Mouth and oropharynx cancer	Motor vehicle
STIs excluding HIV*	Oesophagus cancer	Poisoning
a. Syphilis*	Stomach cancer	Falls
b. Chlamydia*	Colon and rectum cancers	Fires
c. Gonorrhea*	Liver cancer	Drowning
HIV*	Pancreas cancer	Other unintentional
	Trachea, bronchus and lung cancers	
Diarrheal diseases		Intentional injuries
	Melanoma and other skin cancers	
Childhood-cluster diseases		Self-inflicted injuries
Bacterial meningitis and meningococcaemia	Breast cancer*	Violence
Hepatitis B and hepatitis C	Cervix uteri cancer*	War
Malaria	Corpus uteri cancer*	
Tropical-cluster diseases	Ovary cancer*	
Leprosy	Prostate cancer	
Dengue	Bladder cancer	
	Lymphoma and multiple myeloma cancer	
Japanese encephalitis	Leukemia	
Trachoma	Other neoplasms	
Intestinal nematode infections	Diabetes mellitus	
Respiratory infections	Endocrine disorders	
Maternal conditions*	Neuro-psychiatric conditions	
Maternal hemorrhage	Sense organ diseases	
Maternal sepsis	Cardiovascular diseases	
Hypertensive disorders of pregnancy	Respiratory diseases	
Obstructed labor	Digestive diseases	
Abortion	Genito-urinary diseases (minus	
Perinatal*	Nephritis and nephrosis)*	
Nutritional deficiencies	Skin diseases	
Iodine deficiency	Congenital abnormalities	
Vitamin A deficiency	Oral conditions	
Iodine deficiency anaemia* (women aged 15-49 only)		

Appendix 2.2. Codes from the *International Classification of Disease* 9th edition, used in the 1996 Global Burden of Disease to define conditions relevant to sexual and reproductive health[205]

Condition/disease	ICD-9 code	Description of ICD-9 code
STIs, excluding HIV	090-099, 614-616	Other venereal diseases (099); Inflammatory disease of ovary, fallopian tube, pelvic cellular tissue and peritoneum (614); inflammatory diseases of uterus, except cervix (615); inflammatory disease of cervix, vagina and vulva (616)
a. Syphilis	090-097	Congenital syphilis; early syphilis (symptomatic); early syphilis (latent); cardiovascular syphilis; neurosyphilis; other forms of late syphilis (symptomatic); late syphilis (latent); other and unspecified syphilis
b. Chlamydia	n/a	
c. Gonorrhea	098	Gonococcal infections
HIV	n/a	
Maternal conditions	630-676	
a. Maternal hemorrhage	640, 641, 666	Hemorrhage in early pregnancy; antepartum hemorrhage, abruptio placentae and placenta previa; postpartum hemorrhage
b. Maternal sepsis	670	
c. Hypertensive disorders	642	Hypertension complicating pregnancy, childbirth and the puerperium
d. Obstructed labor	660	Obstructed labor
e. Abortion	630-639	Hydatidiform mole; other abnormal product of conception; missed abortion; ectopic pregnancy; spontaneous abortion; legally induced abortion; illegally induced abortion; unspecified abortion; failed attempted abortion; complications following abortion and ectopic and molar pregnancies
Perinatal conditions	760-779	
a. Low birth weight	764-765	Slow fetal growth and fetal malnutrition; disorders relating to short gestation and unspecified low birth weight
b. Birth asphyxia or trauma	767-770	Birth trauma; intrauterine hypoxia and birth asphyxia; respiratory distress syndrome; other respiratory conditions of fetus and newborn

[*]Chylamydia was not included in ICD-9, published in 1980, in ICD-10 the code is A55-A56;
[**] HIV/AIDS was not included in ICD-9, in ICD-10 the code is B20-B24.

Appendix Table 2.3. World Health Organization Regional Classification[206]

AMERICAS	EASTERN MEDITERANEAN	EUROPE	SOUTHEAST ASIA	WESTERN PACIFIC
Antigua and Barbuda	Afghanistan	Albania	Bangladesh	Australia
Argentina	Bahrain	Andorra	Bhutan	Brunei Darussalam
Bahamas	Djibouti	Armenia	Democratic People's Republic of Korea	Cambodia
Barbados	Egypt	Austria	India	China
Belize	Iran (Islamic Rep. of)	Azerbaijan	Indonesia	Cook Islands
Bolivia	Iraq	Belarus	Maldives	Fiji
Brazil	Jordan	Belgium	Myanmar	Japan
Canada	Kuwait	Bosnia and Herzegovina	Nepal	Kiribati
Chile	Lebanon	Bulgaria	Sri Lanka	Lao People's Democratic Republic
Colombia	Libyan Arab Jamahiriya	Croatia	Thailand	Malaysia
Costa Rica	Morocco	Cyprus	Timor-Leste	Marshall Islands
Cuba	Oman	Czech Republic		Micronesia (Federated States of)
Dominica	Pakistan	Denmark		Mongolia
Dominican Republic	Qatar	Estonia		Nauru
Ecuador	Saudi Arabia	Finland		New Zealand
El Salvador	Somalia	France		Niue
Grenada	Sudan	Georgia		Palau
Guatemala	Syrian Arab Republic	Germany		Papua New Guinea
Guyana	Tunisia	Greece		Philippines
Haiti	United Arab Emirates	Hungary		Republic of Korea
Honduras	Yemen	Iceland		Samoa
Jamaica		Ireland		Singapore
Mexico		Israel		Solomon Islands
Nicaragua		Italy		Tonga
Panama		Kazakhstan		Tuvalu
Paraguay		Kyrgyzstan		Vanuatu
Peru		Latvia		Viet Nam
Saint Kitts and Nevis		Lithuania		
Saint Lucia		Luxembourg		
Saint Vincent and the Grenadines		Malta		
Suriname		Monaco		
Trinidad and Tobago		Netherlands		
United States of America		Norway		
Uruguay		Poland		
Venezuela (Bolivarian Republic of)		Portugal		
		Republic of Moldova		
		Romania		
		Russian Federation		
		San Marino		

		Serbia and Montenegro		
		Slovakia		
		Slovenia		
		Spain		
		Sweden		
		Switzerland		
		Tajikistan		
		The former Yugoslav Republic of Macedonia		
		Turkey		
		Turkmenistan		
		Ukraine		
		United Kingdom		
		Uzbekistan		

Appendix 2.4. Summary Tables of the United Nations Population Fund

Article/Document	Concise Description of Study	Reported Benefits or Costs	Methodological Note
FAMILY PLANNING			
STUDIES DISCUSSING (POTENTIAL) BENEFITS ONLY		**Benefits**	
Author/Title: Maynard RA, ed., Kids Having Kids[207] **Country/Region**: United States **Reference Year**: Report date: 1996; data from circa 1987-1995	Objective of study was to better understand the full costs and consequences of adolescent childbearing. Seven coordinated studies on specific aspects were carried out.	**For child,** fewer low-birth weight babies, better childhood health, better home life, less runaways, less child abuse, less foster children, better education results, better productivity, less criminality; **For mothers,** less school dropouts, less single parents, less welfare; **for father**, higher income. **For nation,** tax savings, higher national productivity. Nonmeasured costs: learning disabilities. **Cost-benefit to mothers' income** (componenets: own income, spouses' income, public assistance, out-of-pocket health expenses) -$919, after controlling, -$10,444, unadjusted. **Cost savings to taxpayers**: $6.9 b., cost to society: $8.9 b. (both figures adjusted). No. adolescent mothers (<18) = 175,000. Thus, per birth savings could be [6.9b+8.9b] / 175,000 = $90,300 per birth avoided.	Compared two sets of young women: adolescents aged 17 or younger, and young mothers aged 20-21. Controlled for background factors (race, ethnicity, socioeconomic class, parents' education) and for factors "closely linked to adolescent childbearing (motivation, self-esteem, peer-group influence, impact of community)."
Author/Title Seth Berkley - Global Burden of Disease (GBD) "Unsafe Sex"[208] **Country/Region**: World; developing nondeveloping region breakdown	Ch. 13 of *Health Dimensions of Sex and Reproduction*. Analyses the GBD results in terms of what burden can be attributed to unsafe sexual practices. Considers five diseases or conditions, one of which is"complications of pregnancy in those wanting to use contraception but not having access".	Complications from unwanted pregnancy (developing world): 114,000 deaths, 6.8 million DALYs (1990).	Unintentional pregnancies include those from intentional nonuse of contraception and those from lack of knowledge or access to contraception. (Method failures are not included since these are "inherent limitations" of the methods and are unavoidable.) Unmet need data from Demographic and Health Survey are used, and increased to account for the unmet need of unmarried persons (e.g., for India unmet need is increased from 15% to 25%) these percentages are applied to deaths and DALYs for maternal complications (hemorrhage, etc.) to get the figures on left.
STUDIES DISCUSSING COSTS ONLY		**Costs**	
Author/Title: Green R and Potts M - Commodity costs in Sub-Saharan Africa,[209] **Reference Year**: 2020	The study projects contraceptive commodity costs and anyibiotics for STI treatment.	By 2020, $200-$300 million for family planning commodities	Eight demographic projections are made with varying assumptions on contraceptive prevalence, abortion, breastfeeding and condom use.
Author/Title: M Mitchell, Costing Reproductive Health[210] **Country/Region**: Zimbabwe and Mexico, **Reference Year**: 1995	This study examines costs of various components of reproductive health, using ZNFPC and MEXFAM.	Costs in Zimbabwe and Mexico compared for specific reproductive health services - detailed cost results are included on RTI diagnosis and treatment, contraceptives, gynecological services, IUD check, Pap smear.	Reproductive health definition includes infertility, cancers, dysmenorrheal, nutrition, menopause, adolescent reproductive health (ARH). Comment: detailed costs available for RTI diagnosis and treatment, contraceptive methods and gynecologic services for the two countries.
Author/Title: World Bank, Merrick T - Cost of essential health package spreadsheet[211]. **Country/Region**: Hypothetical population of 10 million; health and demographic characteristics based on Zambia and Bangladesh. **Reference Year**: 2003	This study exists as a spreadsheet only. The "essential health package" interventions are included, with facility-specific interventions given by four levels of service: community outreach, dispensary, clinic and hospital. Costs are broken down into labor, drugs and supplies, overhead and capital.	**Total package cost**: $5.5 million (or $0.55 per capita) **Per user costs**: *Community counseling* $11.67 (20,000 women in community); *Manage/refer problems* $0.81 (53,200 clients at dispensary, clinic levels); *Condom, pill distribution* $5.19; *Refferals* $0.80; *IUDs, Norplant* $8.32; *Injectables* $7.12; *Sterilization* $9.99	Combined Zambia-Bangladesh hypothetical data, CPR = 25%; women 15-49 = 2,500,000; method mix: condoms 20%, IUDs 5%, pills 50%, sterilization 25%; 625,000 users, all supplied by public system - Accompanying data/methods text not yet available
Author/Title: Bulatao - Family planning expenditures[212] 1985 **Country/Region**: Developing world **Reference Year**: 2000	The World Bank study estimates family planning program costs for 2000, as viewed in 1984.	For entire developing world: 1980, $2.6 billion 2000, $7.1 billion (STD, fertility decline) 2000, $9.7 billion (Rapid fertility decline)	A dated study, superseded by the Cairo numbers. However, it does provide an estimate of purely family planning costs at a global level. Uses regression to estimate missing data for CPRs, per capita public expenditure and unmet need. Also estimates private expenditures. Estimates done by method and region.
Author/Title: UNFPA Costing Initiative:[213] IUDs **Country/Region**: Kenya, Mali, Zimbabwe, Colombia, Honduras, Mexico, Peru, Bangladesh, Thailand, Turkey, **Publicaiton date**: 1993-1999.	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 to present), presented on the Web in a highly searchable way.	**Cost per user**: for 3 visits, average cost is $15.88. (cost of IUD alone is usually taken as $1.25). Component shares: drugs 13%, labor 15%, overhead 72%. **Cost per year**, assuming 1 year of use, range: $13.02 to $3.57; assuming 3-4 years, $21.06 to $1.46. For 3-4 years, the average cost per CYP is $8.88. **All costs are in US$ 2001.**	- Variables affecting costs: assumed years of protection; number of visits included (acceptance, follow-up, removal); professional level of service provider. - The higher costs tend to include more elements, e.g., capital costs, several follow-up visits. - Of the $15.88 average, $2.92 went to drugs and supplies and $3.35 to labor. Non-specific "overheads" were the largest component. Comment: These estimates are based on 14 studies, covering 4 regions and 10 countries

Article/Document	Concise Description of Study	Reported Benefits or Costs	Methodological Note
Author/Title: UNFPA Costing Initiative:[214] Pills **Country/Region**: Kenya, Mali, Colombia, Honduras, Mexico, Bangladesh **Publication date:** 1987,1999.	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 to present), presented on the Web in a highly searchable way.	**Cost per birth averted:** $15.77 to $8.61 (one study, Bangladesh, 5 delivery packages) **Cost per year:** average $14.18; range $3.67 to $30.06 **Cost per visit** (acceptance and follow up visits averaged): $2.81 (drugs 12%, labor 6%, overhead 81%). **All costs are in US$ 2001**	- Variables affecting costs: number of visits per year for resupply; number of cycles per year (13-15). - The higher costs tend to include more elements, e.g., capital costs, several visits. - On average (per visit), $0.84 went to drugs and supplies and $0.44 to labor. Non-specific "overheads" were the largest component. Comment: These estimates are based on 12 studies, covering 3 regions and 5 countries; 8 studies yield cost-effectiveness estimates. Some studies look at different delivery methods (this would allow finer estimation of costs).
Author/Title: UNFPA Costing Initiative:[215] Condoms **Country/Region**: Kenya, Tanzania, Zaire, Colombia, Honduras, Mexico, Bangladesh **Publication date**: 1987-1999, costs in US$ 2001.	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 to present), presented on the Web in a highly searchable way.	**Cost per visit:** average $1.26 (in average visit client received 12-20 condoms); average material cost $0.79, ave. labor cost $0.34. **Cost per CYP:** average $35.42; range $3.09 to $92.21, excluding special programs for CSWs	- Variables affecting costs: number of visits per year for resupply; number of cycles per year (150 is fairly standard, but less if client pays); condom cost; number of condoms received (12-20). Comment: These estimates are based on 10 studies, covering 3 regions and 7 countries; 8 studies yield cost-effectiveness estimates. All studies seem to look at community based delivery (CBD).
Author/Title: UNFPA Costing Initiative:[216] Injectables, **Country/Region**: Mali, Mexico, Bangladesh, Thailand, **Publication date**: 1994-1999, costs in US$ 2001	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 to present), presented on the Web in a highly searchable way.	**Cost per visit:** average $2.90 (acceptance visit) to $1.57 (follow-up visit); average material cost $1.31, average labor cost $0.54. (No overhead costs given.) **Cost per CYP:** average $12.92; range $6.10 to $53.50; for 3-month injectables only, range is $6.10 to $9.64.	- Variables affecting costs: number of visits per year for resupply, or, number of injections per year (1-month or 3-month injectables studied); injectable cost. Comment: These estimates are based on 5 studies, covering 3 regions and 4 countries; 6 studies yield cost-effectiveness estimates. In general (not just this method), no account of costs of side effects is considered.
Author/Title: UNFPA Costing Initiative:[217] Female Sterilization, **Country/Region**: Zimbabwe, Colombia, Honduras, Mexico, Bangladesh, Turkey, **Publication date**: 1990-1999, costs in US$ 2001.	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 to present), presented on the Web in a highly searchable way.	**Cost per woman:** average $80.10; component shares: material 25%, labor 27%, overhead 21%, other (usually hospitalization) 26% Average cost postpartum $48.43; average cost, interval, $66.62; Average laparoscopy $90.89, averagecost, minilap, $53.29. **Cost per CYP:** average $7.29; range $3.12 to $18.83.	- Variables affecting costs: number of visits (one study costed an evaluation visit, the operation, and a follow-up visit - all other studies only one visit); type of procedure; timing of the procedure (postpartum/abortion or interval). - Also, some studies looked at all costs, most only at direct costs. Comment: These estimates are based on 6 studies, covering 4 regions and 6 countries; 6 studies yield cost-effectiveness estimates. One study of male sterilization (Brazil vasectomy campaign) is available:cost per CYP = $9.30.
STUDIES DISCUSSING COSTS AND BENEFITS		**Costs/Benefits**	
Author/Title: Cochrane and Sai, Excess Fertility, in Disease Control Priorities in Developing Countries[218] - **Country/ Region**: 3 hypothetical countries, **Reference Year**: 1987	This study examines both health benefits of reducing excess fertility (fewer deaths and DALYs) of infants and mothers, as well as indirect benefits (many are discussed, but only public health and education savings are analysed) in three hypothetical countries: Libana (high mortality, African), Banglapal (high mortality, non-African) and Colexico (low-mortality)	**Benefits**: Survival of offspring, measured as deaths and DALYs averted from elimination of excess fertility; savings on educational and health expenditures from births averted. Several other benefits mentioned but not included in study. Savings per birth averted: $440, $480 and $1,600 for three countries; corresponding costs: $368, $202, $133; Cost benefit ratios: 1.2 to 1, 2.4 to 1, 12 to 1. **Costs:** Cost per birth averted - review of 16 countries, low and high variants estimated. Low variant ranges from $8 (Sri Lanka) and $7 (Colombia) to $100 (Kenya) and $80 (Nepal)	- The study is not clear in some aspects and the references are quite old. Nonetheless, it does try to present global cost-benefit estimates, with cost benefit ratios several multiples on one.
Author/Title: Bobadilla - Essential package of World Bank, 1993 World Development Report[219] (in WHO 1994 Global Burden of Disease report) **Country/Region**: low and middle income countries **Reference year**: circa 1990	This is one of eight studies in the WHO (Murray-Lopez) 1994 report on GBD. Th Bobadilla chapter presents the rationale forgoing from the GBD to the "essential package" described in *World Development Report 1993*.	- FP: $20-30/DALY (for low-income countries, where the package would cost $12 per capita, $0.90 of which goes to FP). - Note that Other public health interventions which includes Information Education and Counseling (IEC) for behavior change, get $4.20 per capita (of the $12 total) which includes IEC for family planning.	- Summarizes the genesis of the essential health package of WDR 1993 which combines the GBD output of DALYs together with the DCP work on cost-effectiveness of interventions. - Figure 1 (p. 172) compares DALYs gained by specific interventions to costs per intervention. Diagonal lines are contours of equal cost-effectiveness (e.g., $100/DALY). - The package includes interventions based on cost-effectiveness and also impact (% of all DALYs).
Author/Title: Cost Benefits Vietnam[220] - National Committee for Population and Family Planning, **Reference Year**: 1996	(Only abstract reviewed). This is perhaps the most recent CBA study which looks at FP program costs versus savings in public expenditure (in this case, health, education and social security).	Savings in social sector expenditure: Every VND (Vietnamese dong) invested in FP produces a savings of VND 7.6 in social sector expenses.	The study looks at the public FP program. The period 1979-1996 is contrasted with the period 1997-2010. CBA applies to the year 2010.

Article/Document	Concise Description of Study	Reported Benefits or Costs	Methodological Note
Author/Title: Moreland, Investing in Egypt's Future, The Costs and Benefits of FP in Egypt[221], **Reference Year**: 1992-2015	This study combines a cost-savings analysis of the public sector with an econometric model of the Egyptian economy. The usual CBA approach is used to compare the costs of the FP state program in Egypt to savings from births averted in other sectors, viz., food subsidies, education, water, sewage, housing and health.	**Benefits:** Savings in public expenditures (in education, health, food subsidies, housing, potable water, sewage treatment). Cumulative benefits (1992-2015): net savings of LE 19,000 million **Costs:** FP program (43% public expenditure, 57% donors) costs go from LE 66 million in 1992 to LE 111 million in 2015. **Cost-benefit ratio**: for the accumulated savings (1992-2015), the ratio is 31 to 1 (0% discount rate).	
Author/Title: Foreit, Costs and Benefits of Implementing FP at private Peru mining company[222] **Reference year:** 1991	(Only abstract reviewed.) The study investigates MCH/FP costs and potential savings in the closed system of an isolated mining company.	**Benefits**: Company's savings at its medical center. Within 18 months, CPR rose 41% and CPR (modern) rose from 16% to 40%. **Costs:** MCH/FP services.	
IPPS Peru, Reference year: 1998	(Only abstract reviewed.) The study is a CBA of the IPSS (Instituto Peruano de Seguridad Social). As opposed to most other CBAs, this one does not show a high cost benefit ratio.	**Benefits:** Cost reductions in maternity, pediatric services and maternity and lactational subsidies. Not clear, but cost benefit ratio seems to be 1.6 to 1, whereas bank deposit would have yielded 1.7 to 1. Costs: FP services.	
Author/Title Day JH, Private Sector Family Planning in Jamshedpur Tata clinics[223], **Reference year: 1956-1987**	Looking at big steel plant, costs of FP program in company's clinics were compared to savings in hospitalization of mothers and children and schooling (also provided by company).	**Benefits:** Savings in services for maternity hospitalization to employees, spouses, daughters; services to dependent children; education of children. **Cost benefit ratio:** One rupee spent on FP saved 5.33 rupees. **Costs:** FP services	
Author/Title Levey, A benefit-cost analysis of family planning services in Iowa, **Report date:** 1988[224]	This is a comparison of tax-financed FP sevices in Iowa to tax-financed transfer programs (Medicaid, AFDC, food stamps).	**Benefits:** Reductions in tax-financed income transfer programs (Medicaid, AFDC and food stamps) - aid to families with dependent children. **CB ratios** vary by age group: 14-19 37:1; 35-44 2:1. **Costs:** FP services.	
Author/Title: Nortman, A cost-benefit analysis if Mexico's IMSS program[225], **Reference year**: 1972-1984	The study is a CBA of the IPSS (Instituto mexicano de seguridad social). One of the best CBA studies of FP due to careful analysis, good quality data.	**Benefits:** Savings in services for maternity hospitalization to employees, spouses, daughters; health services to dependent children. **Cost benefit ratio:** One peso spent on FP saved 9 pesos over period 1972-1984. **Costs:** FP services	
Author/Title: Chao, A cost-benefit analysis of Thailand's family planning program, **Reference** year: 1972:2010[6]	This CBA study looks at FP program costs versus savings in public expenditure in social services.	**Benefits:** Savings in social services provided by Government. **CB Ratio:** One US$ spent on FP saved US$ 7 (1972-1980) and saved US$ 16 over whole period (1972-2010). **Costs:** public FP services	Discount rate of 13.5% was used to get present values.
Author/Title: Alan Guttmacher Institute (AGI) - public-sector savings from FP services[227]	Studies of publicly financied programs (contraceptive services, public medical care, welfare and nutritional supplements) showing the costs and benefits of contraceptive services.	**Benefits:** Savings in social services provided by government. **Cost benefit ratio:** One US$ spent on FP saved US$ 4.40 (1990 study) and saved US$ 3 (1996 study). **Costs:** public FP services	

SEXUALLY TRANSMITTED INFECTIONS

STUDIES DISCUSSING (POTENTIAL) BENEFITS ONLY		Benefits	
Author/Title: WHO World Health Report 2000[228] **Country/Region**: World. Also breakdowns by WHO region and country **Reference year**: 1999	Objective of study was to better understand the full costs and consequences of adolescent childbearing. Seven coordinated studies on specific aspects were carried out.	1990 18.5 million DALYs (GBD) 1999 19.7 million DALYs (this report)	Uses GBD methodology with updated data.

Article/Document	Concise Description of Study	Reported Benefits or Costs	Methodological Note
Author/Title: Murray and Lopez[229]: Global Burden of Disease, Chapter 2: Sex and reproduction **Country/Region**: World; developing nondeveloping region breakdown **Reference Year**: 1990	This volume of the GBD study gives details on sex and reproduction. Chapter 2 estimates the share of total deaths and DALYs from STIs (gonorrhea, chlamydia and syphilis).	For 1990, developing countries: **Gonorrhea:** deaths 9,000 (100% female); 4.8 million DALYs (58% female) (95% YLDs) **Chlamydia:** deaths 16,000 (100% female); 6.5 million DALYs (87% female) (93% YLDs) **Syphilis:** deaths 204,000 (49% female); 6.6 million DALYs (49% female) (11% YLDs) **Total STIs:** 229,000 deaths (55% female); 17.9 million DALYs (66% female) (63% YLDs). Seth Berkley (Ch 13) attributes an additional 12.5 million DALYs attributes to unsafe sex sequela in children (neonatal pnemonia, low birth weight, ectopic pregnancy)	Several errors are noted in tables. The main GBD volume is to be preferred when quoting numbers.

STUDIES DISCUSSING COSTS ONLY		**Costs**	
Author/Title: Potts, Commodity costs in Sub-Saharan Africa[230] (2001) **Reference year**: 2020	This study examines costs of various components of reproductive health, using ZNFPC and MEXFAM.	Costs in Zimbabwe and Mexico compared for specific RH services - detailed cost results are included on RTI diagnosis and treatment, contraceptives, gynecologic services, IUD check, Pap smear.	No methodological details on this estimate in article.
Author/Title: World Bank, Merrick T - Cost of essential health package spreadsheet.[231] **Country/Region**: Hypothetical population of 10 million; health and demographic characteristics based on Zambia and Bangladesh. **Reference Year**: 2003	This study exists as a spreadsheet only. The "essential health package" interventions are included, with facility-specific interventions given by four levels of service: community-outreach, dispensary, clinic and hospital. Costs are broken down into labor, drugs and supplies, overhead and capital.	**Total package cost**: $1.2 million (or $0.12 per capita) **Per user costs**: Recognize/refer $0.17; treatment $4.11 labor, treatment of asymptomatic cases $5.44	For 10 million population (Zambia-Bangladesh) '- combined Zambia-Bangladesh hypothetical data, Syphillis = 10%, STIs other = 10%'; pregnant women = 440,000; syphillis references (3,750), gonorrhea treatment (129,000), syphillis treatment (125,500), lab tests (37,500) - Accompanying data/methods text not yet available
UNFPA Costing Initiative:[232] Chlamydia	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 to present), presented on the Web in a highly searchable way.	**Cost per screening:** $0.22 (clinical detection), $6.68 (antigen detection) or $15,87 (culture) **Cost per treatment**: $0.22 to $2.34, average cost $1.17.	- Variables affecting costs: most of assumed costs are for drugs/supplies, hence type of screening is important; also important antibiotic price differences. - Only two "hypothetical" developing country studies available. - One US study on cost-effectiveness: in terms of cost per pelvic inflamatory disease averted, the screening strategy all women under 30 was most effective (as opposed to universal screening, or screening mucopurulent + under 30).
Author/Title: UNFPA Costing Initiative[233]: Gonorrhea **Country/Region**: 2 hypothetical developing countries **Reference Years**: 1990 and 1996	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 to present), presented on the Web in a highly searchable way.	For entire developing world: 1980, $2.6 billion 2000, $7.1 billion (STD, fertility decline) 2000, $9.7 billion (Rapid fertility decline)	- Variables affecting costs: most of assumed costs are for drugs/supplies, hence type of screening is important; also important antibiotic price differences. - Only two "hypothetical" developing country studies available. - No cost-effectiveness study available.

STUDIES DISCUSSING COSTS AND BENEFITS		**Costs/Benefits**	
Author/Title: Bobadilla - Essential package of World Bank, World Development Report 1993[234] (in WHO 1994 GBD report), **Country/Region**: Low-and-middle income countries, **Reference Year**: circa 1990	This is one of eight studies in the WHO (Murray-Lopez) 1994 report on GBD. Th Bobadilla chapter presents the rationale forgoing from the GBD to the "essential package" described in *World Development Report 1993*.	Condom subsidy and Information Education and Counseling: $1-3/DALY for STI prevention (for low-income countries, where the package would cost $12 per capita, $0.20 of which goes to STIs).	- Summarizes the genesis of the essential health package of World Development Report 1993 which combines the GBD output of DALYs together with the DCP work on cost-effectiveness of interventions. - Figure 1 (p. 172) compares DALYs gained by specific interventions to costs per intervention. Diagonal lines are contours of equal cost-effectiveness (e.g., $100/DALY). - The package includes interventions based on cost-effectiveness and also impact (% of all DALYs).
Author/Title: Jenniskens et al. Syphilis control in Nairobi (1995) **Country/Region**:[235] Nairobi, Kenya **Reference Year**: 1992-1993	The study reports on a demonstration project to decentralize syphilis screening to the primary care level.	**Cost per treated case:** $26.00 **Cost per case of congenital syphilis averted:** $48.00 (implied cost benefit ratio is 1.8 to 1)	- Costs in US$ (1993) - Project: universal ANC screening, 6.5% prevalence, 87% of seroactive women treated, 50% of partners treated. - Costs included: testing, treatment of pregnant women and partners, quality control, project supervision, clinic staff salaries, and annual refresher course. - Variables affecting costs: number of visits per year for resupply; number of cycles per year (150 is fairly standard, but less if client pays); condom cost; number of condoms received (12-20).

Article/Document	Concise Description of Study	Reported Benefits or Costs	Methodological Note
HIV			
STUDIES DISCUSSING (POTENTIAL) BENEFITS ONLY		**Benefits**	
Author/Title:WHO World Health[236] Report 2000 **Country/Region**: World, also breakdowns by WHO region and country, **Reference year**: 1999	Objective of study was to better understand the full costs and consequences of adolescent childbearing. Seven coordinated studies on specific aspects were carried out.	1990 11.2 million DALYs (GBD) 1999 89.8 million DALYs (this report)	Uses GBD methodology with updated data.
Author/Title: Bonnel, Economic Analysis of HIV[237] **Country/Region**: Sub-Saharan Africa	This paper discusses and quantifies the economic rationale for preventing the further spread of HIV in SubSaharan Africa as well as care and support programs.	1. **physical investment:** adversely affects government budget; household savings also affected; overall, the domestic saving rate is negatively affected. This leads to lower investment and reduced long-term economic growth. 2. **human capital:** HIV destroys human capital and reduces incentives to invest in training and schooling (reduces the rate of return on investment in human capital). 3. **social capital:** HIV erodes social capital; a generation of orphans. Empirical results: Figure 2 (p. 6) shows a downward sloping line: e.g., going from 0% to 20% prevalence implies a loss of 1.2 percentage points of GDP per capita growth.	Uses cross-sectional regression (unit = country) to estimate Gross Domestic Product per capita growth as a function of HIV prevalence.
Author/Title: Murray and Lopez: Global Burden of Disease[238], Chaper 2: Sex and reproduction, **Country/Region**: World; developing nondeveloping region breakdown **Reference Year**: 1990	This volume of the GBD study gives details on sex and reproduction - one chapter for each of five main causes of maternal mortality (hemorrhage, sepsis, hypertension, obstructed labor, unsafe abortion).	**Developing country estimates (1990)**: Deaths: 136,000 males, 131,000 females, 267,000 total DALYs: 5.0 million males, 4.8 million females, 9.8 million total YLDs: 1.1 million males, 0.9 million females, 2.0 million total YLLs: 3.9 million males, 4.0 million females, 7.9 m. total	Several errors are noted in tables. The main GBD volume is to be preferred when quoting numbers.
STUDIES DISCUSSING COSTS ONLY		**Costs**	
Author/Title: World Bank, Devarajan S, et al. Goals for development[239], **Country/Region**: Developing world **Reference Year**: 2015	The paper provides rough estimates of additional financing needed "if countries would work vigorously toward meeting the Millennium Development Goals" p.1.	Estimated additional cost to achieve MDGs for health: an additional $20-25 billion; for HIV in SSA: an additional $2.6 - $4.2 b. / year	Seems like back-of-the-envelope calculations.
Author/Title: World Bank, Merrick T - Cost of essential health package spreadsheet[240] **Country/Region**: Hypothetical population of 10 million; health and demographic characteristics based on Zambia and Bangladesh. **Reference Year**: 2003 (forthcoming)	This study exists as a spreadsheet only. The Essential health package interventions are included, with facility-specific interventions given by four levels of service: community outreach, dispensary, clinic and hospital. Costs are broken down into labor, drugs and supplies, overhead and capital.	**Total package cost**: $6.4 million (or $0.64 per capita) **Per user costs**: BCC/condom $0.94 Diagnostics/VCT $13.79	- Combined Zambia-Bangladesh hypothetical data, HIV prevalence = 20% women aged 15-49 = 2,500,000; - BCC on safe sex; condom distribution (2,260,000); diagnostic procedures and VCT (300,000) - Accompanying data/methods text not yet available
STUDIES DISCUSSING COSTS AND BENEFITS		**Costs and Benefits**	
Author/Title: Bobadilla - Essential package of World Bank, 1993 World Development Report[241] (in WHO 1994 Global Burden of Disease report) **Country/Region**: low and middle income countries, **Reference year**: circa 1990	This is one of eight studies in the WHO (Murray-Lopez) 1994 report on GBD. Th Bobadilla chapter presents the rationale forgoing from the GBD to the "essential package" described in *World Development Report 1993*.	Condom subsidy and IEC: $3-5/DALY for HIV prevention (for low-income countries, where the package would cost $12 per capita, $1.70 of which goes to STIs).	- Summarizes the genesis of the essential health package of World Development Report 1993 which combines the GBD output of DALYs together with the DCP work on cost-effectiveness of interventions. - Figure 1 (p. 172) compares DALYs gained by specific interventions to costs per intervention. Diagonal lines are contours of equal cost-effectiveness (e.g., $100/DALY). - The package includes interventions based on cost-effectiveness and also impact (% of all DALYs).

Article/Document	Concise Description of Study	Reported Benefits or Costs	Methodological Note
Author/Title: WHO, Sachs J Macroeconomics and Health[242]	This major study extends the World Bank's World Development Report 1993 approach, advocating a compact health agenda similar to the essential package, but with more emphasis on HIV (including expensive treatment), malaria and nutrition. The macroeconomic effects of poor health are described in detail.	Agenda includes 8 health conditions, including HIV and maternal/perinatal conditions. Economic loss; less investment in human capital; and negative effects on returns to business. **Benefits:** Based on averting 330 million DALYs, total savings are $360 billion by 2015-20. "Scaling up" **costs** (extra financing needed to achieve above DALY reduction) estimated at $57 billion (2007) and $94 billion (2015); in per capita terms these mean an extra $13 (2007) and $20 (2015) per capita in developing countries. 54% (2007) and 49% (2015) of additional resources are **to be spent on HIV**; 43% and 36% of HIV spending to go to HIV prevention.	- Estimates anticipate treatment for HIV of 5 million by 2006. - For benefit estimation, assumes that 1 DALY = 1 year of per capita income - A large chunk of the potential benefit is presented in absolute terms: a reduction in GDP, without recognizing that the effect on GDP per capita might be far less dramatic. - Study based on 83 developing countries (p. 173)
Author/Title: Futures Group International[243]: GOALS model	GOALS estimates the effect of resource allocation decisions on achieving certain goals in HIV prevention and treatment.	- **Costs** are program costs for a set of specific HIV interventions. [A wide variety of interventions can be costed in three areas: care and treatment, prevention and other (e.g., orphan support)] - **Benefits** are number of HIV infections averted, future expenditures averted and years of life gained.	- The model contains default data for many of the detailed inputs required to model the 14 or so specific interventions.
Author/Title: Futures Group International[244] - Resource Needs Model	This model estimates resource needs for prevention, care and mitigation of HIV. It is similar to the GOALS model, but does not model impacts (such as innfections averted), but rather program outputs (such as percent of women at ANC clinics tested for HIV).	- **Costs** are program costs for a set of specific HIV interventions. [A wide variety of interventions can be costed in three areas: care and treatment, prevention and other (e.g., orphan support)] - **Benefits** are process indicators such as % pregnant women tested, % of casual sex covered with condoms, % workforce with access to peer education, % drug users "receiving harm reduction intervention", etc.	A wide range of intervention-specific cost default values are included in the model.
Author/Title: Futures Group International - Prevention of Mother-to-Child Tranmission Model[245]	This model estimates resource needs for prevention of HIV transmission from mothers to children.	**Costs:** detailed program costs **Benefits:** Infections averted, deaths averted (children and adults), treatment cost savings (ZDV, Neviraprine).	- Variables affecting costs: number of visits per year for resupply; number of cycles per year (150 is fairly standard, but less if client pays); condom cost; number of condoms received (12-20).
Title/Author: UNAIDS -- financial resources needed,[246] **Country/Region**: low and middle income countries, **Reference Year**: 2001-2007	This is the official estimate of resources needed to achieve the overall goals laid out in the Declaration of Commitment on HIV/AIDS (United Nations, June 2001)	**Costs:** 2001: $1.4 billion (prevention), $1.7 billion (treatment, care), $3.2 billion (total); 2007: $6.6 billion (prevention), $7.5 billion (treatment, care), $15 billion (total). **Benefits:** increased coverage of various HIV needs (see p. 8 for details), e.g., Prevention of mother to child transmission coverage goes up from 5% in 2001 to 70% in 2007.	Besides prevention, care, treatment, other costs include administration and policy, and orphan care.

MATERNAL HEALTH

STUDIES DISCUSSING (POTENTIAL) BENEFITS ONLY — **Benefits**

Article/Document	Concise Description of Study	Reported Benefits or Costs	Methodological Note
Author/Title: WHO World Health Report 2000[247] **Country/Region**: World. Also breakdowns by WHO region and country, **Reference year**: 1999	Objective of study was to better understand the full costs and consequences of adolescent childbearing. Seven coordinated studies on specific aspects were carried out.	**Author/Title**: Murry and Lopez: Global Burden of Disease, Chaper 2 Sex and reproduction, **Country/Region**: World; developing-non-developing region breakdown, **Reference Year**: 1990	Uses GBD methodology with updated data.
Author/Title: Murry and Lopez: Global Burden of Disease[248], Chapter 2: Sex and reproduction, **Country/Region**: World; developing nondeveloping region breakdown, **Reference Year**: 1990	This volume of the GBD study gives details on sex and reproduction - one chapter for each of five main causes of maternal mortality (hemorrhage, sepsis, hypertension, obstructed labor, unsafe abortion).	**Developing country estimates**: Hemorrhage: 114,000 deaths (95 per 100,000 births); 3.5 million DALYs (30 per 1000 births) Sepsis 68,000 deaths (57); 5.3 million DALYs (45) Hypertension 57,000 deaths (48); 1.7 million DALYs (14) Obstructed labor 34,000 deaths (28); 6.1 million DALYs (52) Unsafe abortion 61,000 deaths (51); 5.1 million DALYs (43) Other 121,000 deaths (101)	- GBD maternal deaths total 454,000 in 1990 (WHO 1990 estimate of 585,000). One reason for discrepancy is GBD insistence on single-cause attribution. - Even so, the other maternal category is not well explained in GBD. It contains more than other direct causes (ectopic, molar pregnancies, anasthesia, cerebrovascular, embolisms) which are 8% of maternal deaths (p.147). It seems that indirect causes (anemia, etc.) are included, but still a discrepancy of 131,000 deaths remains.

STUDIES DISCUSSING COSTS ONLY — **Costs**

Article/Document	Concise Description of Study	Reported Benefits or Costs	Methodological Note
Author/Title: World Bank, Merrick T - Cost of essential health package spreadsheet.[249] **Country/Region**: Hypothetical population of 10 million; health and demographic characteristics based on Zambia and Bangladesh. **Reference Year**: 2003	This study exists as a spreadsheet only. The essential health package interventions are included, with facility-specific interventions given by four levels of service: community outreach, dispensary, clinic and hospital. Costs are broken down into labor, drugs and supplies, overhead and capital.	**Total package cost**: $12.1 million (or $1.21 per capita); $3.9 million (ANC), $8.1 million (Delivery); $0.08 (post-nat) **Per user costs**: ANC $2.18 Delivery care $20.38 (includes EOC) Postnatal care $1.03	- ANC coverage = 90% skill deliveries = 50%, facility deliveries = 50% - Note: births = 400,000; attended at-home deliveries = 100,000; facility deliveries = 100,000 (thus, 200,000 deliveries are outside the public system) - Accompanying data/methods text not yet available

Article/Document	Concise Description of Study	Reported Benefits or Costs	Methodological Note
Author/Title: UNFPA Costing Initiative:[250] Antenatal Care **Country/Region**: Ghana, Kenya, Malawi, Uganda, Guatelmala, Bangladesh, Turkey **Reference Years**: 1993-1998	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 present), presented on the Web in a highly searchable way.	**Average cost per visit:** $4.40 - Asia (Bangladesh) $1.24, SubSaharan Africa $3.32, Latin American and the Caribbean (Guatemala) $12.92, Middle East and North Africa (Turkey) $20.71; drugs/supplies $1.99; labor $1.18; overhead $1.10. (Shares: drugs 47%, labor 28%, overhead 25%.)	- Variables affecting costs: salaries, overhead inclusion (when included, overhead averages 25% of total cost), type of provider. - Eight studies, Five in Sub Saharan Africa - No cost-effectiveness study available.
Author/Title: UNFPA Costing Initiative:[251]: Delivery Care **Country/Region**: Ghana, Malawi, Uganda, Guatemala, Turkey **Reference Year**: circa 1998	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 present), presented on the Web in a highly searchable way.	For entire developing world: 1980, $2.6 billion 2000, $7.1 billion (STD, fertility decline) 2000, $9.7 billion (Rapid fertility decline)	- Variables affecting costs: salaries, overhead/capital/hospitalization cost inclusion (when included, drug and labor costs together are roughly 40% of total), type of provider (from hospital to traditional birth attendant). - Six studies, four in SubSaharan Africa - No cost-effectiveness study available.
Author/Title: UNFPA Costing Initiative:[252] C- Sections **Country/Region**: Ghana, Guinea, Malawi, Uganda **Reference Year**: circa 1998	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 present), presented on the Web in a highly searchable way.	**Average cost per C-Section:** $68.25; SSA $63.49; drugs/supplies $44.39, labor $14.90. Where other costs not included, drugs/supplies cost = 81% of total and labor = 19%. (Shares: drugs 53%, labor 18%, overhead = 29%).	- Variables affecting costs: salaries, overhead/capital/hospitalization cost inclusion. - Six studies, 5 in SSA. - No cost-effectiveness study available.
Author/Title: UNFPA Costing Initiative:[253] Hemorrhage, **Country/Region**: Ghana, Malawi, Uganda, Guatemala, Turkey, **Reference Year**: 1999	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 present), presented on the Web in a highly searchable way.	**Average cost per treatment:** $58.26 - all studies in SSA; drugs/supplies $34.69, labor $14.88, overhead $16.97. Roughly, drugs/supply costs = 50%, labor = 21% and overhead 29%.	- Variables affecting costs: salaries, overhead/capital/hospitalization cost inclusion. - Four studies, all in SubSaharan Africa. - No cost-effectiveness study available.
Author/Title: UNFPA Costing Initiative:[254] Eclampsia **Country/Region**: Malawi, Uganda, **Reference Year**: 1999	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 present), presented on the Web in a highly searchable way.	**Average cost per treatment:** $76.10 - all studies in SSA; drugs/supplies $17.10, labor $43.73, overhead $39.15. Roughly, drugs/supply costs = 17%, labor = 43% and overhead = 40%.	- Variables affecting costs: MVA versus D & E, time in hospital. - 10 studies, in all regions.
Author/Title: UNFPA Costing Initiative:[255] Postabortion Care Country/Region: Ghana, Kenya, Malawi, Uganda, Nigeria, Tanzania, Ecuador, Mexico, Bangladesh, Egypt **Reference year**: 1986-1998	The UNFPA Costing Initiative is a compilation of empirical costing studies (circa 1990 present), presented on the Web in a highly searchable way.	**Average cost per treatment:** $90.54 for D & E; drugs/supplies $16.54, labor $17.05, overhead $5.33 (43%, 44%, 14% of total respectively). $30.60 for MVA; drugs/supplies $6.76, labor $4.84, overhead $2.95 (47%, 33%, 20% of total respectively).	- Variables affecting costs: salaries, overhead/capital/hospitalization cost inclusion. - Four studies, all in SubSaharan Africa. - No cost-effectiveness study available.

STUDIES DISCUSSING COSTS AND BENEFITS		**Costs/Benefits**	
Author/Title: Walsh Value of Mother's Life,[256] - and WHO - Uganda Safe Mother Baby costing study		**Benefits:** Reduction in maternal mortality due to ANC and three other pre-birth interventions is 26%, while safe delivery and essential obstetric care account for 48%. **Costs:** Mother Baby Package recommends spending $1.40 per capita. This totals to around $49 m. ($3,250 per mother's life saved.)	Tanzania has around 15,000 maternal deaths per year.
Author/Title: Walsh, Disease Control Priorities, Maternal and Perinatal Health[257]		**Benefits:** Maternal death reduction: 495 to as few as 247; perinatal deaths averted: 5,600 to 1,200; Births averted: various estimates. **Costs:** cost per capita: $0.50 to $4.50 cost per death averted: $810 to $3,000 cost per event averted: $140 to $510	Himort hypothetical case: CPR = 0%, Maternal Mortality Rate = 1,000, perinatal death rate = 51.6, population = 1,000,000; 5 scenarios: CPR=20%, CPR=40%, CPR=60% (per capita costs are $0.50, $1.50 and $4.50), CPR=20%+limited obstetrics, and CPR=20% and moderate obstetrics. Cost of family planning programs is not shown, only a few references to studies in Korea, Thailand, etc. "limited" and "moderate" maternal care come from Herz and Measham (1987) with per capita costs of $0.48 and $1.50.

Article/Document	Concise Description of Study	Reported Benefits or Costs	Methodological Note
Author/Title: WHO Sachs J Macroeconomics and Health[258]	This major study extends the World Bank's World Development Report 1993 approach, advocating a compact health agenda similar to the essential package, but with more emphasis on HIV (including expensive treatment), malaria and nutrition. The macroeconomic effects of poor health are described in detail.	Agenda includes 8 health conditions, including HIV and maternal/perinatal conditions. Economic loss; less investment in human capital; and negative effects on returns to business. **Benefits:** Based on averting 330 million DALYs, total savings are $360 b. by 2015-2020. "Scaling up" **costs** (extra financing needed to achieve above DALY reduction) estimated at $57 billion (2007) and $94 billion (2015); in per capita terms these mean an extra $13 (2007) and $20 (2015) per capita in developing countries. 15% (2007) and 11% (2015) of additional resources are to be spent on **maternity-related illnesses**.	- Estimates anticipate treatment for HIV of 5 million by 2006. - For benefit estimation, assumes that 1 DALY = 1 year of per capita income - A large chunk of the potential benefit is presented in absolute terms: a reduction in GDP, without recognizing that the effect on GDP per capita might be far less dramatic. - Study based on 83 developing countries (p. 173)
Author/Title: Bobadilla - Essential package of World Bank, 1993 World Development Report[259] (in WHO 1994 Global Burden of Disease report), **Country/Region**: low and middle income countries, **Reference year**: circa 1990	This is one of eight studies in the WHO (Murray-Lopez) 1994 report on GBD. Th Bobadilla chapter presents the rationale forgoing from the GBD to the essential package described in *World Development Report 1993* .	Prenatal and delivery care: $30-50/DALY (for low-income countries, where the package would cost $12 per capita, $3.80 of which goes to maternal care).	- Summarizes the genesis of the essential health package of World Development Report 1993 which combines the GBD output of DALYs together with the DCP work on cost-effectiveness of interventions. - Figure 1 (p. 172) compares DALYs gained by specific interventions to costs per intervention. Diagonal lines are contours of equal cost-effectiveness (e.g., $100/DALY). - The package includes interventions based on cost-effectiveness and also impact (% of all DALYs).

Appendix Table 3.1.a. List of countries by geographic regions and subregions.[260]

Western Africa	Western Asia (con't)	Southern Europe	Central America
Guinea	Cyprus	Portugal	Nicaragua
Guinea-Bissau	Georgia	San Marino*	Panama
Liberia	Iraq	Serbia & Montenegro	*South America*
Mali	Israel	Slovenia	Argentina
Mauritania	Jordan	Spain	Bolivia
Niger	Kuwait	Former Yugoslav	Brazil
Nigeria	Lebanon	Rep. of Macedonia	Chile
	Occupied Palestinian		
St. Helena	Territory	*Western Europe*	Colombia
Senegal	Oman	Austria	Ecuador
Sierra Leone	Qatar	Belgium	Falkland Islands (Malvinas)*
Togo	Saudi Arabia	France	French Guiana
Eastern Asia	Syrian Arab Republic	Germany	Guyana
China	Turkey	Liechtenstein*	Paraguay
China, Hong Kong			
SAR	United Arab Emirates	Luxembourg	Peru
China, Macao SAR	Yemen	Monaco*	Suriname
DPR Korea	*Eastern Europe*	Netherlands	Uruguay
Japan	Belarus	Switzerland	Venezuela
Mongolia	Bulgaria	*Latin America and*	*Northern America*
Republic of Korea	Czech Republic	*the Caribbean*	Bermuda*
South-central Asia	Hungary	Anguilla*	Canada
Afghanistan	Poland	Antigua and Barbuda*	Saint-Pierre-et-Miquelon*
Bangladesh	Republic of Moldova	Bahamas	United States of America
Bhutan	Romania	Barbados	*Oceania*
India	Russian Federation	British Virgin Islands	Australia
Iran (Islamic Rep. of)	Slovakia	Cayman Islands	New Zealand
Kazakhstan	Ukraine	Cuba	*Melanesia*
Kyrgyzstan	*Northern Europe*	Dominica*	Fiji
Maldives	Channel Islands	Dominican Republic	New Caledonia
Nepal	Denmark	Greneda	Papua New Guinea
Pakistan	Estonia	Guadeloupe	Solomon Islands
Sri Lanka	Faeroe Islands*	Haiti	Vanuatu
Tajikistan	Finland	Jamaica	*Micronesia*
Turkmenistan	Iceland	Martinique	Guam
Uzbekistan	Ireland	Montserrat*	Kiribati*
South-eastern Asia	Isle of Man*	Netherlands Antilles	Marshall Islands*
			Micronesia (Federated States
Brunei Darussalam	Latvia	Puerto Rico	of)
Cambodia	Lithuania	Saint Kitts and Nevis*	Nauru*
Dem. Rep. Timor-			
Leste	Norway	Saint Lucia	Northern Mariana Islands*
Indonesia	Sweden	Saint Vincent and	Palau*
Lao People's Dem.			
Rep.	UK of Great Britain and	the Grenadines	*Polynesia*

Malaysia	Northern Ireland	Trinidad and Tobago	American Samoa*
Myanmar	*Southern Europe*	Turks and Caicos Islands	Cook Islands*
		United States Virgin	
Philippines	Albania	Islands	French Polynesia
Singapore	Andorra	*Central America*	Niue*
Thailand	Bosnia & Herzegovina	Belize	Pitcairn*
Viet Nam	Croatia	Costa Rica	Samoa
Western Asia	Gibraltar*	El Salvador	Tokelau*
Armenia	Holy See*	Guatemala	Tonga
Azerbaijan	Italy	Honduras	Tuvalu*
Bahrain	Malta	Mexico	Wallis and Futuna Islands*

Appendix Table 3.1.b. List of countries according to income level.[261]

High income	Upper middle income	Lower middle income	Low income
Andorra	American Samoa	Albania	Afghanistan
Aruba	Antigua and Barbuda	Algeria	Angola
Australia	Argentina	Belarus	Armenia
Austria	Barbados	Belize	Azerbaijan
Bahamas	Botswana	Bolivia	Bangladesh
Bahrain	Brazil	Bosnia and Herzegovina	Benin
Belgium	Chile	Bulgaria	Bhutan
Bermuda	Costa Rica	Cape Verde	Burkina Faso
Brunei Darussalam	Croatia	China	Burundi
Canada	Czech Republic	Colombia	Cambodia
Cayman Islands	Dominica	Cuba	Cameroon
Channel Islands	Estonia	Djibouti	Central African Republic
Cyprus	Gabon	Dominican Republic	Chad
Denmark	Grenada	Ecuador	Comoros
Faeroe Islands	Hungary	Egypt	Congo
Finland	Isle of Man	El Salvador	Côte d'Ivoire
France	Latvia	Fiji	Democratic People's Republic of Korea
French Polynesia	Lebanon	Guatemala	Democratic Republic of the Congo
Germany	Libyan Arab Jamahiriya	Guyana	Equatorial Guinea
Greece	Lithuania	Honduras	Eritrea
Greenland	Malaysia	Iran (Islamic Republic of)	Ethiopia
Guam	Malta	Iraq	Gambia
Iceland	Mauritius	Jamaica	Georgia
Ireland	Mexico	Jordan	Ghana
Israel	Oman	Kazakhstan	Guinea
Italy	Palau	Kiribati	Guinea-Bissau
Japan	Panama	Maldives	Haiti
Kuwait	Poland	Marshall Islands	India
Liechtenstein	Puerto Rico	Micronesia (Federated States of)	Indonesia
Luxembourg	Saint Kitts and Nevis	Morocco	Kenya
Monaco	Saint Lucia	Namibia	Kyrgyzstan
Netherlands	Saudi Arabia	Occupied Palestinian Territory	Lao People's Democratic Republic
Netherlands Antilles	Seychelles	Paraguay	Lesotho
New Caledonia	Slovakia	Peru	Liberia
New Zealand	Trinidad and Tobago	Philippines	Madagascar
Northern Mariana Islands	Uruguay	Romania	Malawi
Norway	Venezuela (Bolivarian Republic of)	Russian Federation	Mali
Portugal		Saint Vincent and the Grenadines	Mauritania
Qatar		Samoa	Mongolia
Republic of Korea		Serbia and Montenegro	Mozambique
San Marino		South Africa	Myanmar

Singapore		Sri Lanka	Nepal
Slovenia		Suriname	Nicaragua
Spain		Swaziland	Niger
Sweden		Syrian Arab Republic	Nigeria
Switzerland		Thailand	Pakistan
		The former Yugoslav	
United Arab Emirates		Republic of Macedonia	Papua New Guinea
United Kingdom		Tonga	Republic of Moldova
United States of America		Tunisia	Rwanda
United States Virgin Islands		Turkey	Sao Tome and Principe
		Turkmenistan	Senegal
		Vanuatu	Sierra Leone
			Solomon Islands
			Somalia
			Sudan
			Tajikistan
			Timor-Leste
			Togo
			Uganda
			Ukraine
			United Republic of
			Tanzania
			Uzbekistan
			Viet Nam
			Yemen
			Zambia
			Zimbabwe

Table 3.2. Estimated total population and number and percentage distribution of females aged 15–49 by union status, risk for unintended pregnancy and fertility-preference status, according to region and subregion;* and economic classification† of countries, 2003.

| | Population | | Union status | | | Risk and fertilty-preference status | | | | | | | | |
| | Number in (000s): | | Percentage: | | | Number in (000s): | | | | | Percentage: | | | |
Region and subregion	Total population July 1, 2003	Total number of females aged 15–49	Currently married	Formerly married	Never married	Not at risk: not having sex, infertile or want a child soon	At risk for unintended pregnancy	At risk and want to space births	At risk and want to limit births	Total	Not at risk	At risk	At risk and want to space births	At risk and want to limit births
All developing countries	5,090,752	1,321,065	69%	5%	27%	616,257	704,809	234,109	470,700	100%	47%	53%	18%	36%
Developing countries minus China	3,781,858	961,410	67%	6%	27%	495,570	465,840	161,057	304,783	100%	52%	48%	17%	32%
World Bank economic classification:														
Low- income	2,465,401	606,723	72%	6%	23%	327,606	279,117	99,182	179,936	100%	54%	46%	16%	30%
Lower- middle- income	2,108,544	573,930	67%	3%	29%	225,333	348,597	111,593	237,004	100%	39%	61%	19%	41%
Upper- middle	441,369	119,616	60%	7%	33%	54,293	65,323	19,594	45,730	100%	45%	55%	16%	38%
High- income	75,438	20,796	61%	4%	35%	9,025	11,771	3,740	8,030	100%	43%	57%	18%	39%
AFRICA	**852,219**	**203,896**	**65%**	**8%**	**28%**	**123,607**	**80,290**	**42,992**	**37,298**	**100%**	**61%**	**39%**	**21%**	**18%**
Sub-Saharan Africa	702,371	163,782	66%	8%	26%	101,285	62,498	37,598	24,900	100%	62%	38%	23%	15%
Eastern Africa	271,062	62,767	65%	11%	24%	39,008	23,759	13,726	10,034	100%	62%	38%	22%	16%
Middle Africa	100,547	22,669	72%	8%	20%	15,106	7,564	5,630	1,933	100%	67%	33%	25%	9%
Southern Africa	52,515	14,007	43%	8%	49%	5,524	8,483	3,480	5,004	100%	39%	61%	25%	36%
Western Africa	244,679	56,159	71%	5%	24%	37,410	18,749	13,527	5,223	100%	67%	33%	24%	9%
Northern Africa	183,416	48,293	60%	5%	35%	26,559	21,734	6,630	15,104	100%	55%	45%	14%	31%
ASIA	**3,696,119**	**970,473**	**71%**	**4%**	**25%**	**426,284**	**544,189**	**166,480**	**377,708**	**100%**	**44%**	**56%**	**17%**	**39%**
Eastern Asia-China	72,806	20,240	63%	3%	34%	10,116	10,124	3,571	6,553	100%	50%	50%	18%	32%
China	1,308,894	359,655	71%	2%	27%	120,687	238,968	73,052	165,916	100%	34%	66%	20%	46%
South Central Asia	1,559,327	388,888	74%	5%	21%	195,373	193,515	48,873	144,642	100%	50%	50%	13%	37%
South East Asia	550,638	150,113	64%	5%	31%	75,266	74,848	33,392	41,456	100%	50%	50%	22%	28%
Western Asia	204,455	51,576	66%	4%	30%	24,842	26,734	7,593	19,141	100%	48%	52%	15%	37%
LATIN AMERICA AND THE CARIBBEAN	**542,413**	**146,697**	**59%**	**9%**	**33%**	**66,366**	**80,331**	**24,637**	**55,694**	**100%**	**45%**	**55%**	**17%**	**38%**
Caribbean	38,645	10,218	59%	12%	29%	4,699	5,518	1,900	3,618	100%	46%	54%	19%	35%
Central America	142,076	38,254	60%	7%	33%	21,652	16,602	5,236	11,366	100%	57%	43%	14%	30%
South America	361,693	98,225	58%	9%	33%	40,015	58,210	17,501	40,709	100%	41%	59%	18%	41%

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.3. Estimated annual number of pregnancies, by outcome and intention status and the percentage of all pregnancies and births that are unintended, according to region and subregion* and economic classification† of countries, 2003.

	All pregnancies				Intended pregnancies			Unintended pregnancies							Percentage of:	
	Number in (000s):				Number in (000s):			Number in (000s):						Unintended pregnancies per 1,000 women at risk for unintended pregnancy	All preg-nancies that are un-intended	All births that are un-intended
	Pregnancies	Births	Induced abortions	Miscarriages	Intended pregnancies	Intended births	Miscarriages of intended pregnancies	Unintended Pregnancies	Unintended births	Mistimed births	Unwanted births	Induced abortions	Miscarriages of unintended pregnancies			
Region and subregion																
All developing countries	183,007	120,606	34,800	27,601	107,086	89,238	17,848	75,921	31,368	16,058	15,310	34,800	9,754	108	41%	26%
Developing countries minus China	148,671	101,710	24,200	22,762	87,714	73,095	14,619	60,957	28,614	14,581	14,033	24,200	8,143	131	41%	28%
World Bank economic classification:																
Low- income	104,353	73,073	15,151	16,130	66,014	55,012	11,002	38,339	18,061	9,985	8,076	15,151	5,127	137	37%	25%
Lower- middle- income	62,434	37,247	16,125	9,062	34,058	28,382	5,676	28,376	8,865	4,058	4,807	16,125	3,386	81	45%	24%
Upper- middle	14,703	9,322	3,196	2,184	6,106	5,088	1,018	8,597	4,234	1,912	2,323	3,196	1,167	132	58%	45%
High- income	1,517	964	328	226	908	756	151	610	207	103	104	328	74	52	40%	22%
AFRICA	**43,772**	**31,848**	**5,050**	**6,875**	**27,991**	**23,326**	**4,665**	**15,781**	**8,522**	**5,221**	**3,301**	**5,050**	**2,209**	**197**	**36%**	**27%**
Sub-Saharan Africa	38,719	28,189	4,447	6,083	25,207	21,006	4,201	13,512	7,183	4,725	2,458	4,447	1,881	216	35%	25%
Eastern Africa	15,509	11,183	1,900	2,427	9,940	8,283	1,657	5,569	2,899	1,830	1,069	1,900	770	234	36%	26%
Middle Africa	6,383	4,770	600	1,014	4,537	3,781	756	1,846	989	741	248	600	258	244	29%	21%
Southern Africa	1,667	1,206	200	261	811	676	135	856	530	237	293	200	126	101	51%	44%
Western Africa	13,681	9,934	1,600	2,147	8,994	7,495	1,499	4,687	2,439	1,796	643	1,600	648	250	34%	25%
Northern Africa	6,531	4,755	750	1,026	3,708	3,090	618	2,823	1,665	617	1,048	750	408	130	43%	35%
ASIA	**120,554**	**77,132**	**25,450**	**17,971**	**71,813**	**59,844**	**11,969**	**48,741**	**17,288**	**8,242**	**9,046**	**25,450**	**6,003**	**90**	**40%**	**22%**
Eastern Asia-China	1,721	976	500	245	949	791	158	773	186	108	78	500	87	76	45%	19%
China	34,336	18,896	10,600	4,839	19,371	16,143	3,229	14,964	2,754	1,476	1,278	10,600	1,611	63	44%	15%
South Central Asia	57,068	39,856	8,400	8,811	35,254	29,378	5,876	21,814	10,478	4,995	5,484	8,400	2,936	113	38%	26%
South East Asia	19,545	11,933	4,750	2,862	11,762	9,801	1,960	7,783	2,132	1,068	1,064	4,750	901	104	40%	18%
Western Asia	7,884	5,470	1,200	1,214	4,477	3,731	746	3,407	1,739	596	1,143	1,200	468	127	43%	32%
LATIN AMERICA AND THE CARIBBEAN	**18,681**	**11,626**	**4,300**	**2,755**	**7,282**	**6,068**	**1,214**	**11,399**	**5,558**	**2,594**	**2,964**	**4,300**	**1,542**	**142**	**61%**	**48%**
Caribbean	1,343	753	400	191	546	455	91	797	298	172	125	400	100	144	59%	40%
Central America	5,068	3,399	900	770	2,122	1,768	354	2,947	1,630	778	852	900	416	177	58%	48%
South America	12,269	7,474	3,000	1,795	4,614	3,845	769	7,655	3,630	1,644	1,986	3,000	1,026	132	62%	49%

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.4. Estimated annual numbers of maternal deaths, percentage distribution and mortality rates per 100,000 events, by pregnancy intention status and non-abortion or abortion-related cause, and deaths to infants under age 1, by pregnancy intention status and rate per 1,000 births, according to region and subregion* and economic classification† of countries, 2003.

	Maternal mortality												Infant mortality			
	Number of maternal deaths from:					Percentage of maternal deaths from:					Maternal deaths from non-abortion causes per 100,000 births	Abortion-related deaths per 100,000 abortions	Number of infant deaths from:			Infant deaths per 1,000 births
	All maternal deaths	Intended pregnancies	Unintended pregnancies	Non-abortion causes to women with unintended pregnancies	Abortion-related deaths to women with unintended pregnancies	All maternal deaths	Intended pregnancies	Unintended pregnancies	Non-abortion causes	Abortion-related deaths			Infant deaths	Intended pregnancies	Unintended pregnancies	
Region and subregion																
All developing countries	530,212	346,198	184,009	114,735	69,274	100%	65%	35%	87%	13%	382	199	7,362,557	5,522,172	1,840,385	61
Developing countries minus China	519,075	336,730	182,341	113,120	69,221	100%	65%	35%	87%	13%	442	286	6,673,030	4,932,893	1,740,138	66
World Bank economic classification:																
Low- income	476,950	315,978	160,972	100,700	60,272	100%	66%	34%	87%	13%	570	398	5,711,095	4,323,562	1,387,533	78
Lower- middle- income	39,815	24,568	15,247	9,164	6,083	100%	62%	38%	85%	15%	91	38	1,383,009	1,053,843	329,166	37
Upper- middle	13,220	5,490	7,731	4,833	2,897	100%	42%	58%	78%	22%	111	91	262,464	140,338	122,126	28
High- income	227	163	59	39	20	100%	72%	26%	89%	9%	21	6	5,989	4,429	1,561	6
AFRICA	**253,790**	**169,107**	**84,683**	**54,274**	**30,409**	**100%**	**67%**	**33%**	**88%**	**12%**	**701**	**602**	**2,823,197**	**2,117,311**	**705,886**	**89**
Sub-Saharan Africa	249,250	166,919	82,332	52,715	29,616	100%	67%	33%	88%	12%	779	666	2,676,544	2,023,881	652,663	95
Eastern Africa	109,416	69,897	39,519	24,517	15,002	100%	64%	36%	86%	14%	844	790	1,080,553	805,131	275,422	97
Middle Africa	46,496	33,347	13,149	8,147	5,002	100%	72%	28%	89%	11%	870	834	553,598	442,084	111,514	116
Southern Africa	3,083	1,523	1,560	1,160	400	100%	49%	51%	87%	13%	222	200	62,593	35,513	27,080	52
Western Africa	83,924	57,850	26,073	17,069	9,004	100%	69%	31%	89%	11%	754	563	895,355	681,845	213,511	90
Northern Africa	10,872	6,489	4,383	3,382	1,001	100%	60%	40%	91%	9%	208	133	231,098	152,739	78,359	49
ASIA	**254,002**	**167,025**	**86,972**	**51,884**	**35,088**	**100%**	**66%**	**34%**	**86%**	**14%**	**285**	**138**	**4,156,563**	**3,202,918**	**953,645**	**54**
Eastern Asia-China	426	319	107	105	3	100%	75%	25%	99%	1%	43	1	22,552	16,347	6,205	23
China	11,137	9,469	1,668	1,615	53	100%	85%	15%	100%	0%	59	1	689,527	589,279	100,248	36
South Central Asia	207,908	134,205	73,703	44,691	29,012	100%	65%	35%	86%	14%	449	345	2,723,380	2,027,307	696,073	68
South East Asia	25,551	16,890	8,661	3,604	5,057	100%	66%	34%	80%	20%	172	106	492,718	403,714	89,004	41
Western Asia	9,552	6,381	3,165	2,161	1,004	100%	67%	33%	89%	11%	156	84	241,024	171,888	69,136	44
LATIN AMERICA AND THE CARIBBEAN	**21,850**	**9,829**	**12,021**	**8,285**	**3,736**	**100%**	**45%**	**55%**	**83%**	**17%**	**156**	**87**	**370,158**	**196,325**	**173,834**	**32**
Caribbean	2,098	1,037	1,061	768	293	100%	49%	51%	86%	14%	240	73	26,461	16,054	10,407	35
Central America	3,906	1,926	1,980	1,538	442	100%	49%	51%	89%	11%	102	49	101,176	53,311	47,865	30
South America	15,847	6,866	8,980	5,979	3,001	100%	43%	57%	81%	19%	172	100	242,521	126,959	115,562	32

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea,
the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.5. Estimated number of disability-adjusted life years (DALYs), years of life lost (YLLs) and years lost to disability (YLDs) from maternal causes, by nonabortion and abortion-related pregnancies, and from perinatal causes, according to region and subregion* and economic classification† of countries, 2003.

Region and subregion	Number in (000s):												DALYs from non-abortion causes per 1,000 births	Abortion-related DALYs per 1,000 abortions	Perinatal DALYs per 1,000 births
	Total maternal DALYs	Maternal DALYs from non-abortion causes	Abortion-related DALYs	Total maternal YLLs	Maternal YLLs from non-abortion causes	Abortion-related YLLs	Total maternal YLDs	Maternal YLDs from non-abortion causes	Abortion-related YLDs	Perinatal DALYs	Perinatal YLLs	Perinatal YLDs			
All developing countries	30,229	25,261	4,969	14,887	13,114	1,773	15,342	12,146	3,196	96,031	81,725	14,306	209	143	796
Developing countries minus China	28,071	23,211	4,859	14,410	12,686	1,724	13,661	10,525	3,136	84,908	72,754	12,154	228	201	835
World Bank economic classification:															
Low- income	23,119	18,899	4,220	12,358	10,881	1,477	10,761	8,018	2,743	68,101	59,224	8,877	259	279	932
Lower- middle- income	5,841	5,205	636	2,115	1,866	250	3,725	3,339	386	22,451	18,228	4,223	140	39	603
Upper- middle	1,170	1,063	107	393	349	45	777	715	62	5,024	3,915	1,109	114	33	539
High- income	99	93	6	21	19	2	78	74	4	455	358	97	97	18	472
AFRICA	**12,612**	**10,403**	**2,210**	**7,731**	**6,829**	**902**	**4,881**	**3,574**	**1,308**	**25,807**	**22,540**	**3,268**	**327**	**438**	**810**
Sub-Saharan Africa	11,529	9,491	2,038	7,157	6,319	838	4,372	3,172	1,200	22,725	19,896	2,829	337	458	806
Eastern Africa	4,852	3,975	876	3,086	2,706	380	1,766	1,270	496	8,433	7,343	1,091	355	461	754
Middle Africa	1,980	1,626	353	1,243	1,096	147	736	530	206	3,718	3,256	462	341	589	780
Southern Africa	563	461	103	362	317	45	201	144	57	932	811	121	382	513	773
Western Africa	3,808	3,153	655	2,296	2,050	246	1,513	1,103	409	8,655	7,638	1,016	317	409	871
Northern Africa	1,409	1,187	223	744	660	84	665	526	139	4,069	3,492	578	250	297	856
ASIA	**15,926**	**13,341**	**2,585**	**6,505**	**5,720**	**785**	**9,421**	**7,621**	**1,800**	**63,689**	**54,072**	**9,617**	**174**	**102**	**828**
Eastern Asia-China	173	150	23	61	54	7	112	96	16	788	665	123	153	46	808
China	2,159	2,049	109	477	428	49	1,681	1,621	60	11,122	8,971	2,152	108	10	589
South Central Asia	10,494	8,556	1,938	4,766	4,195	571	5,728	4,361	1,367	40,992	35,687	5,306	215	231	1028
South East Asia	2,225	1,827	398	868	746	121	1,358	1,081	276	7,908	6,407	1,501	153	84	663
Western Asia	904	786	118	339	302	37	565	483	82	3,024	2,460	564	144	99	553
LATIN AMERICA AND THE CARIBBEAN	**1,662**	**1,490**	**172**	**645**	**560**	**85**	**1,017**	**930**	**87**	**6,388**	**4,996**	**1,393**	**128**	**40**	**550**
Caribbean	107	94	12	43	37	6	63	57	6	337	261	75	125	30	447
Central America	490	439	51	190	165	25	300	274	26	1,893	1,481	412	129	56	557
South America	1,065	956	109	411	357	54	654	599	55	4,159	3,254	905	128	36	556

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.6. Estimated numbers of women at risk of unintended pregnancy, by contraceptive method use, according to region and subregion[*] and economic classification[†] of countries, 2003.

	Women at risk of unintended pregnancy (000s)	Women using modern contraceptives							Women with unmet need				
		Numbers in (000s)							Numbers in (000s)				
		All women using modern contraceptives	Female sterilization	Vasectomy	IUD	Injection/ Implants	Oral contraceptives	Condoms and other supply methods	All women with unmet need	Periodic abstinence	Withdrawal	Other non-supply methods	No method
Region and subregion													
All developing countries	704,809	503,868	203,705	32,473	137,239	31,784	61,749	36,917	200,941	26,837	27,882	8,945	137,278
Developing countries minus China	465,840	281,930	113,775	6,820	49,705	31,221	52,477	27,933	183,910	26,061	27,256	7,851	122,741
World Bank economic classification:													
Low- income	279,117	159,609	76,630	4,440	17,642	19,475	26,169	15,254	119,508	16,386	9,382	5,089	88,651
Lower- middle- income	348,597	287,474	101,914	25,947	111,563	8,874	22,432	16,744	61,123	6,936	14,592	3,132	36,463
Upper- middle	65,323	46,711	21,374	1,048	4,027	3,388	12,614	4,260	18,612	3,404	3,344	627	11,236
High- income	11,771	10,074	3,787	1,038	4,007	48	534	659	1,697	111	563	96	927
AFRICA	**80,290**	**35,648**	**2,997**	**124**	**8,380**	**8,979**	**11,068**	**4,098**	**44,642**	**6,750**	**1,822**	**2,441**	**33,629**
Sub-Saharan Africa	62,498	23,414	2,498	124	2,235	7,987	7,036	3,533	39,084	6,328	1,513	2,131	29,111
Eastern Africa	23,759	8,094	937	7	304	2,965	2,797	1,083	15,666	1,456	629	733	12,848
Middle Africa	7,564	1,415	158	1	46	110	428	672	6,149	2,087	197	516	3,349
Southern Africa	8,483	6,634	1,119	114	164	3,701	1,267	269	1,850	70	54	42	1,684
Western Africa	18,749	4,705	160	2	603	1,039	1,502	1,399	14,044	2,605	548	782	10,110
Northern Africa	21,734	14,802	624	0	7,263	1,166	5,074	676	6,932	532	394	369	5,638
ASIA	**544,189**	**411,369**	**173,404**	**31,165**	**124,033**	**18,792**	**36,277**	**27,698**	**132,819**	**14,920**	**23,099**	**5,641**	**89,160**
Eastern Asia-China	10,124	7,979	3,082	835	3,045	53	397	566	2,145	115	98	75	1,857
China	238,968	221,938	89,930	25,654	87,534	563	9,273	8,984	17,031	776	625	1,093	14,537
South Central Asia	193,515	120,628	73,490	4,295	14,734	3,161	13,135	11,813	72,887	8,932	9,667	1,790	52,498
South East Asia	74,848	49,511	5,700	375	13,025	14,896	12,190	3,325	25,337	4,398	4,851	1,385	14,703
Western Asia	26,734	11,314	1,203	6	5,694	119	1,283	3,010	15,420	700	7,857	1,298	5,564
LATIN AMERICA AND THE CARIBBEAN	**80,331**	**56,851**	**27,303**	**1,184**	**4,826**	**4,012**	**14,404**	**5,121**	**23,480**	**5,167**	**2,961**	**862**	**14,490**
Caribbean	5,518	3,919	2,417	17	167	316	807	194	1,600	143	203	37	1,218
Central America	16,602	10,664	5,279	152	1,352	1,104	2,193	584	5,938	870	297	68	4,703
South America	58,210	42,269	19,607	1,015	3,307	2,592	11,404	4,343	15,941	4,154	2,461	758	8,569

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea,
the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.6 (con't). Estimated numbers of women at risk of unintended pregnancy who are trying to space future births, by contraceptive method use, according to region and subregion* and economic classification of countries†, 2003.

	Women at risk of unintended pregnancy who are spacing (000s)	Women using modern contraceptives (Number in 000s)					Women with unmet need (Number in 000s)				
		All women using modern contraceptives	IUD	Injection/ Implants	Oral contraceptives	Condoms and other supply methods	All women with unmet need	Periodic abstinence	Withdrawal	Other non-supply methods	No method
Region and Subregion											
All Developing Countries	234,109	132,193	60,742	14,906	33,330	23,215	101,916	12,175	10,223	3,856	75,661
Developing Countries minus China	161,057	69,960	16,917	14,386	24,124	14,534	91,097	11,637	9,618	3,087	66,755
World Bank economic classification											
Low-income	99,182	34,697	5,803	9,033	11,814	8,047	64,485	7,848	3,850	2,148	50,639
Lower-middle-income	111,593	82,985	51,572	4,106	14,833	12,473	28,608	2,880	5,061	1,467	19,200
Upper-middle	19,594	11,590	1,462	1,736	6,221	2,172	8,004	1,396	1,143	193	5,272
High-income	3,740	2,921	1,904	31	462	524	819	51	169	49	550
AFRICA	**42,992**	**14,594**	**2,160**	**3,871**	**5,404**	**3,160**	**28,398**	**4,849**	**1,161**	**1,560**	**20,829**
Sub-Saharan Africa	37,598	11,315	683	3,745	4,074	2,813	26,282	4,683	1,041	1,452	19,107
Eastern Africa	13,726	3,846	106	1,285	1,637	818	9,879	865	390	417	8,206
Middle Africa	5,630	952	12	65	297	577	4,678	1,739	148	386	2,405
Southern Africa	3,480	2,663	56	1,806	640	161	817	47	28	29	713
Western Africa	13,527	3,134	236	567	1,139	1,193	10,393	1,987	445	601	7,360
Northern Africa	6,630	3,999	1,750	148	1,690	411	2,631	210	149	128	2,144
ASIA	**166,480**	**103,695**	**56,548**	**9,089**	**20,699**	**17,359**	**62,785**	**5,200**	**7,760**	**2,039**	**47,786**
Eastern Asia-China	3,571	2,354	1,506	20	367	460	1,217	54	57	41	1,065
China	73,052	62,233	43,825	520	9,206	8,682	10,819	538	605	769	8,906
South-central Asia	48,873	14,948	4,748	720	4,627	4,852	33,925	2,746	3,048	427	27,705
South-eastern Asia	33,392	21,228	5,196	7,801	6,063	2,168	12,164	1,695	2,156	526	7,787
Western Asia	7,593	2,933	1,273	27	436	1,197	4,660	167	1,894	277	2,322
LATIN AMERICA AND THE CARIBBEAN	**24,637**	**13,904**	**2,034**	**1,947**	**7,227**	**2,696**	**10,733**	**2,126**	**1,303**	**257**	**7,047**
Caribbean	1,900	983	108	123	586	165	917	78	134	13	692
Central America	5,236	2,395	611	529	1,009	245	2,841	353	135	17	2,336
South America	17,501	10,527	1,314	1,295	5,631	2,287	6,974	1,695	1,034	227	4,018

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.6 (con't). Estimated numbers of women at risk of unintended pregnancy who are trying to limit future births, by contraceptive method use, according to region and subregion* and economic classification of countries[†], 2003.

	Women at risk of unintended pregnancy who are limiting (000s)	Women using modern contraceptives							Women with unmet need				
		Number in (000s)							Numbers in (000s)				
Region and subregion		All women using modern contra-ceptives	Female sterilization	Vasectomy	IUD	Injection/ Implants	Oral contra-ceptives	Condoms and other supply methods	All women with unmet need	Periodic abstinence	Withdrawal	Other non-supply methods	No method
Region and subregion													
All developing countries	470,700	371,675	203,705	32,473	76,498	16,878	28,419	13,702	99,025	14,662	17,658	5,088	61,617
Developing countries minus China	304,783	211,970	113,775	6,820	32,788	16,835	28,353	13,399	92,813	14,424	17,638	4,764	55,987
World Bank economic classification:													
Low- income	179,936	124,912	76,630	4,440	11,839	10,442	14,354	7,208	55,024	8,538	5,533	2,941	38,012
Lower- middle- income	237,004	204,489	101,914	25,947	59,991	4,767	7,600	4,271	32,515	4,056	9,531	1,665	17,263
Upper- middle	45,730	35,121	21,374	1,048	2,565	1,652	6,393	2,088	10,609	2,008	2,201	435	5,965
High- income	8,030	7,152	3,787	1,038	2,103	17	72	135	878	60	394	47	377
AFRICA	**37,298**	**21,054**	**2,997**	**124**	**6,221**	**5,109**	**5,665**	**938**	**16,244**	**1,901**	**661**	**882**	**12,800**
Sub-Saharan Africa	24,900	12,099	2,498	124	1,552	4,242	2,962	720	12,802	1,645	472	680	10,004
Eastern Africa	10,034	4,247	937	7	199	1,680	1,160	265	5,787	591	239	316	4,641
Middle Africa	1,933	462	158	1	33	45	131	95	1,471	347	49	130	944
Southern Africa	5,004	3,971	1,119	114	108	1,895	627	108	1,033	23	26	14	971
Western Africa	5,223	1,571	160	2	368	472	363	206	3,652	618	103	181	2,750
Northern Africa	15,104	10,803	624	-	5,513	1,018	3,383	264	4,301	322	245	241	3,494
ASIA	**377,708**	**307,674**	**173,404**	**31,165**	**67,484**	**9,704**	**15,578**	**10,339**	**70,034**	**9,720**	**15,339**	**3,602**	**41,374**
Eastern Asia-China	6,553	5,625	3,082	835	1,539	33	30	106	928	60	42	34	792
China	165,916	159,705	89,930	25,654	43,709	43	66	303	6,212	238	20	324	5,630
South Central Asia	144,642	105,680	73,490	4,295	9,986	2,441	8,508	6,960	38,962	6,186	6,619	1,363	24,793
South East Asia	41,456	28,283	5,700	375	7,829	7,096	6,127	1,157	13,173	2,703	2,695	859	6,916
Western Asia	19,141	8,381	1,203	6	4,421	91	847	1,813	10,760	533	5,963	1,021	3,242
LATIN AMERICA AND THE CARIBBEAN	**55,694**	**42,947**	**27,303**	**1,184**	**2,792**	**2,065**	**7,177**	**2,425**	**12,747**	**3,041**	**1,658**	**605**	**7,443**
Caribbean	3,618	2,936	2,417	17	59	193	221	29	682	65	68	23	526
Central America	11,366	8,269	5,279	152	740	575	1,184	339	3,097	517	163	50	2,367
South America	40,709	31,742	19,607	1,015	1,993	1,298	5,773	2,057	8,967	2,459	1,427	531	4,550

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea,
the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.7. Percentage distribution of women aged 15-49 at risk for unintended pregnancy by type of contraceptive method use, according to fertility-preference status and region and subregion[*] and economic classification of countries[†], 2003.

	Using modern contraceptive				At risk with unmet need			Spacing			Limiting			
	Total	Using a modern method	Steriliz-ation	Modern revers-ible method	Unmet need	Traditional method	No method	Total	Spacing, using modern revers-ible method	Unmet need	Total	Limiting, using steriliz-ation	Limiting, using modern revers-ible method	Unmet need
Region and subregion														
All developing countries	100%	71%	34%	38%	29%	9%	19%	100%	56%	44%	100%	50%	29%	21%
Developing countries minus China	100%	61%	26%	35%	39%	13%	26%	100%	43%	57%	100%	40%	30%	30%
World Bank economic classification:														
Low- income	100%	57%	29%	28%	43%	11%	32%	100%	35%	65%	100%	45%	24%	31%
Lower- middle- income	100%	82%	37%	46%	18%	7%	10%	100%	74%	26%	100%	54%	32%	14%
Upper- middle	100%	72%	34%	37%	28%	11%	17%	100%	59%	41%	100%	49%	28%	23%
High- income	100%	86%	41%	45%	14%	7%	8%	100%	78%	22%	100%	60%	29%	11%
AFRICA	**100%**	**44%**	**4%**	**41%**	**56%**	**14%**	**42%**	**100%**	**34%**	**66%**	**100%**	**8%**	**48%**	**44%**
Sub-Saharan Africa	100%	37%	4%	33%	63%	16%	47%	100%	30%	70%	100%	11%	38%	51%
Eastern Africa	100%	34%	4%	30%	66%	12%	54%	100%	28%	72%	100%	9%	33%	58%
Middle Africa	100%	19%	2%	17%	81%	37%	44%	100%	17%	83%	100%	8%	16%	76%
Southern Africa	100%	78%	15%	64%	22%	2%	20%	100%	77%	23%	100%	25%	55%	21%
Western Africa	100%	25%	1%	24%	75%	21%	54%	100%	23%	77%	100%	3%	27%	70%
Northern Africa	100%	68%	3%	65%	32%	6%	26%	100%	60%	40%	100%	4%	67%	28%
ASIA	**100%**	**76%**	**38%**	**38%**	**24%**	**8%**	**16%**	**100%**	**62%**	**38%**	**100%**	**54%**	**27%**	**19%**
Eastern Asia-China	100%	79%	39%	40%	21%	3%	18%	100%	66%	34%	100%	60%	26%	14%
China	100%	93%	48%	45%	7%	1%	6%	100%	85%	15%	100%	70%	27%	4%
South Central Asia	100%	62%	40%	22%	38%	11%	27%	100%	31%	69%	100%	54%	19%	27%
South East Asia	100%	66%	8%	58%	34%	14%	20%	100%	64%	36%	100%	15%	54%	32%
Western Asia	100%	42%	5%	38%	58%	37%	21%	100%	39%	61%	100%	6%	37%	56%
LATIN AMERICA AND THE CARIBBEAN	**100%**	**71%**	**35%**	**35%**	**29%**	**11%**	**18%**	**100%**	**56%**	**44%**	**100%**	**51%**	**26%**	**23%**
Caribbean	100%	71%	44%	27%	29%	7%	22%	100%	52%	48%	100%	67%	14%	19%
Central America	100%	64%	33%	32%	36%	7%	28%	100%	46%	54%	100%	48%	25%	27%
South America	100%	73%	35%	37%	27%	13%	15%	100%	60%	40%	100%	51%	27%	22%

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.8. Estimated total annual costs of services for current modern contraceptive users, by type of cost, and average total cost per user, according to region and subregion* and economic classification of countries†, 2003.

	Total costs Dollars in (000s)	Component costs Dollars in (000s)				Average cost per user (2003 dollars)
		Drugs/ Supplies	Labor	Overhead	Other/ Hospitaliz- ation	
Region and subregion						
All developing countries	$ 7,097,505	$ 1,309,309	$ 1,077,642	$ 4,275,896	$ 434,657	$ 14
Developing countries minus China	$ 4,836,529	$ 855,973	$ 626,317	$ 3,111,471	$ 242,769	$ 17
World Bank economic classification:						
Low- income	$ 2,676,186	$ 487,730	$ 372,719	$ 1,652,228	$ 163,510	$ 17
Lower- middle- income	$ 3,444,458	$ 652,499	$ 574,740	$ 1,999,759	$ 217,459	$ 12
Upper- middle	$ 869,006	$ 147,491	$ 109,952	$ 565,956	$ 45,607	$ 19
High- income	$ 107,854	$ 21,589	$ 20,231	$ 57,953	$ 8,081	$ 11
AFRICA	$ **850,616**	$ **134,344**	$ **68,955**	$ **640,922**	$ **6,396**	$ 24
Sub-Saharan Africa	$ 602,685	$ 98,828	$ 48,548	$ 449,979	$ 5,329	$ 26
Eastern Africa	$ 222,426	$ 35,600	$ 17,275	$ 167,550	$ 2,000	$ 27
Middle Africa	$ 30,480	$ 6,166	$ 3,061	$ 20,917	$ 337	$ 22
Southern Africa	$ 178,748	$ 29,033	$ 14,304	$ 133,023	$ 2,387	$ 27
Western Africa	$ 114,383	$ 20,122	$ 9,431	$ 84,488	$ 341	$ 24
Northern Africa	$ 304,579	$ 43,423	$ 24,883	$ 234,943	$ 1,331	$ 21
ASIA	$ **5,217,976**	$ **998,158**	$ **873,972**	$ **2,975,844**	$ **370,003**	$ 13
Eastern Asia-China	$ 85,226	$ 17,299	$ 16,203	$ 45,147	$ 6,577	$ 11
China	$ 2,260,976	$ 453,337	$ 451,326	$ 1,164,425	$ 191,888	$ 10
South Central Asia	$ 1,580,990	$ 316,970	$ 292,058	$ 815,152	$ 156,810	$ 13
South East Asia	$ 1,134,888	$ 179,017	$ 95,089	$ 848,621	$ 12,161	$ 23
Western Asia	$ 155,896	$ 31,535	$ 19,296	$ 102,498	$ 2,566	$ 14
LATIN AMERICA AND THE CARIBBEAN	$ **1,028,912**	$ **176,808**	$ **134,716**	$ **659,130**	$ **58,258**	$ 18
Caribbean	$ 66,087	$ 11,546	$ 9,785	$ 39,598	$ 5,158	$ 17
Central America	$ 185,056	$ 31,687	$ 24,869	$ 117,235	$ 11,264	$ 17
South America	$ 777,769	$ 133,575	$ 100,061	$ 502,297	$ 41,836	$ 18

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.9. Estimated number of unintended pregnancies to current modern contraceptive users, by type of outcome and percentage they represent of all unintended pregnancies, births and abortions; and, estimated number of unintended pregnancies that would occur to the same women if they were not using any contraceptive method, according to region and subregion[*] and economic classification of countries[†], 2003.

Region and subregion	Current unintended pregnancies (000s)	Unintended births Numbers in (000s)			Spon-taneous abortions	Unintended pregnancies to contraceptive users as percentage of:			Pregnancies if using no contraceptive method (000s)
		Mistimed births	Unwanted births	Induced abortions		All unintended pregnancies	All unintended births	All induced abortions	
All developing countries	15,690	2,209	2,818	8,779	1,883	21%	16%	25%	202,965
Developing countries minus China	7,929	1,559	2,040	3,282	1,048	13%	13%	14%	101,084
World Bank economic classification:									
Low- income	3,762	715	940	1,614	492	10%	9%	11%	51,727
Lower- middle- income	9,907	1,065	1,376	6,344	1,123	35%	28%	39%	125,745
Upper- middle	1,834	401	479	707	247	21%	21%	22%	22,043
High- income	187	28	23	115	22	31%	25%	35%	3,449
AFRICA	**1,458**	**421**	**397**	**433**	**207**	**9%**	**10%**	**9%**	**13,065**
Sub-Saharan Africa	1,023	337	225	317	144	8%	8%	7%	8,581
Eastern Africa	362	111	78	124	50	7%	7%	7%	2,966
Middle Africa	92	39	10	30	13	5%	5%	5%	518
Southern Africa	211	64	66	49	31	25%	25%	25%	2,431
Western Africa	259	103	32	88	36	6%	6%	6%	1,724
Northern Africa	535	104	211	142	77	19%	19%	19%	5,425
ASIA	**11,992**	**1,289**	**1,842**	**7,486**	**1,375**	**25%**	**18%**	**29%**	**162,191**
Eastern Asia-China	127	19	11	82	14	16%	16%	16%	2,589
China	7,761	650	778	5,497	835	52%	52%	52%	101,880
South Central Asia	2,217	343	722	854	298	10%	10%	10%	38,255
South East Asia	1,494	208	199	915	173	19%	19%	19%	15,879
Western Asia	393	69	131	138	54	12%	12%	12%	3,588
LATIN AMERICA AND THE CARIBBEAN	**2,239**	**498**	**579**	**860**	**302**	**20%**	**19%**	**20%**	**27,709**
Caribbean	121	28	17	61	15	15%	15%	15%	1,910
Central America	355	81	116	109	50	12%	12%	12%	5,197
South America	1,763	389	447	691	236	23%	23%	23%	20,602

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.10. Estimated annual number of unintended pregnancies averted by current use of modern contraceptive methods, by type of pregnancy outcome and estimated numbers of deaths, children losing their mothers and DALYs averted, according to region and subregion* and economic classification of countries†, 2003.

Region and subregion	Total unintended pregnancies averted	Unintended births	Induced abortions	Miscarriages	Total deaths	Total maternal deaths	From non-abortion causes	From abortion-related causes	Infant (<1) deaths	Orphans	Total DALYs	DALYs - women	DALYS - women non-abortion causes	DALYs women abortion-related	DALYs - infants and children
			Pregnancy outcomes averted Numbers in (000s)			**Deaths** Maternal deaths					**DALYs** Numbers in (000s)				
All developing countries	187,275	59,645	105,183	22,447	2,938,792	214,996	135,521	79,475	2,723,796	684,792	60,153	16,401	9,818	6,583	43,752
Developing countries minus China	93,155	42,325	38,513	12,316	2,297,442	204,504	125,362	79,142	2,092,938	676,465	47,590	13,875	7,968	5,906	33,715
World Bank economic classification:															
Low- income	47,965	21,573	20,070	6,322	1,568,787	162,002	99,019	62,983	1,406,785	552,767	31,130	9,539	4,861	4,679	21,590
Lower- middle- income	115,838	27,479	75,330	13,029	1,038,048	31,491	22,142	9,349	1,006,556	71,095	21,808	5,418	3,780	1,638	16,390
Upper- middle	20,210	9,764	7,721	2,725	327,169	21,278	14,161	7,118	305,891	60,348	6,687	1,329	1,096	233	5,358
High- income	3,262	829	2,061	372	4,788	224	198	26	4,563	583	528	114	80	34	414
AFRICA	**11,606**	**6,605**	**3,345**	**1,656**	**449,161**	**41,072**	**27,392**	**13,680**	**408,089**	**144,258**	**8,908**	**3,464**	**2,071**	**1,393**	**5,444**
Sub-Saharan Africa	7,558	4,218	2,270	1,071	350,505	37,319	25,072	12,248	313,185	130,024	5,909	2,501	1,469	1,033	3,407
Eastern Africa	2,604	1,356	888	360	136,618	19,310	12,387	6,923	117,308	71,845	1,947	900	498	402	1,047
Middle Africa	427	228	139	60	28,464	2,995	1,840	1,156	25,468	10,100	350	162	81	82	187
Southern Africa	2,221	1,375	519	327	72,311	3,961	2,924	1,037	68,349	8,573	1,814	772	515	257	1,042
Western Africa	1,465	763	500	203	71,810	7,965	5,150	2,815	63,845	27,291	1,148	465	250	215	683
Northern Africa	4,890	2,884	1,299	707	139,959	6,841	5,092	1,749	133,118	26,450	3,650	1,165	728	438	2,485
ASIA	**150,199**	**40,761**	**92,078**	**17,360**	**2,074,369**	**146,490**	**89,210**	**57,280**	**1,927,879**	**460,712**	**42,757**	**11,139**	**6,285**	**4,854**	**31,618**
Eastern Asia-China	2,462	591	1,593	278	4,849	146	139	8	4,703	474	465	103	67	36	362
China	94,120	17,320	66,669	10,131	641,350	10,492	10,159	333	630,858	8,327	12,563	2,526	1,849	677	10,037
South Central Asia	36,038	17,311	13,877	4,850	1,199,252	118,510	71,593	46,916	1,080,743	404,395	24,717	6,770	3,578	3,193	17,947
South East Asia	14,384	3,908	8,813	1,663	165,594	15,036	6,033	9,003	150,558	41,932	3,958	1,467	606	861	2,491
Western Asia	3,195	1,631	1,125	439	63,324	2,306	1,287	1,019	61,018	5,584	1,054	273	185	87	782
LATIN AMERICA AND THE CARIBBEAN	**25,470**	**12,279**	**9,759**	**3,432**	**415,262**	**27,434**	**18,918**	**8,516**	**387,828**	**79,822**	**8,487**	**1,798**	**1,461**	**336**	**6,690**
Caribbean	1,789	668	898	223	15,170	1,055	702	352	14,116	3,718	307	70	56	14	237
Central America	4,842	2,679	1,479	684	79,411	3,130	2,403	726	76,282	11,248	1,900	412	329	83	1,488
South America	18,838	8,931	7,382	2,525	320,680	23,249	15,812	7,437	297,430	64,857	6,281	1,316	1,077	239	4,964

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.11. Estimated number of women with unmet need (using no method or a traditional method) and the percentage they represent of all women aged 15-49; distribution of women with unmet need by region and subregion and economic classification of their country; and distributions of women with unmet need by fertility-preference status, union status and method use, according to region and subregion[*] and economic classification of countries[†], 2003.

Region and subregion	Women with unmet need			Fertility-preference status			Union Status			Method use	
	Total (000s)	% of all women aged 15-49	Distribution‡	Total	Spacing	Limiting	Currently in union	Formerly married	Never married	Using traditional method	Using no method
All developing countries	200,941	15%	100%	100%	51%	49%	88%	2%	9%	32%	68%
Developing countries minus China	183,910	19%	92%	100%	50%	50%	90%	1%	7%	33%	67%
World Bank economic classification:											
Low- income	119,508	20%	59%	100%	54%	46%	91%	1%	7%	26%	74%
Lower- middle- income	61,123	11%	30%	100%	47%	53%	83%	2%	14%	40%	60%
Upper- middle	18,612	16%	9%	100%	43%	57%	88%	2%	9%	40%	60%
High- income	1,697	8%	1%	100%	48%	52%	72%	3%	23%	45%	55%
AFRICA	**44,642**	**22%**	**22%**	**100%**	**64%**	**36%**	**84%**	**2%**	**13%**	**25%**	**75%**
Sub-Saharan Africa	39,084	24%	19%	100%	67%	33%	83%	2%	13%	26%	74%
Eastern Africa	15,666	25%	8%	100%	63%	37%	88%	2%	9%	18%	82%
Middle Africa	6,149	27%	3%	100%	76%	24%	78%	2%	17%	46%	54%
Southern Africa	1,850	13%	1%	100%	44%	56%	58%	6%	36%	9%	91%
Western Africa	14,044	25%	7%	100%	74%	26%	83%	1%	15%	28%	72%
Northern Africa	6,932	14%	3%	100%	38%	62%	91%	1%	7%	19%	81%
ASIA	**132,819**	**14%**	**66%**	**100%**	**47%**	**53%**	**90%**	**1%**	**8%**	**33%**	**67%**
Eastern Asia-China	2,145	11%	1%	100%	57%	43%	78%	2%	18%	13%	87%
China	17,031	5%	8%	100%	64%	36%	63%	3%	31%	15%	85%
South Central Asia	72,887	19%	36%	100%	47%	53%	95%	1%	3%	28%	72%
South East Asia	25,337	17%	13%	100%	48%	52%	89%	2%	9%	42%	58%
Western Asia	15,420	30%	8%	100%	30%	70%	95%	1%	4%	64%	36%
LATIN AMERICA AND THE CARIBBEAN	**23,480**	**16%**	**12%**	**100%**	**46%**	**54%**	**87%**	**3%**	**10%**	**38%**	**62%**
Caribbean	1,600	16%	1%	100%	57%	43%	89%	2%	8%	24%	76%
Central America	5,938	16%	3%	100%	48%	52%	98%	1%	1%	21%	79%
South America	15,941	16%	8%	100%	44%	56%	83%	3%	13%	46%	54%

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.
‡ Distribution by region and subregion and economic classification of countries.

Table 3.12. Estimated annual pregnancies to women with unmet need, by fertilty-preference status and by pregnancy outcome, according to region and subregion* and economic classification of countries†, 2003.

Region and subregion	TOTAL (000s)	Fertility-preference status Numbers in (000s)		Method use Numbers in (000s)					Pregnancy outcome Numbers in (000s)		
		Spacing	Limiting	Using traditional method	Using no method	Total	Using traditional method	Using no method	Births	Abortions	Miscarriages
All developing countries	60,231	32,018	28,213	10,424	49,808	100%	17%	83%	26,327	26,036	7,869
Developing countries minus China	53,028	27,530	25,498	9,893	43,135	100%	19%	81%	25,003	20,931	7,094
World Bank economic classification:											
Low- income	34,577	19,351	15,226	4,934	29,643	100%	14%	86%	16,383	13,562	4,633
Lower- middle- income	18,468	9,392	9,077	3,865	14,603	100%	21%	79%	6,422	9,783	2,263
Upper- middle	6,764	3,047	3,717	1,520	5,244	100%	22%	78%	3,359	2,484	920
High- income	422	228	194	104	318	100%	25%	75%	155	214	53
AFRICA	**14,323**	**9,016**	**5,307**	**1,998**	**12,324**	**100%**	**14%**	**86%**	**7,711**	**4,609**	**2,003**
Sub-Saharan Africa	12,489	8,317	4,172	1,820	10,669	100%	15%	85%	6,626	4,125	1,738
Eastern Africa	5,207	3,303	1,904	498	4,708	100%	10%	90%	2,711	1,776	720
Middle Africa	1,754	1,311	443	527	1,227	100%	30%	70%	939	570	245
Southern Africa	646	279	366	28	617	100%	4%	96%	400	151	95
Western Africa	4,428	3,253	1,175	723	3,705	100%	16%	84%	2,304	1,512	612
Northern Africa	2,288	869	1,419	222	2,066	100%	10%	90%	1,349	608	331
ASIA	**36,749**	**18,711**	**18,038**	**6,328**	**30,421**	**100%**	**17%**	**83%**	**14,155**	**17,966**	**4,628**
Eastern Asia-China	646	368	278	43	603	100%	7%	93%	155	418	73
China	7,204	4,489	2,715	531	6,673	100%	7%	93%	1,326	5,103	775
South Central Asia	19,596	9,683	9,913	2,947	16,649	100%	15%	85%	9,413	7,546	2,637
South East Asia	6,289	3,139	3,150	1,557	4,732	100%	25%	75%	1,725	3,835	729
Western Asia	3,014	1,032	1,982	1,249	1,765	100%	41%	59%	1,538	1,062	414
LATIN AMERICA AND THE CARIBBEAN	**9,160**	**4,291**	**4,868**	**2,097**	**7,062**	**100%**	**23%**	**77%**	**4,487**	**3,432**	**1,241**
Caribbean	677	386	291	83	594	100%	12%	88%	253	339	84
Central America	2,591	1,260	1,331	299	2,292	100%	12%	88%	1,434	791	366
South America	5,892	2,646	3,246	1,715	4,176	100%	29%	71%	2,793	2,309	790

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification

Table 3.13. Estimated annual maternal and infant deaths from unintended pregnancies to women with unmet need, numbers of children who lose their mothers through these deaths and the numbers of DALYs lost from these unintended pregnancies, according to region and subregion* and economic classification of countries †, 2003.

| | Total deaths | Maternal deaths | | | Infant deaths (<age 1) | Orphans | DALYs | | | | |
| | | Total maternal deaths | Non-abortion causes | Abortion-related | | | Numbers in 000s | | | | |
							Total DALYs	DALYS - Women	DALYS - Women non-abortion causes	DALYs - Women abortion-related	DALYs - Infants and children
Region and subregion											
All developing countries	1,776,456	166,144	103,605	62,540	1,610,312	578,028	31,528	10,250	5,783	4,467	21,278
Developing countries minus China	1,727,412	165,341	102,827	62,514	1,562,071	577,676	30,566	10,057	5,642	4,415	20,510
World Bank economic classification:											
Low- income	1,423,263	148,048	92,891	55,157	1,275,214	523,548	23,750	8,227	4,336	3,891	15,523
Lower- middle- income	251,522	12,277	7,136	5,141	239,245	37,928	5,406	1,536	1,050	486	3,870
Upper- middle	100,374	5,775	3,552	2,223	94,599	16,461	2,297	469	384	85	1,828
High- income	1,297	44	26	18	1,253	91	74	18	14	4	56
AFRICA	**730,426**	**78,805**	**50,389**	**28,416**	**651,621**	**310,317**	**11,044**	**4,663**	**2,574**	**2,089**	**6,381**
Sub-Saharan Africa	685,498	76,886	49,110	27,776	608,612	301,778	9,720	4,250	2,301	1,949	5,470
Eastern Africa	296,092	36,858	22,815	14,043	259,234	148,836	3,936	1,836	993	843	2,099
Middle Africa	118,529	12,504	7,751	4,753	106,025	46,353	1,451	685	334	351	766
Southern Africa	21,745	1,183	881	302	20,562	3,122	529	226	150	76	303
Western Africa	226,843	24,675	16,168	8,507	202,168	96,093	3,454	1,394	757	637	2,060
Northern Africa	67,216	3,585	2,775	811	63,631	15,913	1,675	522	341	182	1,153
ASIA	**897,025**	**77,798**	**46,633**	**31,164**	**819,228**	**238,869**	**17,310**	**4,869**	**2,634**	**2,235**	**12,441**
Eastern Asia-China	5,913	98	96	2	5,815	285	196	49	28	20	147
China	49,044	803	778	26	48,241	351	962	193	142	52	768
South Central Asia	697,421	66,970	40,794	26,177	630,451	208,485	13,302	3,751	2,001	1,750	9,551
South East Asia	80,152	7,048	2,967	4,081	73,105	22,495	1,721	562	260	301	1,159
Western Asia	64,495	2,879	1,999	879	61,616	7,253	1,130	315	203	112	815
LATIN AMERICA AND THE CARIBBEAN	**149,005**	**9,542**	**6,582**	**2,960**	**139,463**	**28,842**	**3,173**	**717**	**575**	**142**	**2,456**
Caribbean	10,306	972	706	266	9,334	3,291	155	45	34	11	111
Central America	44,032	1,752	1,363	389	42,280	6,953	1,020	224	179	45	796
South America	94,667	6,818	4,513	2,305	87,849	18,598	1,998	449	363	86	1,549

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.14. Estimated numbers of new users if all women with unmet need used contraceptives, by method, according to region and subregion* and economic classification of countries†, 2003.

	New contraceptive users if all women with unmet need were served						
	Number in (000s)						
Region and subregion	Total	Female Sterilization	Vasectomy	IUD	Injectable/ Implant	Oral Contra-ceptives	Condom and other supply methods
All developing countries	200,941	42,006	2,697	42,538	22,996	47,776	42,926
Developing countries minus China	183,911	39,045	1,863	35,434	22,876	45,734	38,956
World Bank economic classification:							
Low- income	119,509	26,931	1,412	15,671	16,905	29,670	28,917
Lower- middle- income	61,123	9,477	1,020	23,131	4,352	12,199	10,944
Upper- middle	18,612	5,413	244	3,018	1,711	5,671	2,555
High- income	1,697	184	21	719	28	235	510
AFRICA	**44,642**	**2,693**	**51**	**5,015**	**11,726**	**15,866**	**9,291**
Sub-Saharan Africa	39,085	2,443	51	2,858	11,411	13,413	8,908
Eastern Africa	15,666	1,182	10	492	6,502	5,431	2,049
Middle Africa	6,149	508	6	180	508	2,043	2,905
Southern Africa	1,850	307	31	51	940	397	125
Western Africa	14,045	391	5	1,559	3,375	4,962	3,755
Northern Africa	6,932	306	-	2,734	402	3,034	457
ASIA	**132,411**	**32,070**	**2,335**	**34,368**	**8,192**	**24,722**	**30,721**
Eastern Asia-China	2,145	399	18	460	111	244	913
China	17,031	2,961	834	7,104	120	2,041	3,970
South Central Asia	72,887	23,380	1,350	13,037	2,691	13,473	18,955
South East Asia	25,337	3,809	128	6,147	5,241	7,424	2,587
Western Asia	15,420	1,574	7	7,683	161	1,661	4,332
LATIN AMERICA AND THE CARIBBEAN	**23,480**	**7,189**	**309**	**3,091**	**2,946**	**7,066**	**2,878**
Caribbean	1,600	344	10	89	426	508	222
Central America	5,938	1,956	62	944	894	1,622	460
South America	15,941	4,889	236	2,058	1,625	4,936	2,197

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification

Table 3.15. Estimated total annual costs to provide contraceptive services to women currently with unmet need, by type of cost and women's fertility-preference status, and average total cost per user, according to region and subregion* and economic classification of countries†, 2003.

Region and subregion	Cost to provide contraceptives to women with unmet need	Component Costs Dollars in (000s)				Fertility-preference status		Average cost per user (2003 dollars)
		Drugs / Supplies	Labor	Overhead	Other/ Hospitalization	Spacing	Limiting	
All developing countries	$ 3,868,296	$ 695,910	$ 412,784	$ 2,669,973	$ 89,630	$ 2,297,826	$ 1,570,471	$ 19
Developing countries minus China	$ 3,637,000	$ 648,884	$ 381,377	$ 2,523,428	$ 83,312	$ 2,124,765	$ 1,512,235	$ 20
World Bank economic classification:								
Low- income	$ 2,424,519	$ 443,127	$ 255,735	$ 1,668,192	$ 57,465	$ 1,514,350	$ 910,168	$ 20
Lower- middle- income	$ 1,042,041	$ 184,869	$ 113,727	$ 723,223	$ 20,222	$ 556,242	$ 485,799	$ 17
Upper- middle	$ 376,717	$ 62,793	$ 40,291	$ 262,083	$ 11,550	$ 213,368	$ 163,349	$ 20
High- income	$ 25,019	$ 5,120	$ 3,031	$ 16,474	$ 393	$ 13,865	$ 11,154	$ 15
AFRICA	$ 1,152,194	$ 189,939	$ 90,902	$ 865,609	$ 5,745	$ 764,501	$ 387,693	$ 26
Sub-Saharan Africa	$ 1,024,719	$ 171,959	$ 80,957	$ 766,588	$ 5,214	$ 713,454	$ 311,265	$ 26
Eastern Africa	$ 447,678	$ 71,248	$ 33,014	$ 340,894	$ 2,522	$ 295,972	$ 151,706	$ 29
Middle Africa	$ 138,135	$ 27,294	$ 13,208	$ 96,550	$ 1,083	$ 108,294	$ 29,841	$ 22
Southern Africa	$ 49,255	$ 8,048	$ 3,993	$ 36,559	$ 654	$ 24,810	$ 24,444	$ 27
Western Africa	$ 358,749	$ 61,043	$ 28,330	$ 268,542	$ 834	$ 271,788	$ 86,960	$ 26
Northern Africa	$ 158,379	$ 22,306	$ 12,357	$ 123,063	$ 652	$ 63,637	$ 94,741	$ 23
ASIA	$ 2,217,299	$ 423,372	$ 269,380	$ 1,456,117	$ 68,430	$ 1,240,554	$ 976,745	$ 17
Eastern Asia-China	$ 33,188	$ 7,650	$ 4,362	$ 20,324	$ 852	$ 20,549	$ 12,639	$ 15
China	$ 231,296	$ 47,026	$ 31,407	$ 146,545	$ 6,318	$ 173,060	$ 58,236	$ 14
South Central Asia	$ 1,186,551	$ 236,976	$ 158,038	$ 741,648	$ 49,888	$ 674,801	$ 511,749	$ 16
South East Asia	$ 565,333	$ 89,866	$ 50,085	$ 417,254	$ 8,128	$ 307,686	$ 257,647	$ 22
Western Asia	$ 211,122	$ 43,461	$ 26,319	$ 137,984	$ 3,359	$ 69,800	$ 141,322	$ 14
LATIN AMERICA AND THE CARIBBEAN	$ 488,612	$ 80,992	$ 51,672	$ 340,609	$ 15,340	$ 287,428	$ 201,184	$ 21
Caribbean	$ 39,190	$ 6,437	$ 3,512	$ 28,507	$ 734	$ 26,014	$ 13,176	$ 24
Central America	$ 121,049	$ 19,694	$ 12,981	$ 84,200	$ 4,174	$ 74,827	$ 46,222	$ 20
South America	$ 328,372	$ 54,861	$ 35,179	$ 227,901	$ 10,431	$ 186,586	$ 141,786	$ 21

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification

Table 3.16. Estimated total annual costs to provide contraceptive services to women currently with unmet need, by type of method, according to region and subregion[*] and economic classification of countries[†], 2003.

Region and subregion	Total costs	Female Sterilization	Vasectomy	IUD	Injectable/ Implant	Oral Contra-ceptives	Condom and other supply methods
				Dollars in (000s)			
All developing countries	$ 3,868,296	$ 384,456	$ 16,539	$ 386,675	$ 720,103	$ 1,759,910	$ 600,612
Developing countries minus China	$ 3,637,000	$ 357,355	$ 11,424	$ 322,100	$ 716,343	$ 1,684,712	$ 545,066
World Bank economic classification:							
Low- income	$ 2,424,519	$ 246,487	$ 8,660	$ 142,447	$ 529,369	$ 1,092,949	$ 404,607
Lower- middle- income	$ 1,042,041	$ 86,739	$ 6,255	$ 210,261	$ 136,272	$ 449,389	$ 153,125
Upper- middle	$ 376,717	$ 49,543	$ 1,496	$ 27,433	$ 53,582	$ 208,915	$ 35,749
High- income	$ 25,019	$ 1,687	$ 128	$ 6,535	$ 881	$ 8,657	$ 7,132
AFRICA	$ 1,152,194	$ 24,643	$ 314	$ 45,590	$ 367,187	$ 584,463	$ 129,997
Sub-Saharan Africa	$ 1,024,719	$ 22,364	$ 314	$ 25,977	$ 357,335	$ 494,088	$ 124,641
Eastern Africa	$ 447,678	$ 10,817	$ 61	$ 4,474	$ 203,594	$ 200,059	$ 28,672
Middle Africa	$ 138,135	$ 4,646	$ 35	$ 1,633	$ 15,909	$ 75,261	$ 40,651
Southern Africa	$ 49,255	$ 2,806	$ 190	$ 463	$ 29,422	$ 14,628	$ 1,745
Western Africa	$ 358,749	$ 3,577	$ 28	$ 14,169	$ 105,673	$ 182,767	$ 52,536
Northern Africa	$ 158,379	$ 2,798	$ -	$ 24,851	$ 12,589	$ 111,747	$ 6,393
ASIA	$ 2,217,299	$ 293,524	$ 14,319	$ 312,405	$ 256,530	$ 910,672	$ 429,849
Eastern Asia-China	$ 33,188	$ 3,655	$ 108	$ 4,182	$ 3,484	$ 8,984	$ 12,774
China	$ 231,296	$ 27,101	$ 5,115	$ 64,575	$ 3,760	$ 75,198	$ 55,547
South Central Asia	$ 1,186,551	$ 213,988	$ 8,277	$ 118,504	$ 84,273	$ 496,300	$ 265,209
South East Asia	$ 565,333	$ 34,865	$ 785	$ 55,881	$ 164,118	$ 273,486	$ 36,198
Western Asia	$ 211,122	$ 14,406	$ 46	$ 69,842	$ 5,032	$ 61,182	$ 60,613
LATIN AMERICA AND THE CARIBBEAN	$ 488,612	$ 65,797	$ 1,893	$ 28,100	$ 92,249	$ 260,299	$ 40,275
Caribbean	$ 39,190	$ 3,150	$ 61	$ 812	$ 13,354	$ 18,710	$ 3,103
Central America	$ 121,049	$ 17,904	$ 383	$ 8,580	$ 28,003	$ 59,746	$ 6,433
South America	$ 328,372	$ 44,743	$ 1,448	$ 18,708	$ 50,892	$ 181,842	$ 30,738

[*] Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
[†] See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.17. Estimated annual unintended pregnancies to women currently with unmet need, the number estimated to occur if they all used modern contraceptive methods and the number that would be averted if all used modern contraceptive methods, according to region and subregion[*] and economic classification of countries[†], 2003.

Region and subregion	Current unintended pregnancies to women with unmet need			Unintended pregnancies if all used modern contraceptive methods			Unintended pregnancies that would be averted if women with unmet need all used modern contraceptive methods		
	\(Numbers in 000s\)								
	Total	Spacing	Limiting	Total	Spacing	Limiting	Total	Spacing	Limiting
All developing countries	60,231	32,018	28,213	8,441	5,819	2,622	51,790	26,199	25,591
Developing countries minus China	53,028	27,530	25,498	7,438	5,044	2,394	45,590	22,486	23,104
World Bank economic classification:									
Low- income	34,577	19,351	15,226	4,877	3,600	1,277	29,700	15,752	13,949
Lower- middle- income	18,468	9,392	9,077	2,617	1,617	1,000	15,851	7,775	8,077
Upper- middle	6,764	3,047	3,717	878	559	319	5,886	2,488	3,398
High- income	422	228	194	69	43	26	353	185	168
AFRICA	**14,323**	**9,016**	**5,307**	**2,244**	**1,646**	**598**	**12,079**	**7,369**	**4,709**
Sub-Saharan Africa	12,489	8,317	4,172	2,009	1,541	468	10,480	6,776	3,703
Eastern Africa	5,207	3,303	1,904	714	507	207	4,493	2,796	1,697
Middle Africa	1,754	1,311	443	409	348	60	1,346	963	383
Southern Africa	646	279	366	64	36	28	582	244	338
Western Africa	4,428	3,253	1,175	768	626	142	3,660	2,628	1,032
Northern Africa	2,288	869	1,419	290	130	160	1,998	740	1,258
ASIA	**36,749**	**18,711**	**18,038**	**5,043**	**3,405**	**1,638**	**31,706**	**15,306**	**16,399**
Eastern Asia-China	646	368	278	97	71	26	549	297	252
China	7,204	4,489	2,715	1,004	776	228	6,200	3,713	2,487
South Central Asia	19,596	9,683	9,913	2,553	1,845	708	17,044	7,838	9,205
South East Asia	6,289	3,139	3,150	843	502	340	5,446	2,636	2,810
Western Asia	3,014	1,032	1,982	547	211	336	2,467	821	1,646
LATIN AMERICA AND THE CARIBBEAN	**9,160**	**4,291**	**4,868**	**1,154**	**768**	**386**	**8,005**	**3,523**	**4,482**
Caribbean	677	386	291	88	70	19	588	316	272
Central America	2,591	1,260	1,331	256	176	80	2,336	1,084	1,251
South America	5,892	2,646	3,246	810	523	288	5,082	2,123	2,959

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
†See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.18. Estimated number of unintended pregnancies that would be averted if women with unmet need all used modern contraceptive methods, by outcome and fertilty-preference status, according to region and subregion* and economic classifciation of countries†, 2003.

Region and subregion	Total unintended pregnancies averted	Pregnancies averted to all women with unmet need			Pregnancies averted to women trying to space future births			Pregnancies averted to women trying to limit future births		
		Unintended births	Induced abortions	Miscarriages	Unintended births	Induced abortions	Miscarriages	Unintended births	Induced abortions	Miscarriages
		Numbers in 000s								
All developing countries	51,790	22,637	22,387	6,766	11,312	11,477	3,410	11,325	10,910	3,356
Developing countries minus China	45,590	21,496	17,995	6,099	10,629	8,847	3,010	10,868	9,148	3,088
World Bank economic classification:										
Low- income	29,700	14,072	11,649	3,979	7,534	6,101	2,117	6,538	5,548	1,862
Lower- middle- income	15,851	5,512	8,397	1,942	2,481	4,362	932	3,031	4,035	1,010
Upper- middle	5,886	2,923	2,162	801	1,236	913	339	1,687	1,249	462
High- income	353	130	179	44	61	102	22	69	77	22
AFRICA	**12,079**	**6,503**	**3,886**	**1,689**	**3,925**	**2,417**	**1,027**	**2,578**	**1,469**	**662**
Sub-Saharan Africa	10,480	5,560	3,462	1,458	3,576	2,260	941	1,984	1,202	517
Eastern Africa	4,493	2,339	1,533	621	1,456	954	387	884	579	235
Middle Africa	1,346	720	437	188	515	313	134	205	124	53
Southern Africa	582	360	136	86	151	57	36	209	79	50
Western Africa	3,660	1,905	1,249	506	1,367	897	363	537	352	143
Northern Africa	1,998	1,178	531	289	436	196	107	742	334	182
ASIA	**31,706**	**12,213**	**15,500**	**3,993**	**5,662**	**7,738**	**1,906**	**6,551**	**7,762**	**2,086**
Eastern Asia-China	549	132	355	62	71	192	33	60	163	28
China	6,200	1,141	4,392	667	683	2,630	400	458	1,762	268
South Central Asia	17,044	8,187	6,563	2,294	3,765	3,018	1,055	4,422	3,545	1,239
South East Asia	5,446	1,494	3,321	631	723	1,608	305	771	1,713	326
Oceania Micronesia		105	36	25	50	17	12	55	19	13
Western Asia	2,467	1,259	869	339	419	289	113	840	580	226
LATIN AMERICA AND THE CARIBBEAN	**8,005**	**3,921**	**3,000**	**1,084**	**1,724**	**1,322**	**477**	**2,197**	**1,678**	**607**
Caribbean	588	220	295	73	118	159	39	102	137	34
Central America	2,336	1,292	713	330	600	331	153	692	382	177
South America	5,082	2,409	1,991	681	1,007	832	285	1,403	1,159	396

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Table 3.19. Estimated maternal and infant deaths that would be averted if women with unmet need all used modern contraceptive methods; distribution of deaths that would be averted; children who would not lose their mothers; and, maternal and infant DALYs that would be averted and their distribution, according to region and subregion[*] and economic classification of countries[†], 2003.

	Deaths averted if women with unmet need all used modern contraceptive methods							DALYs averted if women with unmet need all used modern contraceptive methods				
								Numbers in 000s				
Region and subregion	Total	Total maternal deaths	Non-abortion causes	Abortion-related	Infant deaths (<age 1)	Children who would not become orphans	Distribution of deaths averted	Total DALYs averted	Non abortion related maternal DALYs	Abortion-related DALYs	Perinatal DALYs	Distribution of DALYs averted
All developing countries	1,518,940	142,001	88,606	53,396	1,376,938	505,436	100%	27,089	4,954	3,820	18,315	100%
Developing countries minus China	1,476,723	141,310	87,936	53,374	1,335,413	505,119	97%	26,261	4,832	3,776	17,654	97%
World Bank economic classification:												
Low- income	1,214,720	126,405	79,326	47,079	1,088,314	457,400	80%	20,361	3,700	3,321	13,340	75%
Lower- middle- income	215,809	10,559	6,169	4,390	205,250	33,198	14%	4,664	909	422	3,333	17%
Upper- middle	87,328	4,991	3,080	1,912	82,337	14,762	6%	2,002	334	73	1,595	7%
High- income	1,073	37	22	15	1,037	76	0%	62	11	3	47	0%
AFRICA	**612,432**	**66,029**	**42,251**	**23,777**	**546,404**	**265,695**	**40%**	**9,307**	**2,171**	**1,754**	**5,382**	**34%**
Sub-Saharan Africa	573,291	64,370	41,150	23,220	508,921	258,256	38%	8,151	1,933	1,631	4,588	30%
Eastern Africa	255,665	31,810	19,689	12,121	223,855	130,066	17%	3,396	857	728	1,811	13%
Middle Africa	90,969	9,599	5,953	3,646	81,370	37,360	6%	1,114	256	270	587	4%
Southern Africa	19,511	1,062	790	272	18,449	2,836	1%	477	135	69	273	2%
Western Africa	187,577	20,436	13,404	7,031	167,141	81,449	12%	2,856	625	528	1,704	11%
Northern Africa	58,710	3,121	2,414	708	55,588	13,984	4%	1,464	297	160	1,007	5%
ASIA	**770,793**	**67,407**	**40,390**	**27,017**	**703,386**	**213,791**	**51%**	**15,003**	**2,279**	**1,941**	**10,783**	**55%**
Eastern Asia-China	5,026	83	81	2	4,943	249	0%	166	24	17	125	1%
China	42,217	691	669	22	41,525	317	3%	828	122	45	661	3%
South Central Asia	606,431	58,374	35,606	22,767	548,058	187,290	40%	11,588	1,740	1,525	8,323	43%
South East Asia	69,363	6,116	2,578	3,538	63,247	19,803	5%	1,490	226	262	1,003	6%
Western Asia	53,101	2,394	1,676	718	50,706	6,133	3%	931	167	93	671	3%
LATIN AMERICA AND THE CARIBBEAN	**130,370**	**8,315**	**5,743**	**2,571**	**122,055**	**25,950**	**9%**	**2,779**	**504**	**125**	**2,150**	**10%**
Caribbean	9,025	853	620	233	8,172	2,963	1%	135	29	10	96	1%
Central America	39,679	1,578	1,228	350	38,100	6,370	3%	919	161	40	718	3%
South America	81,667	5,884	3,896	1,988	75,783	16,616	5%	1,724	313	75	1,336	6%

* Sub-Saharan Africa includes: Eastern Africa, Middle Africa, Southern Africa, Western Africa and Sudan from Northern Africa; Eastern Asia-China includes the Democratic People's Republic of Korea, the Republic of Korea, and Mongolia; see Appendix Table 3.1a for a listing of countries by region and subregion.
† See appendix table 3.1b for the a listing of countries by economic classification.

Appendix Table 4.1. Interventions: information and services[262]

Contraceptive information, counseling and services:	STI/HIV Services:	Pregnancy-related Services:

• Information & education (sex education in schools, media campaigns, etc.)
• Counseling (communication skills, self-efficacy skills)
• Services and supplies as relevant for each method (visit to medical provider, community based distribution, family planning home visitor, etc.)
• Postabortion services (medical treatment, contraceptive counseling)
	• Prevention (information and education; behavior change programs, including ABC (Abstinence/Be Faithful/Condom use); screening; condom provision
	• STI testing & treatment; HIV testing and treatment;
	• Gynecologic/urologic services:
	  • checkups,
	  • pap test,
	  • mammogram,
	  • prostate exam;
	  • medical treatment (vaginal infections, genito-urinary tract infections,
	  • pelvic inflammatory disease
	  • fibroids;
	  • cervical and prostate cancer)
		• Prevention and treatment (preconception counseling, antenatal care, delivery care for normal delivery and C-section)
		• preexisting conditions and interactions
		• postpartum care
		• safe abortion services
		• postabortion care
		• treatment for short and longer term complications resulting from pregnancy

Appendix Table 4.2. Examples of medical benefits of sexual and reproductive health services[263]

Contraceptive services	STI-related services and gynecologic and urologic care	Maternal health services
Help space births, resulting in	**Prevention and treatment of STIs, including HIV,**	**Prenatal care provides**
• lower rates of infant and child mortality; • decreased risk of anemia for mothers; and • more time to breastfeed, improving infant health and survival.	• save lives and prevents ill-health; • increase productive life-span; • reduce transmission among sexual partners and from mothers to infants; and • lowers infertility.	• education and counseling on healthy behaviors, diet and nutrition; • opportunity for prompt intervention in case of complications; and • opportunity for management of ongoing conditions such as hypertension, anemia, malaria, hepatitis, tuberculosis and cardiovascular disease.
Prevent high-risk pregnancies among	**Prevention and treatment of gonorrhea reduces**	**Obstetric care reduces probability and severity of**
• very young adolescents; • women in their late 30s and 40s; • women who have had many births; and • women with preexisting medical conditions.	• septicemia, arthritis and endocarditis in men; • pelvic inflammatory disease and infertility among women; and • eye infections and blindness among infants.	• hemorrhage • infection • obstetric fistula • urinary or fecal incontinence • pelvic inflammatory disease
Prevent unsafe abortion resulting from unwanted pregnancies, thereby reducing	**Prevention and treatment of human papillomvirus reduce prevalence of genital warts and cervical cancer.**	**Postpartum visits help**
• maternal deaths; • ill-health; and • infertility.	• Gynecologic and urologic care can prevent and reduce ill-health and death from • cervical, breast and prostate cancer; • endometriosis; • fibroids and ovarian tumors • reproductive tract infections; and • sexual dysfunction.	• reduce infection; • increase breastfeeding; and • improve nutrition. Care for complications of unsafe abortion reduces mortality and severity of subsequent ill-health, and promotes subsequent contraceptive use.

Appendix Table 4.3. Examples of nonmedical benefits of contraceptive services[264]

Individual	Family/Household	Community/society
Greater satisfaction with life	Improved living conditions through less crowding	Higher productivity and better incomes
Less worry over unplanned pregnancy	Increased ability of women to care for families	Less societal burden to care for neglected children
Greater self-esteem and efficacy for women	Stronger, more stable marital relationships	Decreased inequality between men and women
More decision making power for women	Promotion of joint household decision making	Rapid economic growth during the "demographic window"
More time with children	Less discrimination against female children	Higher savings and investment
Greater educational and employment opportunities for girls and women	More attention and parental care to each child	Improved productivity
Improved social status for women	Increased household income	Reduced public expenditures in education, health care and other social services
Increased opportunity to join social and civic organizations	Higher health, nutrition and education expenditures per child	
Greater financial security for women	Fewer orphaned children	
Higher productivity and income		

B. Examples of nonmedical benefits of STI/HIV and related services and other gynecologic and urologic care

Individual	Family/household	Community/society
Prevention of infertility and sterility	Better support to families by healthy parents	Fewer families in need of subsidies
Stronger, more stable sexual relationships	Fewer orphaned children	Higher productivity and investment
Reduced stigma surrounding HIV/AIDS and infertility	Greater household income and savings	Reduced public expenditures through prevention rather than treatment of STIs
Greater ability for infected persons to work and earn an income		

C. Examples of nonmedical benefits of maternal health services

Individual	Family/household	Community/societal
Reduction in postpartum depression and puerperal psychosis	More time for mothers to care for children	Lower maternal mortality
Reduction in stigma related to infertility, abortion and obstetric fistula	Fewer maternal deaths and fewer children orphaned	Lower costs of caring for maternal health complications
Increased productivity and income	Higher household income and savings	Higher productivity and investment
Reduction in violence against women	More intact families	Increased rate of economic growth
Reduction in emotional stress for men (husbands, fathers)		

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